



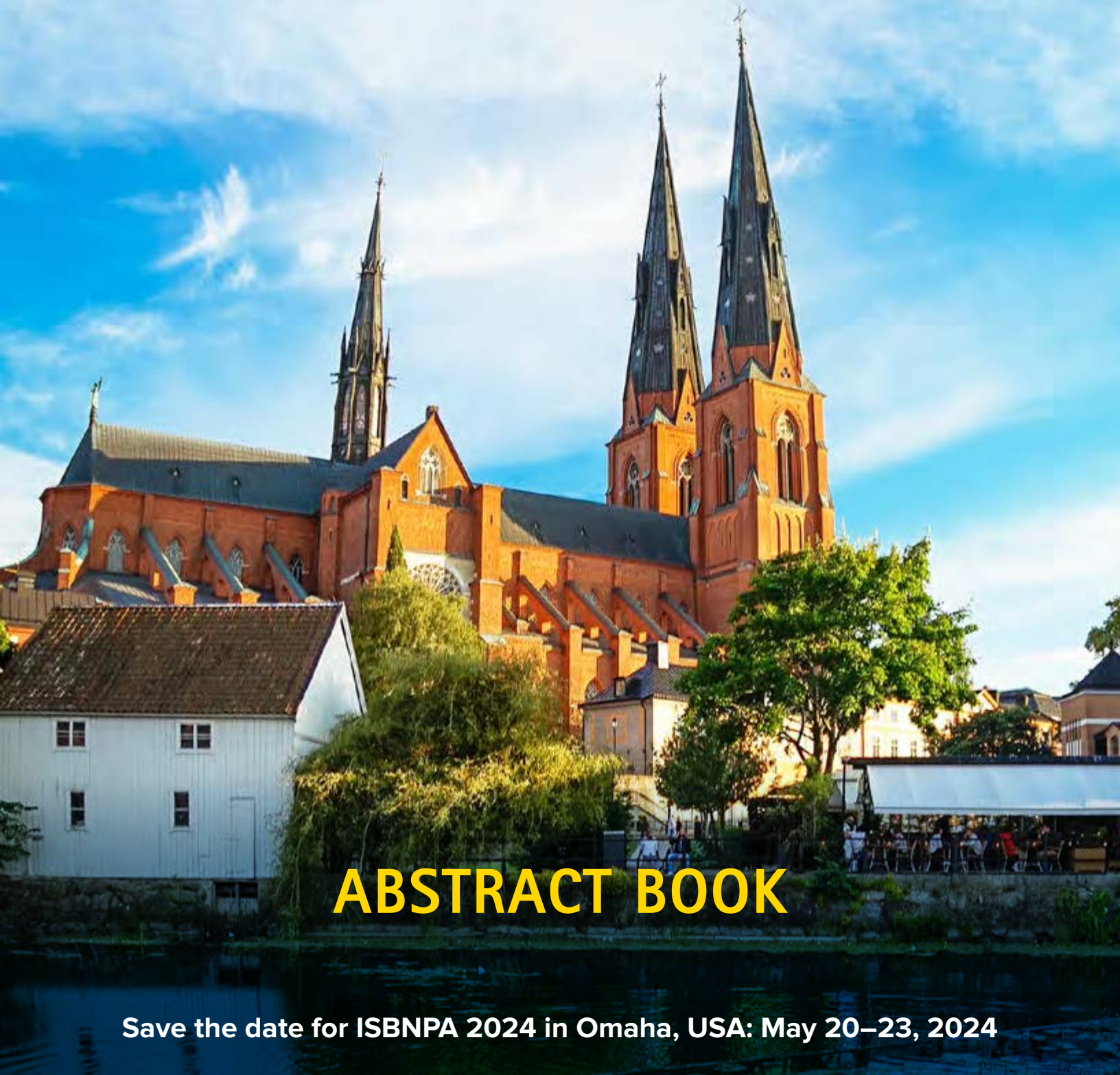
# ISBNPA

Advancing Behavior Change Science

SWEDEN UPPSALA



14-17 June  
**2023**  
5053



## ABSTRACT BOOK

Save the date for ISBNPA 2024 in Omaha, USA: May 20–23, 2024



# JSHS

## Journal of Sport and Health Science

Open Access		Free of Charge
<b>Q1</b> SCI & SSCI	<b>Top 2</b> Among International Sport Sciences Journals	<b>13.077</b> Impact Factor (2021)

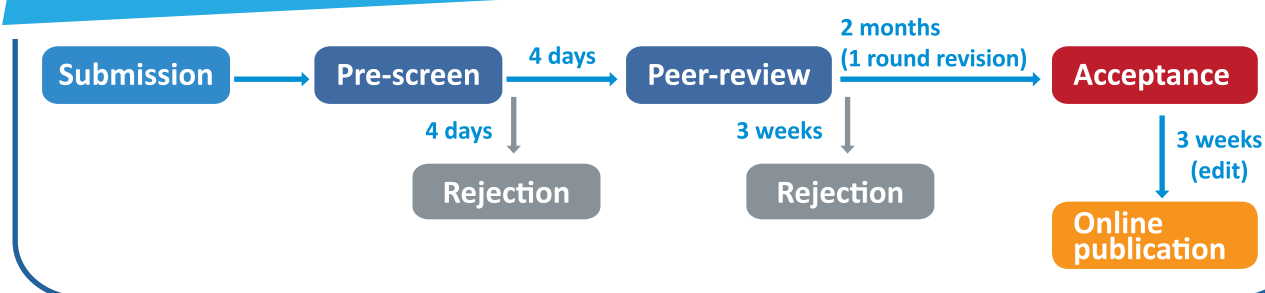
Exercise Sport  
**Health Sport**  
Physical Activity  
Exercise Health  
Physical Activity



### JSHS Hot and Trending Topics

- Physical activity and chronic disease prevention and recovery
- 24-Hour Movement Guidelines, adherence, and health outcomes
- Exercise, immune function, and molecular mechanism of aging
- Exercise, cancer, Alzheimer's disease, mental health, and brain health
- Sport injury prevention, risk assessment, biomarkers
- Resistance exercise in injury, disease, and aging
- Rehabilitation and return to sport

### Publication Timelines



### JSHS Editorial Office

Address: 650 Qingyuanhuan Road,  
Shanghai 200438, China

Tel: +86+21-65506293(F), 65506299

E-mail: jshs@sus.edu.cn



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NAVIGATION TIPS: The titles above are linked to their respective pages. Hover over the title, then click to follow the link. Or scroll down to read through page by page. All pages have a "Back to Table of Contents" link at the bottom right, which will return you to this page.

Abstract book for the ISBNPA 2023 Annual Meeting

Published by: International Society of Behavioral  
Nutrition and Physical Activity

ISBN: 978-1-7324011-5-0

Note about the content of the abstract book:  
The organizing and abstract review committees have not made  
any edits to the content of the abstract. The abstracts are,  
therefore, presented as they were submitted by the authors.



Erica Hinckson  
ISBNPA President

## DEAR ISBNPA COLLEAGUES,

It is with great pleasure that I welcome you all to our 2023 International Society of Behavioral Nutrition and Physical Activity conference in Uppsala, Sweden. This year's conference is particularly special as we broke several of our conference records: 1287 registrations, 1412 total presentations,

60 Symposia, 9 Dare2Share sessions, 11 workshops, 34 awards orals, 162 orals and 270 short orals. We have also reached the highest numbers of members joining our Society at 1087 and counting! Consequently, we have built an exciting programme with a diverse range of topics in a variety of formats. Thank you everyone for responding to our calls and submitting your best work.

The conference venue, Uppsala Konsert & Kongress (UKK), provides the best space for us to re-connect, network, share and collaborate with our colleagues from around the world. We will be offering many opportunities to connect throughout the conference, during lunch and other breaks, poster sessions, Meet the Mentors lunch-time session, and this year we are providing you with a booking system to book your own team/collaborator meetings. Our social programme starts with morning running and HIIT sessions and finishes with sporting activities in the afternoon including street basketball tournament "Professors" vs "Youth Team" and "Walking Football". Take the time also to explore Uppsala, a stunning and very walkable and accessible city. I encourage you to maximise on the opportunities provided, share ideas, forge new relationships, and foster new friendships.

As the President of our society, I am proud to see how much progress we have made in the last year, ensuring the advancement and financial security of our society. We are excited to share this with you at the conference. Particularly around our strategic initiatives: Growing the Next Generation, Research Impact, Climate Action and Inclusive Culture.

It is also my pleasure to welcome our four keynote and invited speakers, who promise to deliver thought-provoking and shifting the dial type of presentations. Welcoming Professor Claire Collins, Professor Ulf Ekelund, and Distinguished Professors Abby King and Edward Maibach. Also welcoming our invited speakers Dr Lena Maria Nilsson, Dr Isaac Warbrick, Dr Jairo Hidalgo Migueles, Dr Maria Somaraki and Dr Jenny Rossen.

I would like to offer a massive thank you to the local organising committee chaired by Marie Löf, the scientific programme committee chaired by Scott Duncan and Meg Bruening, executive director Antonio Palmeira, and our executive committee for their dedication and hard work in putting together such a fantastic program and conference. Special thanks to our session chairs, judges, volunteers and Venue West for supporting us in running a smooth conference. I would also like to thank our sponsors and exhibitors for their support, that make certain aspects of the conference possible.

Once again, a warm welcome to all. I hope you find the conference to be intellectually stimulating, thought-provoking, and enjoyable. It has been my absolute privilege serving our Society. Thank you and have a wonderful conference!

Nga mihi nui (Warm Regards)

—Professor Erica Hinckson  
ISBNPA President





## WELCOME TO UPPSALA SWEDEN

Uppsala is one of Sweden's oldest cities. It was known as Östra Aros up until the 13th century, when the name Uppsala took over. Today, Uppsala is one of Sweden's four major cities with a population of 230 000 inhabitants.

Uppsala has a rich and inspiring range of cultural activities and exciting events together with history—all in one place. The tourist attractions are numerous and exciting and include something for everyone. In addition, there is beautiful nature, both in the centre of town and close by. For travelers Uppsala is only 30 minutes away from Stockholm and 18 minutes from Stockholm Arlanda Airport by train. In the city the distances are short, and you can easily walk or bike to any sight or attraction.

Uppsala is today a modern city yet retains a small-town feel. It is Sweden's fourth largest city and home to two universities, the archbishopric of the Church of Sweden, a rich cultural life and beautiful scenery. Uppsala is rich in history and science and the prestigious Uppsala university is older than universities in many other countries. At the same time, the modern city is vibrating with life and is well known for its progressive research, innovation and position as a leader in modern technology. Whether you want to eat a lot or a little, outdoors or inside, Uppsala has a wide selection of pubs, cafés and outdoor restaurants. Don't forget to enjoy a Swedish fika, a Swedish social institution: a friendly, relaxing break with coffee and cake.





## DEAR ISBNPA COLLEAGUES,

**W**arm welcome to Uppsala, Sweden, for the 2023 International Society of Behavioural Nutrition and Physical Activity conference! I am particularly excited as you will be visiting us at the best time of the year. Mid-June marks the beginning of summer in Sweden, with a lot of beautiful flowers and bright long summer evenings to be spent outside. Uppsala is a perfect city for our conference as you can walk everywhere. Why not start the day with an early morning walk with some colleagues? Or take the opportunity to see more of Uppsala with Maria and Jairo in their morning running and HIIT sessions? In the evenings we offer outdoor activities such as “Walking football” with Andreas or join the street basketball tournament at the Summer Zone arena.

Uppsala is one of Sweden’s oldest cities, rich in history and science and hosts the prestigious Uppsala university. We are delighted that our opening ceremony will be held in Uppsala University’s Grand Auditorium from 1887, which is a very beautiful building. Uppsala can be described a modern city vibrating with life and is well known for its progressive research, innovation, and position as a leader in modern technology. The city has a wide selection of pubs, cafés, and outdoor restaurants. And when in Sweden you should not forget to enjoy a “fika” which means a friendly, relaxing break with coffee and cake. Thank you for the opportunity to organise ISBNPA 2023, and a big thank you to the Organisation committee for all your contribution. A special thank you to the executive director António Palmeira who has guided us through the planning of the conference in a brilliant way (we do not know what we would have done without you), Anne Keller at Venue West and Lisa Wästberg at Destination Uppsala for all your excellent support and help.

I wish you all a wonderful meeting with inspiring scientific discussions, catching up with old friends and establishing new collaborations, and a great time in Uppsala!

Warm regards,



Marie Löf  
ISBNPA 2023 Chair

—Marie Löf  
ISBNPA 2023 Chair

**O**n behalf of the ISBNPA Scientific Program committee, we thank everyone for submitting excellent science to share in Uppsala. We had close to a record-breaking number of submissions (1,435) for this conference. Each abstract was reviewed and scored by three independent, expert reviewers. Once scored, the Scientific Program Committee, the Local Organizing Committee, and SIG leaders worked together to create a scientific program that includes the strongest research coming out of our field. We want to extend our gratitude to the reviewers and volunteers for their time and efforts! We hope that you leave Uppsala, inspired by the science and fulfilled by old and new connections to ISBNPA members.



Scott Duncan  
Scientific Program  
Committee Co-Chair



Meg Bruening  
Scientific Program  
Committee Co-Chair

—Scientific Program Committee Chairs  
Meg Bruening and Scott Duncan

—Scientific Program Committee Members  
Sarah Rosenkranz; António Palmeira; Cindy Gray;  
Falk Muller-Riemenschneider and Inês Santos





## Program Committee Chairs:

- Meg Bruening, Penn State University, USA
- Scott Duncan, Auckland University of Technology, New Zealand

## Committee Members:

- Marie Löf, Department of Biosciences and Nutrition, Karolinska Institutet
- Paulina Nowicka, Nutrition and Dietetics at the Department of Food Studies, Nutrition and Dietetics, Uppsala University, Sweden
- Anna Ek, CLINTEC, Division of Pediatrics, Karolinska Institutet, Sweden
- Erica Hincson, Auckland University of Technology, New Zealand
- Maria Hagströmer, Division of Physiotherapy, Department of Neurobiology, Care Sciences and Society, Karolinska Institutet, Sweden
- Ioannis Ioakeimidis, Department of Biosciences and Nutrition, Karolinska Institutet, Sweden
- Anna Karin Lindroos, The Swedish Food Agency and the Department of Internal Medicine and Clinical Nutrition, The Sahlgrenska Academy, University of Gothenburg, Sweden
- Christine Delisle Nyström, Department of Biosciences and Nutrition, Karolinska Institutet, Sweden
- Teresia O'Connor, Baylor College of Medicine, USA
- António L Palmeira, Universidade Lusófona, Portugal
- Amy Yaroch, Gretchen Swanson Center for Nutrition, USA

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- Meg Bruening, Penn State University, USA
- Stephanie Chappel, CQUniversity Adelaide, Australia
- Moushumi Chaudhury, Auckland University of Technology, New Zealand
- Scott Duncan, Auckland University of Technology, New Zealand
- Jenna Hollis, University of Newcastle, Australia
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- Carol Marher, University of South Australia, Australia
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- Inês Santos, Universidade Lusófona, Portugal
- Sarah Shaw, University of Southampton, United Kingdom
- Delfien Van Dyck, Ghent University, Belgium





## THANK YOU TO OUR REVIEWERS

The ISBNPA 2023 Abstracts Committee would like to acknowledge the abstract reviewers for the 2023 Annual Meeting.

Their expertise is central to the quality of communications of the meeting.

Thank you for your invaluable contribution to ISBNPA.

—António L Palmeira, Meg Bruening & Scott Duncan (Chairs of the Abstract Committee)

Mavra Ahmed	Hannah Doughty	Emma Lawlor	Maria Paula Santos
Teatske Altenburg	Scott Duncan	Eun-Young Lee	Jan Seghers
Odysseas Androutsos	Sarah Edney	Nanna Lien	Adam Shoesmith
Maureen Ashe	Cindy Forbes	Leah Lipsky	Bridve Sivakumar
Lee Ashton	Jennifer Gay	Penelope Love	Albert Smith
Tom Baranowski	Emma George	Ralph Maddison	Andrea Smith
Courtney Barnes	Nazhif Gifari	Emily Mailey	Amanda Staiano
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Stuart Biddle	Alice Grady	Josef Mitáš	Debbe Thompson
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Tom Deliens	Chelsea Kracht	Sara Rosenkranz	
Shilpa Dogra	Lilian Krist	Richard Rosenkranz	
Craig Donnachie	Jeroen Lakerveld	Alisha Rovner	





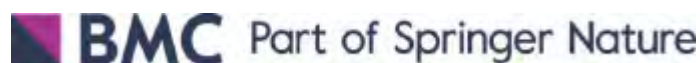
## SILVER SPONSOR



### The Gretchen Swanson Center for Nutrition

The Gretchen Swanson Center for Nutrition is a nonprofit research institute providing expertise in measurement and evaluation to help develop, enhance and expand programs focused on healthy eating and active living, improving food security and healthy food access, promoting local food systems and applying a health equity lens in all we do. With expertise in public health nutrition, we are dedicated to building measurement strategies to assess the impact of innovative health-related programs. We work nationally and internationally, partnering with other nonprofits, academia, government and private foundations to conduct research, evaluation and scientific strategic planning.

## BRONZE SPONSORS & EXHIBITORS



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At BMC we are dedicated to publishing the best open access journals across our portfolio of over 250 titles and are always striving to drive progress in biology, health sciences and medicine. With over 20 years of expertise in pioneering open access, you can trust our extensive experience to deliver high quality, impactful research and provide a supportive publishing experience for authors. If you believe, like we do, that openness, transparency and community focus should be at the heart of research publishing, then we would like to welcome you to the BMC family of journals. BMC is part of Springer Nature.



### Pal Technologies Ltd. / activPAL™

22 years ago we launched the activPAL™, the world's first single-sensor solution for free-living Posture and Activities Logging. Using a discrete thigh-worn sensor combined with innovative software tools, we give researchers objective measures of person-centered free-living physical activities providing the evidence to link physical behaviors with health outcomes. Our approach

is based on the three tenets of objective body-worn sensor measurement: sensor location, data fidelity and data processing. The thigh-segment location provides the ground-truth for our outcomes; a horizontal thigh is sitting (or lying) and vertical is upright. When repeatedly reciprocating, the wearer is either stepping or cycling. Free-Living Outcomes (FLO) are based on an analysis of the patterns of participation in the primary activities of Lying, Sitting, Standing and Stepping (and the travel choices of Cycling and Seated Transport). The activPAL is unique in this ability to quantify time cycling and in-car travel, providing the opportunity to measure commuting choices (active travel vs car). New for 2023, the software tools characterize the locus of activity providing a measure of the time spent in the primary household locus in contrast with the wider community loci. The latest generation of the activPAL, the activPAL4+, can quantify stair climbing and straight-line stepping.



### Pennington Biomedical Research Center

Pennington Biomedical Research Center, a campus of Louisiana State University, is a world-renowned leader at the forefront of medical discoveries related to obesity, diabetes, cardiovascular disease, cancer and dementia. The scientists conduct basic,



clinical and population health research and are dedicated to solving the world-wide obesity epidemic by 2040. Our mission is to improve human health throughout the lifespan.



Research Ideas Catalogue = Knowledge & Impact

## Research Ideas Catalogue – Knowledge & Impact

RIC-KI is an online platform that connects scientists worldwide for collaborations in health, wellbeing, weight management, dietary behaviour, and sport, allowing research ideas to go further and faster and have greater impact. RIC-KI is hosted by Loughborough University, UK, and led by Professor Amanda Daley, a leading expert in behavioural medicine.



## SENS Innovation ApS

SENS Innovation ApS is a Copenhagen based scale-up company specializing in medical devices for activity monitoring, for use within the research and healthcare sector.

Our technology platform SENS motion®, is a cloud-backed and medical approved activity tracker in the form of a patch, that can be discretely worn 24/7, and automates the monitoring of various parameters related to physical activity and sleep. It has been developed together with researchers and clinicians in Denmark and is especially well suited for use in the healthcare sector and for large research projects where data security (GDPR) and validity is a main concern.



## Washington State University

Washington State University, a top-ranking public research university, has six campuses offering 200+ undergraduate fields of study and nearly 150 graduate and professional degree programs preparing you for a wide range of careers in exercise physiology, dietetics, public health, behavioral health, research, and academia. Learn more at <https://wsu.edu/tp>.

## SUPPORTING SPONSORS



## World Class Uppsala



## Uppsala City



## movisens

movisens provides technologies for ambulatory assessment, mobile psycho-physiological measurement and expertise in the field of stress- and lifestyle-monitoring and analysis. The movisens product line combines innovative and cutting-edge products such as wearable sensors for physical activity, ECG and electrodermal activity with suitable data analysis software. Our EMA platform movisensXS is the leading solution for experience sampling with smartphones. Today movisens provides Europe's most complete wireless ambulatory assessment and analysis package for unobtrusive monitoring of human physiology, mood, stress, behaviour and performance. movisens sensors and systems are used by top researchers all over the world.



**5 Rikssalen at Uppsala Castle**  
Drottning Christinas  
väg 1D, 752 37 Uppsala



# VENUE FLOOR PLANS

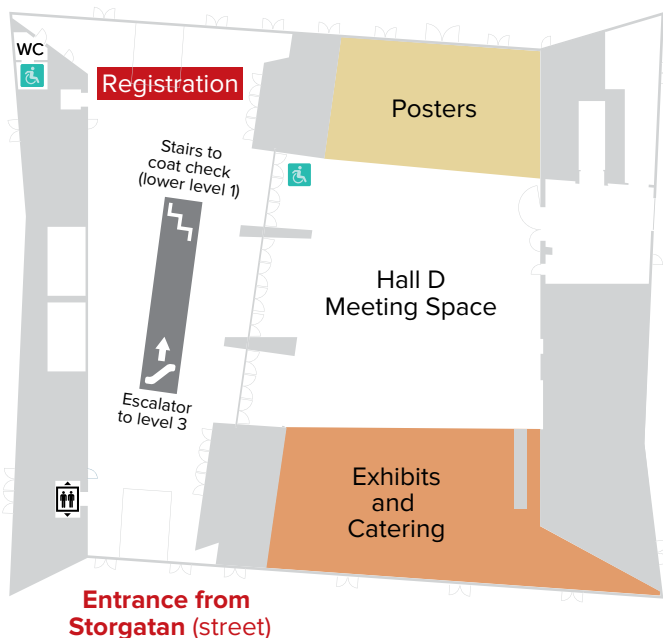


## UPPSALA KONSERT & KONGRESS

Vaksalagatan 1, 753 31 Uppsala, Sweden

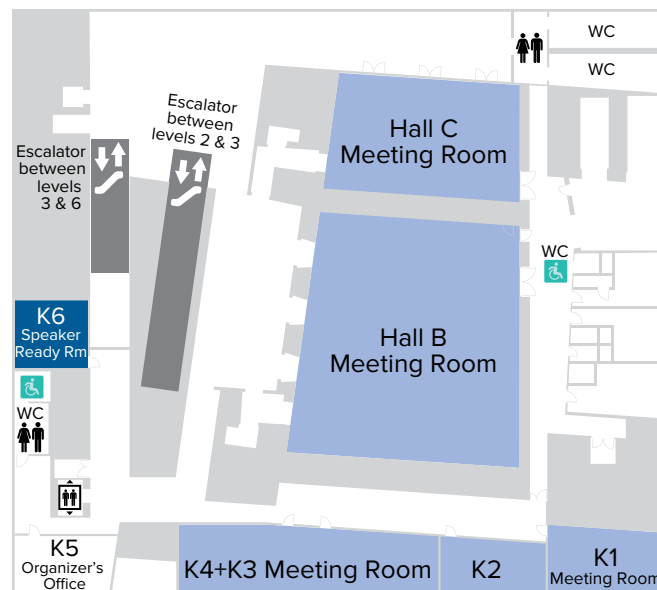
### Level 2 (Ground Floor)

Entrance from Vaksala torg  
(Vaksala Square)



### Level 3

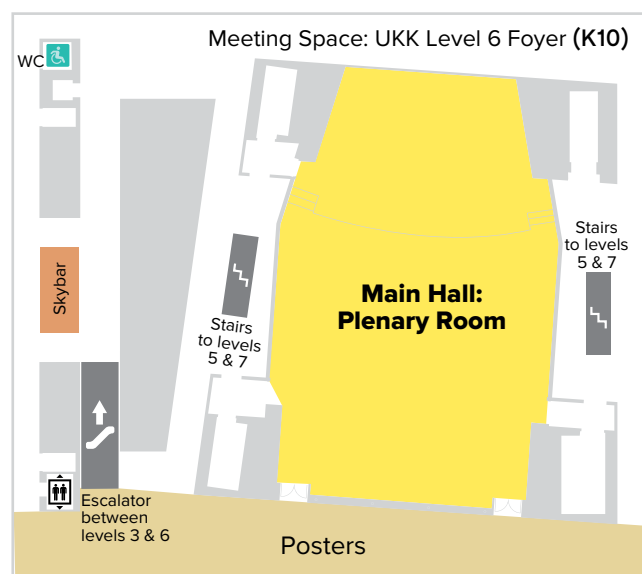
Vaksala torg (Vaksala Square)



Storgatan (street)

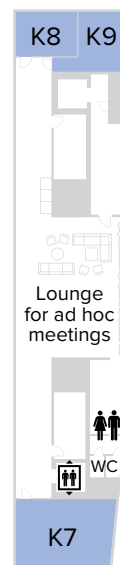
### Level 6

Vaksala torg (Vaksala Square)



Storgatan (street)

### Level 7



### LEGEND

- Registration Desk (Level 2)
- Plenary Room (Main Hall, Level 6)
- Posters (Levels 2 and 6)
- Breakouts Rooms (Levels 3 and 7)
- Exhibits and Catering (Level 2)
- Speaker Ready Room (Level 3)

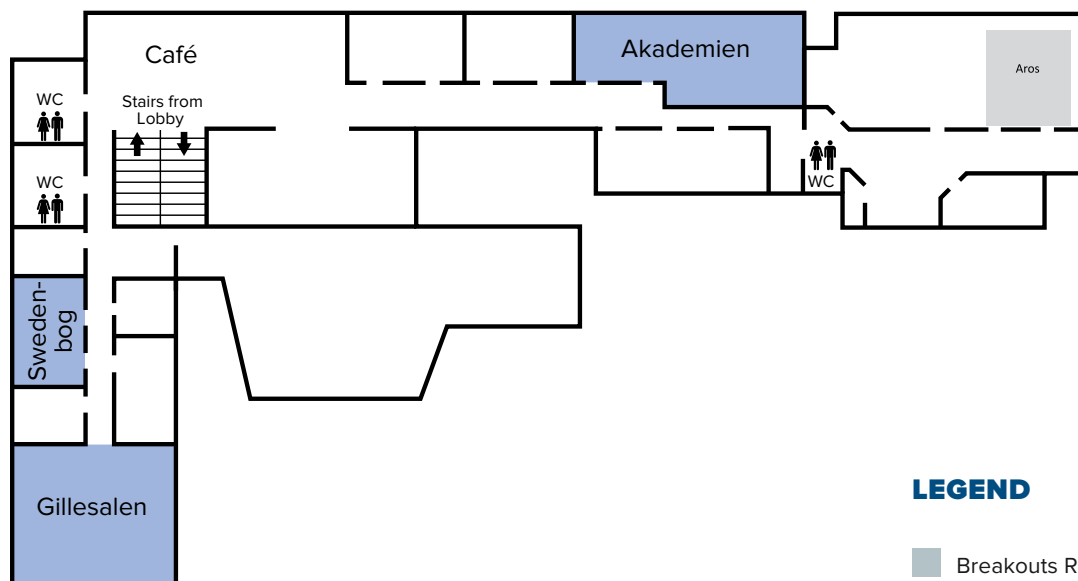




## CLARION HOTEL GILLET

Dragarbrunnsgatan 23, 753 20 Uppsala, Sweden

### Level 3



### LEGEND

- Breakouts Rooms (Clarion Hotel Gillet, Levels 3)
- Workshops (Biomedical Center)

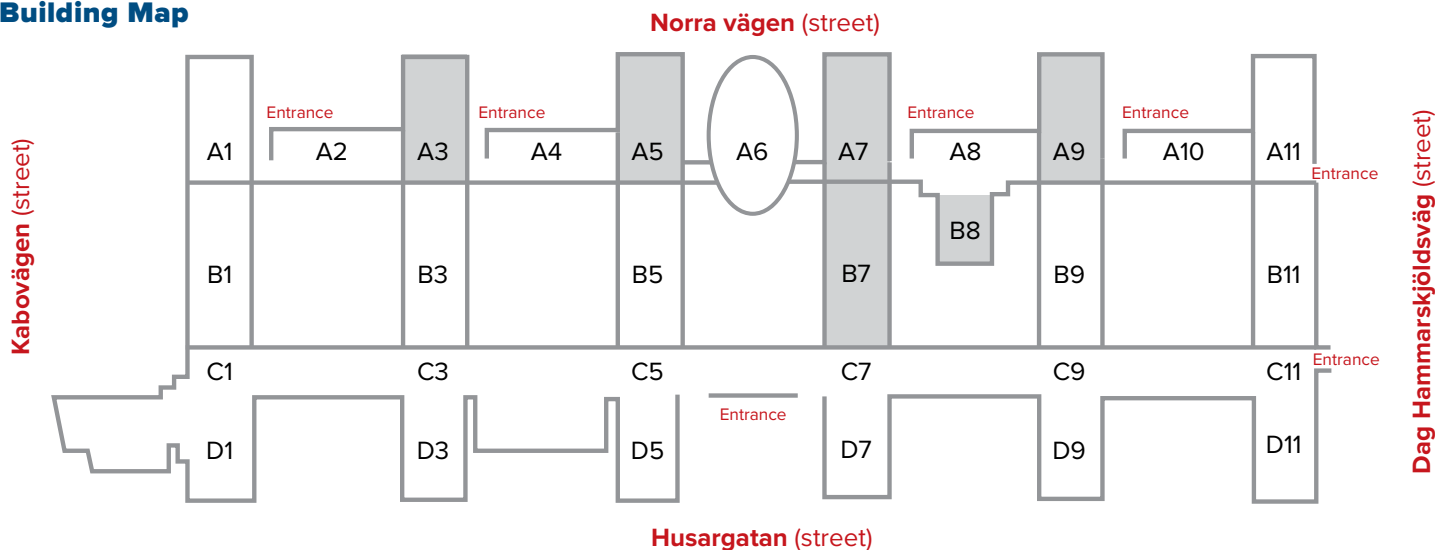
## BIOMEDICAL CENTRE (BMC)

Husargatan 3, 751 23 UPPSALA

**How a room number is built**

Building	Floor	Room No.
B7	1	25a

### Building Map





## Venues

**Uppsala Konsert & Kongress** – main conference venue  
Vaksala Square 1, 753 31 Uppsala

**Clarion Hotel Gillet** – secondary conference venue  
Dragarbrunnsgatan 23, 753 20 Uppsala

**Uppsala University** (Main Building), Auditorium – opening ceremony June 14  
Biskopsgatan 3, 753 10 Uppsala

**BMC (Uppsala Biomedical Centre)** – Pre-conference workshops June 14  
Husargatan, 752 37 Uppsala

## Registration Desk

The registration desk will be located at the UKK and will be open at the following times:

- Wednesday, June 14th 08:00 – 19:00 hours
- Thursday, June 15th 07:00 – 17:30 hours
- Friday, June 16th 07:00 – 17:30 hours
- Saturday, June 17th 07:00 – 17:30 hours

## Exhibit schedule

### Set up:

- Wednesday, June 14th 12:00 – 15:30 hours

### Exhibiting Hours:

- Thursday, June 15th 10:00 – 16:30 hours
- Friday, June 16th 10:00 – 16:30 hours
- Saturday, June 17th 10:00 – 14:30 hours

### Move out:

- Saturday, June 17th 14:30 – 16:30 hours

## ISBNPA Dinner (ticketed event)

### Friday, June 16, 2023

The ISBNPA Dinner will be held at the Rikssalen at Uppsala Castle from 19:00 – 23:00 hours.  
Distance from UKK: 15 mins walk.

## Internet Access:

### UKK Wi-Fi

Network: UKK\_Guest  
Password: UKK\_2023

### Wi-Fi at Clarion Gillet Hotel

Network: Clarion Connect  
Password: no password required

### Wi-Fi at University / BMC

Network: UU Guest  
You will have to create an account with Eduroam

1. Connect to the Wi-Fi network
2. Click “Create new account”
3. Enter first and last name and mobile phone number with international code (must be two digits, e.g. USA/Canada +01)
4. Click ‘Register’
5. You will receive a text message with a username and password; enter these in the window that appears and click ‘Sign in.’
6. Accept Guest User Policy

### Wi-Fi in Uppsala City

Uppsala Wi-Fi gives you 3 hours of free wi-fi daily in central parts of Uppsala. You will find more information and a range map of the Wi-Fi area here. There is also Wi-Fi available in public places such as Uppsala Central Station as well as malls, libraries, restaurants and cafes in the city.

1. Choose “!uppsalawifi” from the list of available networks on your device.
2. Agree to the terms and surf free!

## Social Media

### Follow us on Twitter and Instagram



@isbnpaadmin



@ISBNPA

Post or Tweet about ISBNPA 2023 using the following hashtags:  
#isbnpaannualmeeting  
#isbnpa2023  
#StayActive



## Posters

Posters will be displayed at the UKK in Hall D and on Level 6. Presenting authors are required to attend their posters during the appropriate poster session.

### Chaired Poster Session:

**Wednesday, June 14**

**17:30 – 18:45 hours**

- Mounting: between 15:45 and 17:00 hours
- Take down: right after the session, before 19:00 hours

### Poster Session #1:

**Thursday, June 15, 11:00 – 12:00 hours**

- Mounting: between 07:30 and 08:15 hours
- Take down: between 16:15 and 17:30 hours

### Poster Session 2:

**Friday, June 16, 10:50 – 12:00 hours**

- Mounting: between 07:30 and 08:15 hours
- Take down: between 16:15 and 17:30 hours

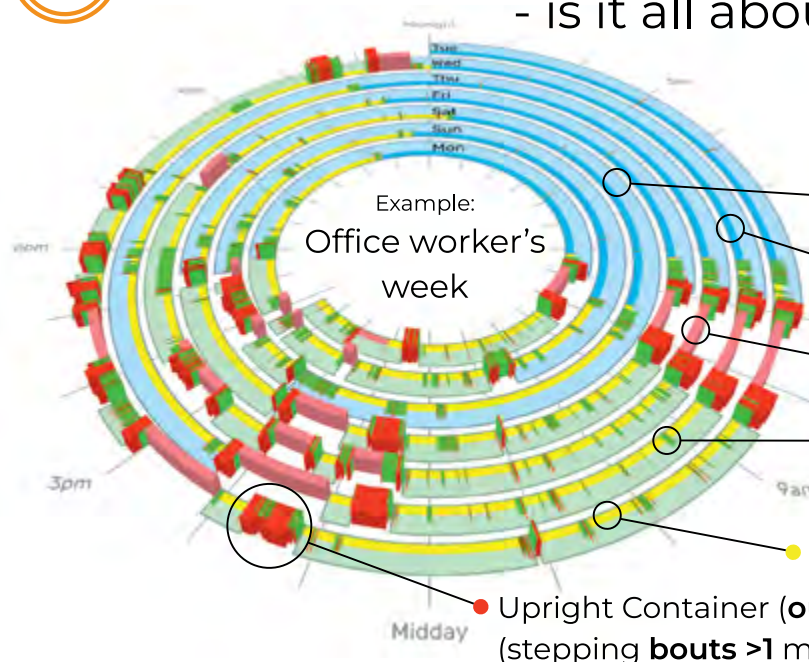
### Poster Session 3:

**Saturday, June 17, 13:00 – 14:00 hours**

- Mounting: between 07:30 and 08:15 hours
- Take down: after the session, but before 17:00 hours



## Objectively Quantifying **Physical Behaviour** - is it all about **Patterns** of **Activities**?



**Free-living Outcomes (FLO),**  
beyond step counts and sedentary time

• **Primary Locus** of daily activities

• **Time in Bed**

• **Seated Transportation Events**

• **Upright Container (indoor)**  
(stepping **bouts** <1 minute)

• **Sedentary Events**

• **Upright Container (outdoor)**  
(stepping **bouts** >1 minute)



**activPAL™**  
research bred, research led  
from PALtechnologies [www.palt.com](http://www.palt.com)





## Travelling to Uppsala

Stockholm Arlanda Airport offers Sweden's strongest route network with more than 181 different national and international destinations. Its proximity to Arlanda makes Uppsala an easily-accessible destination for travellers from around the world.

If you decide to take the train to the airport, it gets you there in just 18 minutes. Trains to Uppsala stop at Arlanda Central Station, which is located in SkyCity between terminal 4 and 5. But you can also travel by bus, car or taxi. Links to various bus and taxi companies can be found on the conference mobile app.

## Travelling in Uppsala

Once you are in Uppsala, you easily get around the city by public transport, taxi, on foot, or by bike.

While more attractions are easily accessible on foot, UL manages the regional buses, and has a customized range of travel options so that travellers can choose to travel by public transport wherever possible and appropriate. Your journey by bus shall be perceived as simple, reliable and secure at the same time that it will facilitate your stay throughout our region. UL promotes a greener world with biogas in the tank.

You can also choose to travel in Uppsala by taxi. The majority of the city's taxis are environmentally friendly cars and taxi companies not only take into account the city's environment but also work actively to improve it.

When travelling in Uppsala ISBNPA urges you to be cautious and mindful of your carbon footprint, whenever possible.



## Evidence Empowers

*Gretchen Swanson Center for Nutrition (GSCN) provides expertise in measurement and evaluation to help develop, enhance and expand programs focused on food and nutrition security, healthy food access, promoting food systems, as well as healthy eating active living, while applying a health equity lens.*

- ✦ External program evaluation
- ✦ Measurement development/shared measures
- ✦ Program development and capacity building
- ✦ Strategic planning
- ✦ Research partnerships

*GSCN proudly leads the Nutrition Incentive Hub which was created by the Nutrition Incentive Program Training, Technical Assistance, Evaluation and Information Center (NTAE), funded by the Gus Schumacher Nutrition Incentive Program (GusNIP).*



[www.centerfornutrition.org](http://www.centerfornutrition.org) | [www.nutritionincentivehub.org](http://www.nutritionincentivehub.org)



## Language & currency:

The official language in Uppsala is Swedish, but most Swedes speak English fluently. The Swedish currency is the Swedish Crown (SEK).

## Nearby Banks:

- Swedbank
  - Monday to Friday: 10:00 – 15:00 hours
  - Saturday and Sunday: Closed
- Handelsbanken
  - Monday to Friday: 10:00 – 16:00 hours
  - Saturday and Sunday: Closed

## Weather in Uppsala

In June, we can expect average highs of 15–20 degrees Celsius with overnight lows of 10 degrees. Pack layers as you will need something warmer for the evenings.

## Destination Uppsala Info Points:



### TRAVEL CENTER – UL Center

- Olof Palmes plats, inside Uppsala Central Station
- Open: Monday to Friday 07:00 – 19:00 hours, Saturday 09:00 – 17:00 hours

### CITY CENTER – Contact Center Uppsala

- Uppsala Town Hall, Stadshusgatan 2
- Open: Monday to Wednesday 08:00 – 17:00 hours, Thursday 08:00 – 18:00 hours, Friday 08:00 – 17:00 hours

### Uppsala Konsert & Kongress

- Vaksala torg 1
- Open: Monday to Friday 10:00 – 16:00 hours

### HISTORICAL DISTRICT – The Uppland County Museum

- S:t Eriks torg 10
- Open: Tuesday to Sunday 12:00 – 17:00 hours

### Uppsala Art Museum: Uppsala Castle, Entrance E

- Open: Tuesday to Wednesday 11:00 – 17:00 hours, Thursday 11:00 – 20:00 hours, Friday to Sunday 11:00 – 17:00 hours

### IN THE COUNTRYSIDE – Fullerö Handel

- Open: Monday to Friday 11:00 – 18:00 hours, Saturday & Sunday 11:00 – 17:00 hours







## FRIDAY, JUNE 16

### ISBNPA Dinner

19:00 – 23:00 hours

Rikssalen at Uppsala Castle

Distance from UKK: 15 mins walk

Dress Code: Smart/Casual

The ISBNPA Dinner will be held in the Rikssalen at Uppsala Castle.

The castle was seriously damaged by fire in 1702, being essentially reduced to a ruin. Reconstruction took many years and was indeed hampered by the remains of the castle being used as a quarry for stone to be used in building Stockholm Palace. The castle was the administrative centre of Uppland for many years and is today the residence of the County Governor of Uppsala County. Rikssalen, the former Hall of State, was fully restored in 1932 and is now Uppsala's most glittering festive location.

Guests will enjoy a 3-course menu, music and dancing.







## STAY ACTIVE!

ISBNPA offers a variety of physical activities during the conference for participants to attend. Pre-registration is required.

**Thursday, June 15**  
**18:00 – 20:00 hours**

### Summer Zone Uppsala

Summer Zone is a 6,360 square meter activity area open to everyone. Here there are courts for floor ball, futsal, volleyball, mini tennis, street basketball, badminton, and other areas with various games, café, pump track and lots of fun.

Uppsala Municipality together with ISBNPA is organising a chance to see, experience and actively try out the Summer Zone activity area.

There are two options for participation, either as a player in the street basketball tournament that will be arranged between “Professors” and young people (limited number of places) or if you only want to cheer your peers and perhaps try other sport activities offered. There will be special t-shirts for the players! The event is funded by Världsklass Uppsala.

**Thursday, June 15**  
**17:45 – 19:30 hours**

### Walking Football

Walking football is a moderate-intensity activity that has shown to be associated with multiple health effects, and has been

identified as a sport with great potential to be adopted by a wide range of groups. At the same time, Walking football has the advantage that participation in the game is perceived as fun and can motivate people to continued activity. Walking football is usually played 6 v 6, but can be adapted according to the number of participants. Walking football is a team-based sport that is played on a smaller pitch and only at a walking pace with no tackles allowed.

The session will be led by a Walking football ambassador for the Uppsala region appointed by the Swedish Football Association together with researcher Andreas Caspers.

We will meet outside of UKK (entrance facing Vaksala torg) at 17:45 hours. In the event of rain, we will be indoors in Svandammshallarna next to the park.

**Thursday and Friday, June 15 and 16**  
**07:00 – 07:30 hours**

### Combined Running and HIIT Session – Get sweaty and see Uppsala!

This is an outdoor session, built around a few stations where you will be performing bodyweight exercises that can be adapted to your level of fitness/abilities. In between sets, there is a short run before moving on to the next station. You can make this session as tough as you want to! How many bodyweight squats can you do in 30 seconds? Is there a better way to see a new town?





## **Thursday, June 15th** **11:15 – 11:45 hours**

Facilitated by the SIG Leaders

### **Policies and Environments**

Room: Hall B

### **Participatory Research in Health Promotion**

Room: Hall C

### **Indigenous Group**

Room: K2

### **Young Adults**

Room: K1

### **SocioEconomic Inequalities**

Room: K3+4

## **Friday, June 16th** **11:15 – 11:45 hours**

Facilitated by the SIG Leaders

### **Children and Families**

Room: Hall B

### **Implementation and Scalability**

Room: Hall C

### **e- and mHealth**

Room: K7

### **Ageing**

Room: K1

### **Early Care and Education**

Room: K2

### **Cancer prevention and management**

Room: K3+4

## **Positions Available – Pennington Biomedical**

# **Postdoctoral Training in Obesity Research**

Premier state-of-the-art research facility  
Internationally-known investigators  
Top 10 place for postdoctoral training  
Benefits & travel





## **Abby C. King, PhD**

*Recipient of Stanford University's David and Susan Heckerman Endowed Professorship, Dr. King serves as Professor and Vice Chair for Academic Affairs of Epidemiology & Population Health and Professor of Medicine at Stanford University School of Medicine. She is the founder and Faculty*

*Director of the Our Voice Citizen Science Initiative and Global Network. Recipient of the Outstanding Scientific Contributions in Health Psychology Award from the American Psychological Association, her research focuses on the development, evaluation, and translation of public health interventions to reduce chronic disease and its key behavioral risk factors. She uses state-of-the-art communication technologies, community-based participatory research perspectives, and citizen science approaches to address health disparities among disadvantaged populations worldwide. Dr. King has served on a number of government taskforces in the U.S. and abroad, including membership on the U.S. Department of Health and Human Services' Scientific Advisory Committee on National Health Promotion and Disease Prevention Objectives for 2020. She co-chaired the USDHHS 2018 Physical Activity Guidelines for Americans Advisory Committee and was one of 10 U.S. scientists honored by the Association of American Medical Colleges in 2014 for outstanding research targeting health inequities. She served as President of the Society of Behavioral Medicine (SBM) from 2011-2012. Her research on citizen science to promote healthy environments for all has been honored with an international excellence award in addition to Stanford Medical School's inaugural 2018 faculty Community Engagement Award, SBM's 2018 Research to Practice Award, and Stanford Medicine's 2021 STAR Award. She received the International Society of Behavioral Nutrition and Physical Activity's inaugural lifetime achievement award in 2019, and the Society of Behavioral Medicine's Distinguished Scientist Award in 2020. In 2022, Dr. King was the winner of Stanford University's Miriam Aaron Roland Prize for Volunteer and Public Service.*

## **Mobilizing Community-engaged Citizen Science to Advance Healthy Lifestyles & Health Equity Worldwide**

**Wednesday, June 14, 14:30–15:30**

**ABSTRACT:** A growing evidence base supports the promise of “research-to-action” citizen science in helping to generate locally relevant, real-world solutions to some of today's most vexing challenges. Establishing productive partnerships between communities and researchers also can help to mitigate mistrust of science that has increasingly surfaced among some portions of the public. Yet, can such multi-component, qualitatively

driven methods attain the scientific rigor often craved by many in the scientific community? The Our Voice Global Citizen Science Research Initiative represents one example of how this form of community-engaged mixed methods research can be built across the continuum of translational science. Global examples will be presented of the initiation of early exploratory studies in the field, followed by enhanced reproducibility, increasing scientific rigor, expanding levels of knowledge and impact, and methods for attaining global scalability. The presentation will end with an exploration of the future of such research-to-action approaches as a resource-efficient means for advancing health equity, environmental justice, and authentic community-researcher partnerships.



## **Clare Collins, PhD**

*Laureate Professor Clare Collins is an Accredited Practising Dietitian, NHMRC Leadership Research Fellow and winner of the 2021 NHMRC Elizabeth Blackburn Investigator Grant Award (Leadership in Clinical Medicine and Science). She is Director of the Hunter Medical Research*

*Institute Research Program in Food and Nutrition. Her research focusses on personalised nutrition technologies and programs evaluating impact on diet-related health in chronic disease and across life stages.*

- *L/Prof Collins is a Fellow of the Australian Academy of Health and Medical Sciences, Fellow of the Nutrition Society of Australia and Fellow of the Dietitians Australia (DA). She has been awarded \$29M in grant funding, published 450 research paper and supervised 35 PhD candidates to completion.*
- *L/Professor Collins is a sought-after nutrition science media commentator, most read Australian author on The Conversation with >14 million readers and co-created the EdX Massive Open Online Course, Science of Weight Loss – Dispelling Diet Myths, completed by >67,000 people across 180 countries.*

## **Making an impact in behavioral nutrition! Are we there yet?**

**Thursday, June 15, 09:50–10:50**

**ABSTRACT:** Poor diet impacts one in five deaths globally. If population eating patterns were consistent with nutrition recommendations the global disease burden would drop dramatically. For example heart disease burden would drop by 58% and type 2 diabetes by 41%. There is a massive disparity between health costs incurred due to nutrition and weight-related poor health and the limited funding for nutrition





prevention and treatment. While over 40% of the global population can't afford a healthy diet, the worldwide revenue attributed to vitamin and mineral supplements was estimated at \$US27 billion in 2022.

In terms of prevention an OECD report on obesity prevention estimated that policies targeting food labelling, advertising restrictions and mass media campaigns across 36 countries analysed has the potential to prevent 76,000 new non-communicable disease cases per year, while also increasing GDP through reduced health expenditure and increased participation in the workforce.

Additionally, members of the public do appear very interested in food and nutrition. For example, each month Instagram accounts for more than 250 million #food posts. Celebrity nutrition misinformation abounds and can seriously undermine evidence-based nutrition recommendations and guidelines endorsed by nutrition organisations.

How does ISBNPA's mission statement, which calls for 'stimulation of impactful research in behavioural nutrition and physical activity to improve health and wellbeing worldwide', address these current challenges? We face stiff competition from self-proclaimed food and nutrition gurus. But are we partly to blame for not meeting consumer needs? What should ISBNPA, that's all 1000+ members, do? Can ISBNPA and IJBPA lead the way in terms of communicating the research on nutrition to facilitate evidence translation and impact?

It is timely to reflect on past success, while planning for evaluation of future impacts. When it comes specifically to making an impact in behavioural nutrition, we must strategically turn the volume up on our collective voices to influence development, implementation and evaluation of evidence-based nutrition policy and programs. This will ensure that we do 'get there' and achieve impact that is dynamic, quantifiable, and valuable.



## **Ulf Ekelund, PhD**

*Professor in Physical Activity and Health at the Norwegian School of Sport Sciences and a senior researcher at the Norwegian Public Health Institute (20%). Before moving to the Norwegian School of Sport Sciences in 2012, Ekelund lead a research program in physical activity epidemiology at the MRC*

*Epidemiology Unit, University of Cambridge, UK. Ekelund is leading or co-leading large international research projects, including the International Children Accelerometer database (ICAD), the world largest pooled database of device measured physical activity in young people. Ekelund is also leading an international consortium examining the dose-response and joint*

*associations between device-based measures of sedentary time and physical activity with non-communicable disease outcomes and act on the scientific advisory committee for the ProPASS consortium. Ekelund has lead work packages in several EU funded research projects such as the InterAct and DEDIPAC projects. Ekelund is member of the steering group for the Lancet series on physical activity 2012, 2016, 2020 and 2024. He also serve on the steering committee for the Global Observatory for Physical Activity (GoPA) and has served on the American College of Sports Medicine board of trustees (2016-2019). Ekelund was on the International Society for Physical Activity and Health (ISPAH) executive committee between 2012 and 2016. In 2019 to 2020 he served on the WHO physical activity guideline development group and was an international expert for the UK physical activity guidelines in 2018. Ekelund currently serves on the editorial board for Medicine and Science in Sports and Exercise, Journal of Physical Activity and Health and the Journal of Sport Sciences. Ekelund's main research areas include assessment of physical activity and sedentary time; patterns and trends in population levels of physical activity; the role of sedentary time and physical activity for preventing chronic diseases across the life course. Ekelund have published more than 400 original publications since 2000 including papers in The Lancet, JAMA, The Lancet Public Health, Science, Nature and The BMJ. Three of his publications were listed on the Altmetric Top 100 list in 2012, 2016 and 2019. Ekelund's current H-index is 93 and he was listed as highly cited researcher in 2018, 2019, 2021 and 2022 according to Clarivate analytics.*

## **Dose-response associations, physical activity intensity and deaths attributable to physical inactivity – lessons learned from device-measured physical activity**

**Friday, June 16, 09:50–10:50**

**ABSTRACT:** Dose-response associations, physical activity intensity and deaths attributable to physical inactivity - lessons learned from device-measured physical activity Studies have shown a non-linear dose-response association between physical activity and the risk of non-communicable diseases and mortality. National and international public health authorities, including the World Health Organization (WHO), have recommended population levels of physical activity, primarily based on self-reported data. However, self-reporting is prone to bias and overestimates physical activity participation. Self-reporting may also overestimate the amount of physical activity needed to reduce the risk of chronic diseases, underestimate the magnitude of associations with these outcomes, and not capture all intensities of physical activity.

Recent studies using accelerometry have shown that the shape of the dose-response association is similar to that of self-



reporting, but the maximal risk reduction is larger and observed at lower levels of physical activity. Total physical activity and all intensities of physical activity assessed by accelerometry are associated with a lower risk of premature mortality, and high levels of physical activity can mitigate the negative impact of sedentary time.

The population attributable fraction (PAF) is a measure that estimates the number of events that can be averted if a risk factor is removed from the population. Recent estimates suggest that 4–5 million deaths every year globally are due to physical inactivity. In contrast, the Global Burden of Disease study estimated less than 1 million deaths annually due to physical inactivity. These studies used self-reported physical activity data and estimated the population-attributable fraction as a dichotomous variable or methods that deviated from established thresholds. Others have estimated that an increase in device measured moderate to vigorous intensity physical activity by 10 and 30 minutes per day, respectively were associated with 7% (245,000 deaths) and 17% (595,000 deaths) decrease in the number of deaths per year in the US population. However, this study estimated the PAFs for a fixed increase in moderate-to-vigorous intensity activity using the same referent and did not consider the nonlinear dose-response association between physical activity and risk for mortality.

The lecturer will discuss how device-measured physical activity in large cohort studies has advanced our understanding of the association between physical activity and chronic disease risk. I also discuss differences in methodology when estimating the number of deaths that can be prevented by physical activity at the population level. Finally, I will discuss a method to estimate the theoretical number of deaths averted, taking into account the non-linear dose-response association between physical activity and the risk of death.



## **Edward Maibach, PhD**

*Edward Maibach is a Distinguished University Professor and Director of the George Mason University Center for Climate Change Communication. His research illuminates public understanding of climate change and strategies for improving it. Dr. Maibach previously served as an Associate*

*Director of the National Cancer Institute and Worldwide Director of Social Marketing at Porter Novelli; he is currently a Fellow of the American Academy for the Advancement of Science and a Member of the U.S. National Academy of Medicine.*

## **Protecting human and planetary health: New unique and necessary roles for health professionals**

**Saturday, June 17, 15:45–16:30**

**ABSTRACT:** Climate change and the burning of fossil fuels—which is the principal cause of climate change—are arguably the leading causes of preventable morbidity and mortality worldwide. In this talk Dr. Maibach will make the case that helping to lead efforts to rapidly decarbonize the world's energy supplies and limit global warming to the fullest extent possible is a necessary role for health professionals. Further, he will make the case that because health professionals are among the most trusted voices in communities worldwide, and because the climate/health narrative is uniquely effective in increasing public engagement with the issue, health professionals have a unique leadership role to play in the global effort.



## **Isaac Warbrick**

**Director of Taupua Waiora Māori Health Research Centre, Auckland University of Technology (AUT)**

*Dr Isaac Warbrick is of Ngāti Te Ata, Te Arawa, and Ngā Puhi descent, Māori tribes of New Zealand's North Island. He is the director of Taupua Waiora Māori Health Research*

*Centre at Auckland University of Technology (AUT). Isaac's background is in exercise physiology and research exploring the role of physical activity in improving Māori health and reducing health inequities. His current research focuses on applying kōrero tuku iho (Māori narratives, knowledge, and stories) as a driver and motivator for living a healthy lifestyle, and the role of ancestral knowledge in realigning with the natural environment, strengthening cultural identity, and improving health and holistic well-being.*

## **'Moon walking' before Michael – Environmental rhythms and Indigenous systems of well-being'**

**June 17th, 11:15 – 11:45 hours, Hall B**

**ABSTRACT:** Indigenous knowledge and systems of well-being highlight the close connection between the natural environment and the health of people. Our relationship with the environment relates to our ability to provide food, the way we move and are active, and the maintenance of spiritual well-being, and cultural identity. Contemporary scientific literature has also shown that engagement with natural environments improves physical health, mental well-being, and management of stress. On the other hand, modern lifestyles are characterised by a disconnection from the natural environment and the natural rhythms and cycles that were once closely observed by our tūpuna (ancestors).

Our ancestors observed the seasons, cycles, and rhythms on land, in oceans and waterways, and in the sky above to determine optimal times to perform certain activities, including when to plant, harvest, hunt, and collect food. In Aotearoa (New Zealand), this system of observation is known as the maramataka (often termed the 'Māori lunar calendar'). Although some of these practices, and the knowledge underpinning this system have been diminished or lost due to colonisation, Indigenous peoples continue to observe, record, and pass down their observations, and align their lives and activities to natural cycles. What's more, communities are leading the rejuvenation of these practices throughout Aotearoa and the Pacific.

Our culture and the reclamation of cultural knowledge are drivers for lifestyle change. Thus, many are reclaiming culturally relevant approaches to health, where physically activity, healthy

eating, and a lifestyle more attuned with the environment become secondary outcomes of strengthening cultural knowledge and identity.



## **Lena Nilsson**

**Epidemiology and Global Health, Umeå University**

*Lena Maria Nilsson's Sámi roots are from Malå in Västerbotten, Sweden, a Forrest Sámi area highly affected by industries such as mining, forestry, energy production and tourism. She is a nutrition epidemiologist by*

*training and employed as a research project coordinator at the Arctic Centre and the Department of Epidemiology and Global Health at Umeå Universitähäta (the official Sámi name of Umeå University). In 2012 Nilsson defended her PhD thesis focusing on traditional Sami food as a determinant of health. As of April 2023, her total scientific production included 79 peer reviewed papers and 11 book chapters. Recently she also contributed to the IPCC report Climate change 2022: impacts, adaptation and vulnerability, with a scoping literature review on Indigenous peoples' health and well-being in a changing climate. In 2020 Lena Maria Nilsson was honored by being appointed a knight in the French Order of Academic Palms. At present she is deeply involved in the research group Lávvuo – research and education for Sámi health, a group of Sámi and non-Sámi professionals at the department of Epidemiology and Global Health with the goal to improve the health and well-being of the Sámi people in Sweden through high quality research and education activities.*

## **Indigenous Sámi food systems in Sweden – resiliency, threats and possibilities**

**June 17th, 11:15 – 11:45 hours, Main Hall**

**ABSTRACT:** Sámi people are the only Indigenous people of the European Union with their traditional homelands situated in the northern half of Norway, Sweden, Finland and the Kola Peninsula of Russia. Sámi people live all over Sweden, with the highest population density in the northern inland. Traditional Sámi food is mainly based on natural resources in the Arctic environment such as wild berries, plants, fish, game and semi-domesticated reindeer. Some trade-based foods such as cereals and stove-top or campfire boiled un-filtered coffee are also significant for the Sámi cuisine.

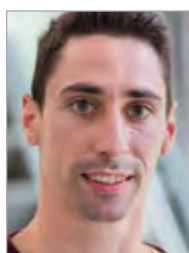
Previous studies based on data from the Northern Sweden Diet Database as well as recent indicators of traditional Sámi diet from the large registry population based cross-sectional study Sámi Health on Equal Terms (SamiHET, 2021) confirms a continued strong importance of traditional Sámi food in





the Sámi population in Sweden. However, climate change and the so-called green transition is threatening the Sámi food system. In addition, EU legislation as well as knowledge gaps and ignorance of the nutritional value and health aspects of traditional Sámi food, means an obstacle to traditional knowledge transfer necessary for a sustainable and sovereign future food system in Arctic Sweden.

This presentation is partly based on a book chapter, published last year in the Anthology "The Sámi word" edited by Sanna Valkonen et al, and partly on data from the SamiHET study.



## **Jairo H Migueles**

**Department of Biosciences and Nutrition, Karolinska Institutet, Huddinge, Sweden**

*Jairo H Migueles is a physical activity researcher with expertise in the measurement of physical activity using accelerometers and the use and processing of data from wearable*

*sensor data in general. In 2020, Jairo defended his PhD thesis on the measurement of physical activity with accelerometers and its relationship with health outcomes. In 2023, his research trajectory shows more than 80 peer-reviewed publications, including two "highly cited papers" according to the Thomson Reuters Essential Science Indicators (Web of Science). Jairo provided support to conduct the systematic reviews of evidence behind the 2020 World Health Organization's Guidelines on Physical Activity and Sedentary Behaviour. He is currently heavily involved in the development of methods for measuring physical activity and sleep, being co-developer of the R package 'GGIR', and main developer of the R package 'actilifecounts', among other tools. His passion is to develop methods and provide consultancy to facilitate research on physical activity and sleep and related outcomes using wearable sensors.*

## **Lessons learnt on the measurement of physical activity with movement sensors**

**June 17th, 11:15 – 11:45 hours, Hall C**

**ABSTRACT:** Accelerometers were first used to estimate energy expenditure and physical activity in the early 1980s. The vertiginous advancements in the technology made it possible to access to the raw data, increase precision in the recordings, measure different planes of movement, or record longer periods of time without having to recharge the devices. Researchers have developed methods to clean and analyse such amount of information as they had access to the data, which has led to many parallel efforts to address similar challenges. As a result, a myriad of methods with limited comparability to process the raw data and extract physical activity, sedentary behaviour, and

sleep related characteristics have been developed. The flip side is that the harmonisation of the accelerometer-based measure of movement behaviours remains a challenge today.

At a time when the field is moving from closed (proprietary) to open-source algorithms and methods, now is the time to reflect on what we can do as a field to address this challenge. This presentation will take a critical look at the measurement of physical activity with accelerometers, from the concepts to the decisions that should be made to process the accelerometer signal. Some of the contents shared in this presentation are personal opinions based on years of research and as such is open for discussion.



## **Jenny Rossen**

**Department of Health Promoting Science, Sophiahemmet University**

*Dr Jenny Rossen is a senior lecturer at Sophiahemmet University in Stockholm, Sweden. She teaches nursing students in public health, health promotion, behavior change, and research methodology. Her*

*background is in nutrition and sport science.*

*Jenny defended her thesis in 2018 at Karolinska Institutet, Stockholm, the title of the thesis was "Support for physical activity in individuals with prediabetes and type 2 diabetes in primary care-the Sophia Step Study". Her research as a post-doc and junior researcher at Sophiahemmet University has since taken two main paths, one is physical activity epidemiology, which includes studying patterns of physical activity and sedentary behavior in relation to health outcomes. The other path is intervention and behavior change research. Jenny has an interest in developing and evaluating behavioural interventions that are optimised and adapted to individual needs, preferences, and circumstances.*

## **Behavioural intervention research – the value of formative and process evaluation**

**June 17th, 11:15 – 11:45 hours, Rooms K3+4**

**ABSTRACT:** Human behaviours such as lifestyle habits are challenging to change and complex to study. Whether implementing interventions in health care settings or using digital platforms a thorough planning phase including an underpinning programme theory and undertaking a process evaluation are key phases for a better understanding of what works.

I will present some of my experiences from behavioural intervention research. We followed the Medical Research Council guidance for evaluating complex interventions to undertake a process evaluation of a two-year pedometer intervention with or without counselling in primary care. The process evaluation included the delivery of the interventions,



intervention dose, and patterns of behavior change. Further, we studied intervention mechanisms as perceived by the participants through qualitative interviews. For an upcoming real-world study, we have performed a formative research phase, including focus group interviews, a systematic review, and co-development of the intervention in close collaboration with a tech company.



**Maria Somaraki**  
**Researcher, MoISA, Univ Montpellier,**  
**CIRAD, CIHEAM-IAMM, INRAE, Institut**  
**Agro, IRD, Montpellier, France**

*I am a researcher at UMR MoISA (Montpellier Interdisciplinary center on Sustainable Agri-food systems) in France. My research interests revolve around healthy and*

*sustainable diets adopting an epidemiological approach to identify relevant actions to promote public health through nutrition.*

*I am a dietitian-nutritionist with a background in Public Health Sciences. My studies were carried out in different settings, which has enriched my perspective on different aspects of eating and food environments. In December 2020, I defended my doctoral thesis entitled: "Parent-child feeding dynamics and childhood obesity: The importance of foreign background and effects of early obesity treatment" at Uppsala University (Sweden). During my post-doctoral studies at the Centre for Taste and Feeding Behaviour (CSGA) in Dijon, France, I focused on early neurodevelopmental outcomes in a French birth cohort investigating the immediate food environment –defined by parent-child feeding dynamics during the first year of life.*

## **Food behaviours and the environment: a social-ecological perspective**

**June 17th, 11:15 – 11:45 hours, Hall D**

**ABSTRACT:** Food behaviours are integral components of health behaviours that mobilise interdisciplinary research processes. The social-ecological framework describes the different levels of influence on individual food behaviours and health outcomes. These levels of influence involve different food environments encompassing socio-cultural processes and their interactions to shape how and what humans eat.

My research has acknowledged such processes in regard to children's food behaviours in the context of childhood obesity and neurodevelopment. I focused on the home food environment that shapes children's eating habits and behaviours. This is defined by the parent-child feeding dynamics involving different components, namely parental feeding practices and child food behaviours. Obesity-related feeding practices and food behaviours were associated with mother's foreign

background, i.e. a broader level of influence. In addition, early feeding practices that pertain to introduction to food texture were associated with lower scores for child developmental milestones, i.e. motor and cognitive skills, which represent the individual level of influence.

Against a backdrop of higher obesity rates among children from disadvantaged backgrounds, I evaluated the effects of a treatment programme involving parents and how they can re-shape the home food environment. The findings showed that parents may influence the home environment, beyond their feeding practices, through clear rules and routines with the child. In addition, involvement of all caregivers is noteworthy, including fathers who are typically underrepresented in research.

My current research seeks to unravel sustainable diets and food supply practices applying this social-ecological understanding of food behaviours. To this end, I am interested in further understanding levers for sustainable diets at the consumer level, considering different production modes, changing food environments and diverse backgrounds.



## Ageing

**Time:** Wednesday, 16:15 – 17:30 hours

**Location:** UKK – Hall D (Level 2 – main floor)

- **Stephanie Alley**, *CQUniversity Australia*  
Engagement, acceptability, usability and satisfaction with Active for Life, a computer-tailored web-based physical activity intervention using Fitbits in older adults (502)
- **Clare Collins**, *The University Of Newcastle*  
Reduction in diet quality is associated with a greater healthcare claims and charges over 21-years in Australian women (506)
- **Anne Tiedemann**, *University Of Sydney*  
Impact of physical activity on dynamic balance & prevention of falls in middle age: systematic review & meta-analysis (772)

## Cancer prevention and management

**Time:** 16:15 – 17:30 hours

**Location:** UKK – Hall D (Level 2 - main floor)

- **Ki-Yong An**, *University of Alberta*  
A higher level of health-related fitness is related to better physical quality of life in newly diagnosed breast cancer patients (641))
- **Angela Fong**, *Rutgers Cancer Institute of New Jersey*  
Feasibility and preliminary efficacy of an online-delivered resistance exercise intervention among racially diverse breast cancer survivors: The B-REP Trial (877)
- **Meeke Hoedjes**, *Tilburg University*  
Using the Behavior Change Wheel to identify and understand key facilitators and barriers for lifestyle care for postmenopausal breast cancer survivors: A Delphi-study (367)

## Children and Families

**Time:** 16:15 – 17:30 hours

**Location:** UKK – Hall B (Level 3)

- **Lee Ashton**, *University of Newcastle*  
Feasibility of Daughters and Dads Cricket: a program targeting fathers to improve daughters' engagement and skills in cricket. (709)
- **Ana Maria Contardo-Ayala**, *Deakin University*  
Are sitting, standing and stepping associated with adiposity markers in youth?: A compositional approach (795)
- **Cristina Gago**, *Nyu Langone Health*  
Which components of a family-based obesity prevention intervention matter most in predicting change in preschool

parents' empowerment and healthy weight parenting practices? (1081)

- **Elena Jansen**, *Johns Hopkins School of Medicine*  
Parent-reported child appetite moderates relationships between child genetic obesity risk and parental feeding response (986)

## Early care and education | Young Adults

**Time:** 16:15 – 17:30 hours

**Location:** UKK – K1 (+K2) (Level 3)

- **Hayley Christian**, *Telethon Kids Institute, University of Western Australia*  
Play Active Program for Early Childhood Education and Care: A Pragmatic RCT (786)
- **Shreela Sharma**, *University of Texas Health Science Center at Houston, School of Public Health*  
Nurturing Healthy Teachers: A cluster quasi-experimental trial to improve the health, well-being, and food security of early care and education (ECE) professionals (572)
- **Nancy Wells**, *Cornell University*  
Gardening in Childcare Centers: A Cluster Randomized Controlled Trial Examining Effects on Physical Activity among Children (683))

## Young Adults

**Time:** 16:15 – 17:30 hours

**Location:** UKK – K1 (+K2) (Level 3)

- **Matthew Jenkins**, *University of Otago*  
A co-designed system of support for the health of young people experiencing first episode psychosis (273)
- **Maryam Marashi**, *University of Toronto*  
What predicts food and physical activity tracking among young adults: Results from the longitudinal Canadian NDIT study (1128)
- **Rebecca Raeside**, *University of Sydney*  
Effectiveness of digital health interventions targeting lifestyle risk behaviours on improving adolescent mental health or wellbeing: a systematic review with meta-analysis (376)

## Implementation & scalability

**Time:** 16:15 – 17:30 hours

**Location:** UKK – Hall C (Level 3)

- **Rachel Sutherland**, *University of Newcastle*  
Optimising the effectiveness, cost effectiveness, reach and adoption of a school nutrition intervention for national scale up (843)





- **Matthew Bourke**, *Western University*  
Effect of Capacity Building Interventions on Classroom Teacher and Early Childhood Educator Perceived Capabilities, Knowledge, and Attitudes Relating to Physical Activity and Fundamental Movement Skills: A Systematic Review and Meta-Analysis (347)
- **Cassandra Lane**, *University of Newcastle*  
Using sequential randomised and controlled trials to optimise a physical activity policy implementation strategy: the PACE case study (534)

## Policies and Environments

**Time:** 16:15 – 17:30 hours

**Location:** UKK – Hall C (Level 3)

- **Jack Benton**, *University of Manchester*  
The effects of the “Grow Green” urban greening improvements on physical activity and other wellbeing behaviours in Manchester UK: A natural experimental study (437)
- **Julie Lengle**, *University of Oslo*  
Environmental impact of Norwegian self-selected diets and potential benefits of transitions to diets consistent with national and international dietary guidelines (455)
- **Narakorn Wongsingha**, *Institute for Population and Social Research, Mahidol University, Thailand Physical Activity Knowledge Development Centre*  
Investments in community-wide initiative in physical activity: how do we evaluate its implementation and public participation? (1075)

## Motivation and Behavior Change

**Time:** 16:15 – 17:30 hours

**Location:** UKK – Level 6 Foyer

- **Dot Dumuid**, *University of South Australia*  
Could supporting routinization be key to improving physical activity? (706)
- **Breanne Wilhite**, *Tufts Friedman School of Nutrition Science and Policy*  
Operationalizing behavioral theory in a communications campaign to improve physical activity (PA) parenting behaviors (972)
- **Katharina Ruettgger**, *Loughborough University*  
Drivers with and without obesity respond differently to a multi-component health intervention in heavy goods vehicle drivers (302)

## e- &mHealth

**Time:** 16:15 – 17:30 hours

**Location:** UKK – Level 6 Foyer

- **Ty Ferguson**, *University of South Australia*  
The annual rhythms in physical activity, sedentary behavior and sleep of Australian adults: a prospective cohort study (372)
- **Magda Rosin**, *The University of Auckland*  
Bridging the Gap: Development and evaluation of digital tools to support adoption and implementation of the New Zealand Healthy Food and Drink Policy (472)
- **James Sanders**, *Loughborough University*  
Using the Intervention Mapping Framework to develop a mHealth Snacktivity™ intervention to promote physical activity (910)

## Socio-economic inequalities

**Time:** 16:15 – 17:30 hours

**Location:** UKK – K3+4 (Level 3)

- **Juan Miguel Fernández Alvira**, *Centro Nacional De Investigaciones Cardiovasculares (cnic)*  
The accumulation of social vulnerabilities directly associates with obesity and weight gain over adolescence (387)
- **Andrea Mudd**, *Utrecht University*  
Socioeconomic inequalities in health and health behavior mapped out from a complex systems perspective: A systematic review (575)
- **Luiza Ricardo**, *MRC Epidemiology Unit, University of Cambridge*  
Gender gap for accelerometer-measured physical activity throughout the lifespan: A longitudinal analysis using five Brazilian cohort studies (582)

## Participatory research in health promotion

**Time:** 16:15 – 17:30 hours

**Location:** UKK – K3+4 (Level 3)

- **Laura Belmon**, *Amsterdam UMC*  
Perspectives of Spanish children on drivers of their energy balance-related behaviors: “¡Chic@s en Acción!” (1025)
- **Alan Coffey**, *Technological University of The Shannon*  
The barriers and facilitators to reducing sedentarism amongst home-office employees: An employer’s perspective (923)



## Chaired Poster Session: Ageing

**Time:** 17:30 hours-18:45 hours

**Location:** Level 2

- **Jessica Stroope**, *Louisiana State University*  
Active Transportation and Community Participation in Older Adults: Results from the WHO Survey of Global Ageing and Adult Health (450)
- **Sara Rosenkranz**, *University of Nevada, Las Vegas*  
Evaluating correlates of healthy eating and dietary quality among older adults: A mixed-methods approach to development and application of a new survey instrument (456)
- **Andrew Putman**, *University of Ontario Institute of Technology*  
Neighbourhood greenness moderates the association between physical activity and geriatric relevant health outcomes: An analysis of the CLSA (1033)
- **Irmina Klicnik**, *Ontario Tech University*  
Social Engagement during a Sedentary Time Reduction Intervention in Assisted Living (1089)
- **Irmina Klicnik**, *Ontario Tech University*  
Associations of Neighbourhood Greenness and Walkability with Social Participation among Older Canadians: An Analysis of the CLSA (1090)
- **Dori E. Rosenberg**, *Kaiser Permanente Washington Health Research Institute*  
Associations between profiles of the 24-hour activity cycle and cognitive function in older adults (358)
- **Mikael Anne Greenwood-hickman**, *Kaiser Permanente Washington Health Research Institute*  
Pre-pandemic Sleep and Activity Behaviors and Associated Change in Depressive Symptoms during the COVID-19 Pandemic (1059)

## Chaired Poster Session: Children and families

**Time:** 17:30 hours-18:45 hours

**Location:** Level 6

- **Nan Zeng**, *University of New Mexico Health Sciences Center*  
Effects of Home-based Exergaming on Preschool Children's Cognition, Sedentary Behavior, and Physical Activity: A Randomized Crossover Trial (599)
- **Gregory S Kolt**, *Western Sydney University*  
Physical activity and inactivity during youth sport and dance: A systematic review and meta-analysis (722)

- **Amaya de Cos-Gandoy**, *She Foundation*  
Influence of parental health on children's health behaviors from the SI! Program for Elementary Schools (451)
- **Daniela Rodrigues**, *University of Coimbra*  
Sex differences and family determinants in children's time use throughout the day (583)
- **Sarah Overgaard Sørensen**, *University of Southern Denmark*  
Study protocol for the Screen Free Time with Friends Feasibility Trial (674)
- **Nicole McCarthy**, *University of Newcastle*  
Cluster randomised controlled trial to determine the impact of an activity enabling uniform on primary school student's fitness and physical activity (708)

## Chaired Poster Session: Cancer prevention and management

**Time:** 17:30 – 18:45 hours

**Location:** Level 2

- **Linda Trinh**, *University of Toronto*  
Changes in Physical Activity, Sedentary Behavior and Cognitive Function among Cancer Survivors During the COVID-19 Pandemic (282)
- **Spencer Allen**, *University of Alberta*  
Associations between Health-Related Fitness Measures and General Health in Newly Diagnosed Breast Cancer Patients from the AMBER Cohort Study (751)
- **Anna Henriksson**, *Uppsala University*  
Exercise adherence trajectory during chemotherapy treatment in patients with breast cancer- Results from the Phys-Can study (800)
- **Judith de Vries-ten Have**, *Wageningen University*  
Design and baseline results of the SoFiT study: a randomized controlled intervention to study the effect of a personalized lifestyle program on cancer-related fatigue in colorectal cancer survivors (887)
- **Cynthia Forbes**, *University of Hull*  
Using Intervention Mapping in adapting a smartphone-based cardiac rehabilitation programme for older adults living with and beyond cancer: A work in progress (158)
- **Grace Brannon**, *UT Arlington*  
A qualitative analysis examining the impact of a biosensor feedback-based physical activity intervention on motivation and behavior change in cancer survivors (462)



- **Ki-Yong An**, *University of Alberta*  
Associations between cancer and cardiovascular disease diagnosis history and physical activity in Korean adults (712)
- **Hania Taha (corresponding author)**, *University of Illinois at Urbana-Champaign*  
Preliminary effects of a carbohydrate-restricted, high-fat diet in head and neck cancer patients undergoing radiotherapy: A pilot randomized controlled trial (1105)

## Chaired Poster Session: e- & mHealth

**Time:** 17:30 – 18:45 hours

**Location:** Level 2

- **Anke Hanssen-doose**, *University of Education Karlsruhe*  
Reliability of the digital physical fitness test digimot (686)
- **Jonah Thomas**, *Loughborough University*  
A systematic scoping review of accelerometer-measured physical activity datasets that include markers of cardiometabolic health: The Global Physical Activity Dataset (GPAD) catalogue (898)
- **Rebecca Krukowski**, *University of Bayreuth*  
Investigating Evidence of a Digital Divide in the Recruitment, Randomization, Engagement, Retention, and Efficacy in Post-Smoking Cessation Weight Management Clinical Trial (29)
- **Matthew McGrievy**, *University of South Carolina Arnold School of Public Health*  
Design, technical challenges, solutions, and participant feedback of the mobile Lifestyle Intervention for Food and Exercise (mLIFE) app (468)
- **Riley C C Brown**, *The University of Queensland*  
Utilizing technology for Diet and Exercise Change In complex chronic conditions across Diverse Environments (U-DECIDE Study): feasibility randomised controlled trial (522)
- **Anna Jansson**, *University of Newcastle*  
Outdoor gym resistance training workouts delivered via mHealth: Process evaluation from the ecofit effectiveness trial (743)
- **Georgina Wort**, *University of Bath*  
Pupils' experiences of physical activity and wearable technologies within primary school (830)
- **Chen-Chia Pan**, *Leibniz Institute for Prevention Research and Epidemiology*  
Smartphone- & Wearable-based Activity Trackers–Determinants of Engagement: Study Design and Instrument Development (880)

## Chaired Poster Session: Early care and education

**Time:** 17:30 – 18:45 hours

**Location:** Level 2

- **Devan Antczak**, *University of Wollongong*  
The Sleep and Activity Database for the Early Years (SADEY) project: International collaboration and data pooling to understand young children's 24-hour movement behaviours. (733)
- **Lynne Lafave**, *Mount Royal University*  
Assessing Physical Literacy Knowledge, Attitudes and Behaviours in Early Childhood Educators: Face and Content Validity Study (1050)
- **Mara Kirschner**, *Open Universiteit of the Netherlands*  
Effect of a physical activity-based lifestyle intervention on mental wellbeing of vocational education and training student (351)
- **Georgie Tran**, *University of Wollongong*  
Developing and testing an online quality improvement tool for service providers and educators in family day care to improve nutrition and physical activity practices (359)
- **Audrey Elford**, *Deakin University*  
Environmentally sustainable, healthy, and affordable food provision in childcare: a fine balancing act. (421)
- **Ana Renda**, *University of Newcastle*  
Assessing the implementation of obesity prevention practices in Early Childhood Education and Care setting in New South Wales, Australia: a cross-sectional study. (813)
- **Bianca Schmidli**, *Department of Health Science, Institute of Sport Science, University of Bern*  
Swiss pre-school children's type and level of physical activity during open gym programs (936)
- **Trish Tucker**, *University of Western Ontario*  
Implementation of the TEACH e-Learning course on physical activity and sedentary behaviour for pre- and in-service early childhood educators: A pilot study (1013)

## Chaired Poster Session: Implementation and scalability

**Time:** 17:30 – 18:45 hours

**Location:** Level 2

- **Melanie Nichols**, *Deakin University*  
Nutrition and physical activity data harmonisation across complex community interventions to support pooled analysis and generate generalisable insights (510)





- **Marlinde L. van Dijk**, *Amsterdam Umc*  
Barriers and facilitators for implementing a 'lifestyle is medicine' model of care in hospitalized care: a qualitative study (593)
- **Caitlin Golden**, *University of Nebraska Medical Center*  
Customer Discovery for Scale Up: Enhancing the Acceptability and Scalability of the Building Healthy Families Program (604)
- **Caitlin Golden**, *University of Nebraska Medical Center*  
Comparing direct and indirect assessments of fidelity in a family healthy weight program (678)
- **Josephine Chau**, *Macquarie University*  
What types of brief vigorous intermittent physical activity could workplace interventions try as 'exercise snacks'? A scoping review (613)
- **Ana Renda**, *University of Newcastle*  
Barriers and facilitators to dissemination of obesity prevention research: a mixed methods systematic review. (814)
- **Nina Abrahams**, *University of Bristol; University of Cape Town*  
Using mixed-methods social network research to grow and sustain complex community-based health programmes in low- and middle-income countries: Benefits, limitations, and potential solutions. (955)
- **Emma Ostermeier**, *Western University*  
Implementation Models and Frameworks Used to Guide Community-Based Physical Activity Programs for Children: A Scoping Review (1082)

## Chaired Poster Session: Motivation and behavior change

**Time:** 17:30 – 18:45 hours

**Location:** Level 2

- **Uthman Albakri**, *Maastricht University and Albaha University*  
The association between sleep quality and the need for recovery among nurses working irregular shifts: A cross-sectional study (555)
- **Uthman Albakri**, *Maastricht University and Albaha University*  
Strategies and lifestyle behaviors that nurses working irregular night shifts use to improve sleep quality: A qualitative interview study among good and bad sleepers (564)
- **Christine Pellegrini**, *University of South Carolina*  
A cross-country ecological momentary assessment of joint association between outdoor and social contexts on movement behaviors (588)
- **Katja Dierkes**, *Institute of Sports Science, University of Tübingen*  
Does Exercise Modality Matter Affectively? Contrasting Type and Sequence of Moderate-Intensity Continuous Training versus High-Intensity Interval Training in a Randomized Within-Subject Study (858)
- **Rebecca Coulter**, *University of Victoria*  
Examining Exercise Motivation and Physical Activity Patterns Among Users and Non-Users of Wrist-Worn Wearable Activity Trackers (1071)
- **Pablo Campos-Garzón**, *University of Granada*  
Physical activity energy expenditure of active commuting to/from school: The ENERGYCO Study (371)
- **Carol Curtin, E.k. Shriver Ctr**, *Umass Chan Medical School*  
The Feasibility of a Remotely-Delivered Physical and Food Literacy Program for Youth with Intellectual Disabilities (ID) (609)
- **Pia Laemmert**, *University of Bayreuth*  
The role of nature as a resource for student's health in the university setting (818)
- **Jessica Malloy**, *University of Auckland*  
Co-Designing a Lifestyle-Focused Social Media Intervention for Young Women (355)
- **Thomas Sire**, *Université Du Québec À Trois-rivières*  
Factors that influence firefighters' food choices at the fire station (1053)
- **Ambria Crusan**, *St. Catherine University*  
Using community-based participatory research to support increased compliance to DASH diet recommendations in immigrant, Hispanic/Latinx individuals with cardiovascular disease and obesity (337)
- **Jordan Curry**, *University of Hull*  
The development and testing of a website (ExerciseGuide UK) for people with lung cancer: reflections on the added value of patient and public involvement within a doctoral degree (464)
- **Tina Gingell**, *Qut*  
Connecting with Cultural Foods: Exploring food security among people from refugee backgrounds (489)

## Chaired Poster Session: Participatory Research in Health Promotion

**Time:** 17:30 – 18:45 hours

**Location:** Level 2



- **Sophie Wright-Pedersen**, *Queensland University of Technology*  
The extent and nature of children's participation in investigations of food practice determinants: a scoping review (513)
- **Suzannah D'Hooghe**, *Sciensano*  
Perceived environmental factors affecting recreational walking behavior among socioeconomically disadvantaged adults (963)
- **Ash Cox**, *Edge Hill University*  
The Feasibility and Acceptability of an Online CPD Programme to Enhance PE Teachers' Knowledge of Muscular Fitness Activity (1007)

## Chaired Poster Session: Policies and environments

**Time:** 17:30 – 18:45 hours

**Location:** Level 6

- **Gabriel Wong**, *Saw Swee Hock School of Public Health*  
Understanding the perspectives of the food retail sector towards policies to reduce sodium in the food supply (528)
- **Rebecca Kehm**, *Columbia University*  
Neighborhood environment and physical activity in girls: findings from the LEGACY Girls Study (615)
- **Lisa Quintiliani**, *Boston Medical Center, Boston University*  
Multilevel Physical Activity Intervention for Low Income Public Housing Residents in the U.S.: Protocol for the Community Walks Trial (540)
- **Thera A. M. Peeters (Corresponding Author)**, *Erasmus Mc*  
Effect of Changing Fast-food Environments on Children's Eating Behaviour: A Random Effect Within Between Analysis within the Generation R Study (647)
- **Andrea Barney**, *Brigham Young University*  
Carbon footprint of diets among K-12 students in the USA (716)
- **Jasmine Kaidbey**, *The George Washington University*  
State laws that expand water access are less common and less opposed than state laws that restrict sugar sweetened beverages in the United States (1087)
- **Kamila Tiemann Gabe**, *University of Sao Paulo*  
Is the adherence to the food practices recommended by the 2014 Brazilian Food Guide associated with a healthier diet? (907)

- **Emily Denniss**, *Deakin University*  
Nutrition-related information on Instagram: A content analysis of posts by popular Australian accounts (732)

## Chaired Poster Session: Socio-economic inequalities

**Time:** 17:30 – 18:45 hours

**Location:** Level 6

- **Patrick Brady**, *University of Minnesota*  
Perceptions of Strengths and Needs Emerging During the COVID-19 Pandemic in Minnesota's Emergency Food System (452)
- **Katja Siefken**, *Msh Medical School Hamburg*  
Better Late Than Never?! Five Compelling Reasons for Putting Physical Activity in Low- and Middle-Income Countries High Up on the Public Health Research Agenda (320)
- **Chelsea Pelletier**, *University of Northern British Columbia*  
Rural-urban differences in domain-specific physical activity in Canadian adults (598)
- **Anna Lene Seidler**, *University of Sydney*  
Early childhood obesity prevention interventions – are we reaching the right populations to address this health equity problem? (773)
- **Miika Tuominen**, *University of Turku*  
Changes in self-reported physical activity engagement across retirement transition among retirees from different occupational backgrounds (831)
- **Rachel Liebe**, *Virginia Tech*  
Factors that Predict Interest in Participation in Nutrition Interventions among Audiences with Low Incomes during COVID-19 (870)
- **Rachel Liebe**, *Virginia Tech*  
Accessibility, Quality, and Selection of Nutritious Foods Differ by Food Security Status in Virginia (920)
- **Christian Maino Vieytes**, *University of Illinois at Urbana-Champaign*  
Prevalent Dietary Patterns in U.S. Food-Insecure Cancer Survivors are Associated with Mortality: NHANES 1999-2018 (1045)



## Chaired Poster Session: Young Adults

**Time:** 17:30 – 18:45 hours

**Location:** Level 2

- **Tara Grogan, corresponding, *Norwich University***  
Measuring Resilience and Mental Health as Moderated by Daily Habits of Senior Military College Students. (901)
- **Emily Heying, *College of Saint Benedict***  
Understanding Food Insecurity at Residential Liberal Arts Colleges: Roles of Campus Dining Options and Cooking Habits (1076)
- **Kayla Parsons, *University of Maine***  
The Relationship Between Intuitive Eating and Dining Out Frequency in Undergraduates in the United States (446)
- **Bo Peng, *The Chinese University of Hong Kong***  
Barriers and facilitators to physical activity for young adult women: a systematic review of qualitative research (521)
- **Sarah Jenner, *University of Southampton***  
Identity-based adolescent health interventions: A systematic review (592)
- **Emma Watras, *University of Maine***  
Cooking Self-Efficacy and Nutrition Knowledge Predict Diet Quality in College Students (658)
- **Caera Grady, *University of Limerick***  
Communicating Physical Activity to Adolescents: what works? A scoping review (829)
- **Matthew Savage, *Nottingham Trent University***  
Exploring factors associated with sedentary behaviour pre, during, and post covid-related restrictions in UK university students: A pooled cross-sectional analysis (1121)





## ISBNPA Implementation Science Short Course

**When:** June 12 (09:00 – 18:00 hours) and

June 13 (08:00 – 14:00 hours)

**Where:** Amsterdam UMC/VU University

**Cost:** EUR 250 (exl. VAT) includes 2 lunches and 1 dinner

30 spaces available

### Course Overview

Join us for a two-day implementation science short course designed to equip you (beginner in implementation science) with the skills and knowledge you need to successfully translate research into practice in the field of physical activity, nutrition and health promotion. Led by international experts in the field of implementation science and nutrition and physical activity, this course will cover key topics such as:

- Understanding the principles of implementation science
- Identifying barriers and facilitators to implementation using theories and frameworks
- Developing and testing implementation strategies
- Evaluating the effectiveness of implementation efforts

### Who Should Attend?

Whether you're a researcher, practitioner, or policymaker, this course is for you. You'll gain practical tools and techniques that you can apply to your work immediately, and you'll have the opportunity to network with other professionals in the field. We encourage you to register early to secure your spot as only 30 spaces are available! (ISBNPA members are given priority).

### Course Date and Costing

The course will take place on June 12 (09:00 – 18:00 hours) and June 13 (08:00 – 14:00 hours) at the Amsterdam UMC/VU University. The cost is 250 Euro (ex VAT). Lunch on both days, and a group dinner on Monday in Amsterdam are included in the price.

### Here's what you'll get when you enroll in our implementation science short course:

Two days of expert instruction: Our instructors are experts in the field of implementation science and have years of experience in translating research into practice.

- Hands-on learning: You'll have the opportunity to participate in interactive exercises and case studies that will help you apply the concepts you've learned.
- Networking opportunities: You will connect with other professionals in the field of implementation science and learn from their experiences.
- Course materials: You'll receive a course workbook and other materials to help you review and apply what you've learned.
- Certificate of completion: After successfully completing the course, you'll receive a certificate of completion to add to your professional portfolio.

We look forward to seeing you at our implementation science short course and helping you take your skills to the next level!



## WEDNESDAY, JUNE 14

### Pre-Conference Workshops

The pre-conference workshops will take place at the Biomedical Centre on Wednesday, June 14 and must be pre-registered.

**Address:** Husargatan 3, 751 23 Uppsala

**PUBLIC ENTRANCES ARE:**

**A11:** 1 from Dag Hammarskjöldsväg

**C7:** 2 from Husargatan

**A8:** 1 from Norra vägen

**Entrance SciLife / Hub is C11:** 1 from Dag Hammarskjöldsväg

**How a room number is built**

**Building** **Floor** **Room No.**  
**B7 : 1 25a**

**08:30 – 12:30 hours**

**Biomedical Centre**  
**A9:011**

WS.1.01

**Observational research and causal conclusions: friends or foes?**

Dr. Jelle Van Cauwenberg

Dr. Louise Poppe

**09:00 – 12:00 hours**

**Biomedical Centre**  
**A9:017**

WS.1.02

**Connections Matter: Introduction and Application of Social Network Analysis**

Dr. Tyler Prochnow

Dr. Katherine Arlinghaus

**08:45 – 13:00 hours**

**Biomedical Centre**  
**A9:001**

WS.1.03

**What works for whom under which circumstances and how: an introduction and practical guide to evaluate health behavior interventions using realist review**

Dr. Sofie Compernelle

Mrs. Rebecca Hunter

Miss Laura Van de Velde

**08:00 – 13:00 hours**

**Biomedical Centre**  
**A9:105**

WS.1.04

**Intervention Optimization: An Introduction to the MOST Mindset**

Dr. Kate Guastaferro

Dr. Heather Wasser

**09:00 – 13:00 hours**

**Biomedical Centre**  
**A7:115**

WS.1.05

**Introduction to and hands-on practice with system dynamics using the CO-CREATE model on youth obesity prevention**

Prof. Nanna Lien

Mrs. Anaely Aguiar Rodriguez

**08:00 – 13:00 hours**

**Biomedical Centre**  
**A7:111**

WS.1.06

**Designing interventions to promote community health: a multilevel, stepwise approach**

Dr. Leslie Lytle

Dr. Jess Haines

Dr. Allison Myers

**08:30 – 13:00 hours**

**Biomedical Centre**  
**B7:101**

WS.1.07

**Network of Early Career Researchers and Students of ISBNPA (NESI) Workshop**

Dr. Stephen Barrett

Dr. Emma Lawlor

**08:30 – 13:00 hours**

**Biomedical Centre**  
**A5:001**

WS.1.08

**Data science for nutrition research—an introduction to programming**

Dr. Francesca Pontin

Tamara Garcia del Toro

*Continued...*

# PRE-CONFERENCE WORKSHOPS (CONT'D)



08:30 – 12:30 hours

Biomedical Centre  
B8:001

WS.1.09

## Cognitive interviewing for improved measurement in behavioral nutrition and physical activity

Dr. Cassandra Johnson  
Associate Prof. Katherine Dickin  
Dr. Amanda McClain

08:30 – 12:30 hours

Biomedical Centre  
A3:117

WS.1.10

## Engaging vulnerable or marginalized populations in health behavior research: ethical considerations and lessons learned

Dr. Marilyn Wende  
Ms. Jessica Stroope  
Prof. Renée Umstattd Meyer

09:00 – 12:30 hours

Biomedical Centre  
A7:103

WS.1.11

## Mobile Health App Development Using a “No-code” App Builder

Dr. Sam Liu  
Amanda Willms

## Dare2Share Sessions

09:00 – 13:00 hours

Biomedical Centre  
A9:111

d2s.0.01

## Launching a Digital Citizen Science Observatory: Rapid Systems Mapping to Create a Global Digital Ecosystem for Active Living and Nutrition Research

Dr. Jasmin Bhawra  
Dr. Tarun Katapally  
Claire Buchan

12:00 – 13:00 hours

Biomedical Centre  
A9:117

d2s.0.02

## Towards open and reproducible science in physical activity and behavioural nutrition research - what and how?

Dr. Trynke Hoekstra  
Borja Del Pozo Cruz

11:00 – 13:00 hours

Biomedical Centre  
B8:002

## Learning how to resource the main phase of the study without a grant. Experiences from the SUNRISE International Study

Prof. Tony Okely

## PRE-CONFERENCE WORKSHOPS AND DARE2SHARE SESSIONS

### Wednesday, June 14 • Biomedical Centre (BMC)

Address: Husargatan 3, Uppsala. Entrances A8 (from Norra vägen) and A11 (from Dag Hammarskjöldsväg) are open between 07:30 and 17:00 hrs. BMC's reception is located in room B7: 121a, in the center of the building.

WORKSHOPS											Dare2Share		
Room A9:011	Room A9:017	Room A9:001	Room A9:105	Room A7:115	Room A7:111	Room B7:101	Room A5:001	Room B8:001	Room A3:117	Room A7:103	Room A9:111	Room A9:117	Room B8:002
08:30–12:30 <b>WS.1.01</b> Observational research and causal conclusions: friends or foes?	09:00–12:00 <b>WS.1.02</b> Connections Matter: Introduction and Application of Social Network Analysis	08:45–13:00 <b>WS.1.03</b> What works: an introduction and practical guide to evaluate health behavior interventions using realist review (title abbreviated)	08:00–13:00 <b>WS.1.04</b> Intervention Optimization: An Introduction to the MOST Mindset	09:00–13:00 <b>WS.1.05</b> Introduction to and hands-on practice with system dynamics using the CO-CREATE model on youth obesity prevention	09:00–12:30 <b>WS.1.06</b> Designing interventions to promote community health: a multilevel, stepwise approach	08:30–13:00 <b>WS.1.07</b> Network of Early Career Researchers and Students of ISBNPA (NESI) Workshop	08:30–13:00 <b>WS.1.08</b> Data science for nutrition research—an introduction to programming	09:00–12:30 <b>WS.1.09</b> Cognitive interviewing for improved measurement in behavioral nutrition and physical activity	08:30–12:30 <b>WS.1.10</b> Engaging vulnerable or marginalized populations in health behavior research: ethical considerations and lessons learned	09:00–12:30 <b>WS.1.11</b> Mobile Health App Development Using a “No-code” App Builder	09:00–13:00 <b>d2s.0.01</b> Launching a Digital Citizen Science Observatory: a Global Digital Ecosystem for Active Living and Nutrition Research (title abbreviated)	12:00–13:00 <b>d2s.0.02</b> Towards open and reproducible science in physical activity and behavioural nutrition research – what and how?	11:00–13:00 Learning how to resource the main phase of the study without a grant. Experiences from the SUNRISE International Study
14:00–15:45 Opening Ceremony & Keynote #1 at University Auditorium – Biskopsgatan 3, 753 10 Uppsala													
15:45–16:15 Walk to Uppsala Konsert & Kongress (UKK) – Vaksalagatan 1, 753 31 Uppsala													



# PROGRAM AT A GLANCE



## Wednesday June 14

Room	Foyer Level 6 (K10)	Hall B (Level 3)	Hall C (Level 3)	Hall D (Level 2)	K1 (+K2) (Level 3)	K3+4 (Level 3)
08:15–13:00	ISBNPA Executive Committee Meeting – K3, UKK					
14:00–14:30	Opening Ceremony – University Auditorium					
14:30–15:30	Keynote #1: Abby C. King, PhD <i>Community-engaged Citizen Science to Advance Healthy Lifestyles &amp; Health Equity Worldwide: Building the Science of Citizen Science</i> – University Auditorium					
15:45–16:15	Walk to UKK (30 minute window)					
16:15–17:30	Award Session Motivation and behaviour change   E- & mHealth	Award Session Children and Families	Award Session Implementation & scalability   Policies and environments	Award Session Ageing   Cancer prevention and management	Award Session Early care and education   Young Adults	Award Session Socio-economic inequalities   Participatory Research in Health Promotion
17:30–18:45	Chaired Poster Sessions – Hall D (Level 2) and Level 6					
	Coffee & Networking					

## Thursday June 15

Room	Main Hall (Level 6)	Foyer Level 6 (K10)	Hall B (Level 3)	Hall C (Level 3)	Hall D (Level 2)	K1 (+K2) (Level 3)	K3+4 (Level 3)	Gillesalen (Clarion Gillet Hotel)	Akademien (Clarion Gillet Hotel)	Swedenborg (Clarion Gillet Hotel)
07:00–07:30	ACTIVITY: Combined running and HIIT session (pre-registration required). Meeting point: UKK Entrance (facing Vaksala torg – market square)									
08:15–09:30	S.1.01 Novel approaches for assessing and analysing child eating behaviours	S.1.02 The methodological challenges of understanding and transforming systems to promote healthier dietary and physical activity behaviours: lessons from the LIKE and Mandala programmes	S.1.03 Food insecurity in context: Capturing lived experiences and exploring implications for research and policy	S.1.04 The Quest for a Valid and Reliable Global Adolescent and Child Physical Activity Questionnaire – introducing the GAC-PAQ Project	S.1.05 Measurement and Trends in Physical Activity and Sedentary Time Among Middle Aged and Older Adults in the US and CZ	S.1.06 Measuring health-related features of the natural, built and food environments in low- and middle-income countries: a syndemic approach	S.1.07 Cognitively enriched physical activity interventions for healthy ageing	S.1.08 Supporting sustainment of nutrition and physical activity interventions in schools	S.1.09 The need for and feasibility of using ecological momentary assessment and just-in-time adaptive interventions in vulnerable groups	S.1.10 Implementing exercise and lifestyle support in individuals living with and beyond cancer: a patient-centred approach
09:40–09:50	Impact strategic planning and IJBNPA awards – Main Hall (Level 6)									
09:50–10:50	Keynote #2: Clare Collins, PhD <i>Making an impact in behavioral nutrition! Are we there yet?</i> – Main Hall (Level 6)									
10:50–12:00	Coffee, Posters P.1.01–P.1.07, Exhibits & Networking – Hall D (Level 2), Foyers Level 3 and 6									
	SIG Meetings: 11:15–11:45		Policies and environments	Participatory Research in Health Promotion		K1: Young Adults K2: Indigenous Group	SocioEconomic Inequalities	Meet Our Voice Team (11:15–12:00) – Lounge (Level 7, UKK)		
12:00–13:15	SO.1.01 Latest findings in Epidemiology and COVID-related studies	SO.1.02 Policies for healthy environments	SO.1.03 Hot topics on metabolic health	SO.1.04 Improving measurement of diet and physical activity	SO.1.05 If it's complex, use participatory research designs	SO.1.06 Latest findings in motivational predictors	SO.1.07 Latest findings in Ageing	SO.1.08 Lessons learned from implementation in the school setting	SO.1.09 The Latest Research on Mobile Interventions for Weight-Related Behaviors	d2s.1.03 How to make our research more inclusive (12:00–13:30)
13:15–14:15	Lunch / Posters / Exhibits – Hall D (Level 2), Foyer Level 6 IJBNPA Editorial Meeting – Room K7									
14:15–15:45	O.1.01 How parents and carers behaviors are linked to children behaviors and health	O.1.02 Evidence-based approaches for the promotion of healthy foods	O.1.03 Latest findings on socio-economic inequalities	O.1.04 Improving measurement of movement behaviour in children	O.1.05 What have we learned recently on participatory research designs	O.1.06 How is early child care education linked to child health?	O.1.07 Physical function and ageing – from prevention to intervention	O.1.08 Scaling up interventions in community and health care settings	O.1.09 Multi-source data collection using e- & m-Health methodologies, towards improved mental and physical health	S.1.21 Move, sit, sleep: the co-dependence of physical activity, sedentary behavior and sleep in adults with (pre)diabetes
15:45–16:15	Coffee, Posters, Exhibits & Networking – Hall D (Level 2), Foyers Level 3 and 6									
16:15–17:30	S.1.11 Adaptation of a healthy lifestyle program for fathers and their children (Healthy Dads Healthy Kids) across different countries, settings and cultures	S.1.12 Experiences of policy and research co-creation with young people: Learnings from the COCREATE Project	S.1.13 The latest insights in measurement and analysis of 24-hour movement behaviors in the early years – definitions, measurement tools and analysis	S.1.14 BMI or Not to BMI? Weighing the Value of Body Mass Index as a Measure of Health (Debate)	S.1.15 Let us sleep! Promoting adolescent sleep health: sharing experiences of co-creating sleep health interventions in Belgium and the Netherlands	S.1.16 Leveraging Systems Science to Improve Nutrition and Obesity-Related Policy and Actions	S.1.17 Novel insights on physical behaviour and non-communicable disease from the UK Biobank: A unified physical activity, posture, and sleep framework	S.1.18 Indigenous Health Promotion – A Distinct and Decolonial Approach to Promoting Health Led by Indigenous Communities	S.1.19 The Power of Parks: The role of parks and recreation spaces in promoting youth physical activity	S.1.20 The changing influence of social and physical environments on diet quality across adolescence and early adulthood
17:45–19:30	ACTIVITY: Walking Football. Meeting point UKK Entrance (facing Vaksala torg - market square)									
18:00–20:00	ACTIVITY: Street Basketball Tournament at Summer Zone. Meeting point: Street Basketball courts									
19:30–22:00	NESI Dinner (ticketed event) – Katalin and All That Jazz – Godsmagasinet Östra Station – Roslagsgatan 1									

# PROGRAM AT A GLANCE



## Friday June 16

Room	Main Hall (Level 6)	Foyer Level 6 (K10)	Hall B (Level 3)	Hall C (Level 3)	Hall D (Level 2)	K1 (+K2) (Level 3)	K3+4 (Level 3)	K7 (Level 7)	Gillesalen (Clarion Gillet Hotel)	Akademien (Clarion Gillet Hotel)	Swedenborg (Clarion Gillet Hotel)
07:00–07:30 <b>ACTIVITY: Combined running and HIIT session</b> (pre-registration required). Meeting point: UKK Entrance (facing Vaksala torg – market square)											
08:15–09:30	<b>S.2.21</b> Parental perceptions of risk and safety: Do they undermine child and youth physical activity, and can they be reframed?	<b>S.2.22</b> Relation of home and neighbourhood environments to adolescent physical activity and sedentary behaviour: The IPEN–Adolescent study	<b>S.2.23</b> Sex and Gender Based Analysis: Understanding the Landscape and Improving our Approach	<b>S.2.24</b> Time-efficient accumulation of sufficient physical activity: Vigorous Intermittent Lifestyle Physical Activity (VILPA)	<b>S.2.25</b> Data-driven and compositional data analysis for profiling and assessing the associations of 24-hour movement behaviors and cardiometabolic health	<b>S.2.26</b> Is it feasible to apply a systems approach to nutrition interventions in non-western, low-to middle-income countries? Sharing empirical experience from China, Southeast Asia, South Pacific, and the Middle East.	<b>S.2.27</b> 9 months and 24-hours: Innovations in 24-hour Movement Behaviors during Pregnancy		<b>S.2.28</b> Can school-based high-intensity interval training (HIIT) interventions be scaled-up for population health?	<b>S.2.29</b> Advancing the science of co-creation of health promotion and behaviour change interventions: Health Cascade Network	<b>S.2.30</b> Effectiveness and Implementation of Active Living After Cancer: A Community-Based Program to Increase Physical Activity, Physical Function, and Quality of Life in Cancer Survivors
09:40–09:50 <b>Growing the next generation and awards</b> – Main Hall (Level 6)											
09:50–10:50 <b>Keynote #3: Ulf Ekelund, PhD</b> <i>Dose-response associations, physical activity intensity and deaths attributable to physical inactivity – lessons learned from device-measured physical activity</i> – Main Hall (Level 6)											
10:50–12:00	<b>Coffee, Posters P.2.01–P.2.07, Exhibits &amp; Networking</b> – Hall D (Level 2), Foyers Level 3 and 6										
	<b>SIG Meetings: 11:15–11:45</b>		Childrens and Families	Implementation and Scalability		K1: Ageing K2: Early Care and Education	Cancer and Prevention	e- and mHealth			
12:00–13:15	<b>SO.2.10</b> How movement and nutrition behaviors are associated with mental health	<b>SO.2.11</b> How Our Surroundings Impact Our Health	<b>SO.2.12</b> What have we learned recently on socio-economic inequalities	<b>SO.2.13</b> The Latest Research on Motivation and Emotion Studies	<b>SO.2.14</b> Lifestyle factors and cancer survivorship: Evidence from cross-sectional to intervention studies	<b>SO.2.15</b> Hot topics in young adults nutrition and physical activity	<b>SO.2.16</b> Parenting and health in young children		<b>SO.2.17</b> Experience from implementation research in various settings	<b>SO.2.18</b> From cohort studies to interventions	<b>d2s.2.04</b> Live demonstration of supervision using motivational interviewing and a reflecting team: Tools for supervising counselors to parents of children with weight-related problems
13:15–14:15 <b>Lunch / Posters / Exhibits</b> – Hall D (Level 2), Foyers Level 3 and 6 <b>Meet the Mentor Lunch</b> – Lounge, Level 7											
14:15–15:45	<b>O.2.10</b> Movement behaviors and health in children and families	<b>O.2.11</b> Policies for healthy environments in children and youth	<b>O.2.12</b> Hot topics for children health behaviours	<b>O.2.13</b> What have we learned recently on motivation and behavior change	<b>O.2.14</b> What have we learned recently on cancer prevention and management	<b>O.2.15</b> Cognitive function and ageing – predictors to interventions	<b>O.2.16</b> Predictors of children’s and families’ nutrition and movement behaviors	<b>d2s.2.06</b> Implementation and Translation of Physical Activity Environment Assessment within the context of an International Partnership	<b>O.2.17</b> Translating evidence into practice - with focus on school setting	<b>O.2.18</b> Changing behaviors in early care and education settings	<b>d2s.2.05</b> Church of Fail: The Congregation of Co-creation with Health CASCADE
15:45–16:15 <b>Coffee, Posters, Exhibits &amp; Networking</b> – Hall D (Level 2), Foyers Level 3 and 6											
16:15–17:30	<b>S.2.31</b> Understanding and improving physical activity and sedentary behaviour: From infancy to adolescence	<b>S.2.32</b> Monitoring and assessing physical activity policy from local to national level	<b>S.2.33</b> When moving is the only option: the role of necessity versus choice for understanding and promoting physical activity in Low- and Middle-Income Countries	<b>S.2.34</b> Goldilocks and the Three Postdocs: Exploring the optimal day for health and wellbeing	<b>S.2.35</b> A data driven approach to understand food purchasing behaviour and co-produce instore interventions to encourage healthier and more sustainable purchasing behaviour	<b>S.2.36</b> Online grocery stores as a novel tool for promoting healthy diets	<b>S.2.38</b> Engaging different generations in research to co-create healthy urban spaces in Europe and Africa	17:00–18:00 <b>LPAS4 Team Meeting</b>	<b>S.2.39</b> Opportunities, challenges and strategies for developing digital health interventions for the first 1000 days	<b>S.2.40</b> Physical Activity and Sedentary Behavior Interventions in Older Adults to Address Cognitive Aging	<b>S.2.53</b> Addressing Food Insecurity: Formal and Charitable Food Assistance and Implications for Nutrition Policy and Practice in Community and Clinical Settings
19:00 – 23:00 <b>ISBNPA Dinner</b> – Rikssalen at Uppsala Castle											

# PROGRAM AT A GLANCE



## Saturday June 17

Room	Main Hall (Level 6)	Foyer Level 6 (K10)	Hall B (Level 3)	Hall C (Level 3)	Hall D (Level 2)	K1 (+K2) (Level 3)	K3+4 (Level 3)	Gillesalen (Clarion Gillet Hotel)	Akademien (Clarion Gillet Hotel)	Swedenborg (Clarion Gillet Hotel)
08:15–09:30	<b>S.3.41</b> Interventions to optimize 24-hour movement behaviors in preschoolers and children	<b>S.3.42</b> Park features and their micro scale designs important for park use among adults and older adults.	<b>S.3.43</b> The underlying mechanisms via which food environments and related policies impact on socioeconomic inequalities in diets	<b>S.3.44</b> Enhancing the design of interventions to change health behaviours	<b>S.3.45</b> Towards healthy and sustainable food environments in hospitals and other health care settings: international lessons learned	<b>S.3.46</b> Evaluating innovative food policies to reduce consumption of unhealthy foods and drinks in Chile and Peru	<b>S.3.47</b> Risky play in childhood: innovative insights and future research directions	<b>S.3.48</b> Narrowing the science-practice implementation gap in the field of physical activity and nutrition	<b>S.3.49</b> Artificial Intelligence as Applied Predictive Models for Food Composition Databases	<b>S.3.50</b> Randomized controlled trials of remotely delivered exercise interventions for men with prostate cancer: rationale, design, and adherence in men across the cancer spectrum from active surveillance to metastatic disease
09:40–10:55	<b>SO.3.19</b> What we know about weight management from children and families studies	<b>SO.3.20</b> School-related studies on behavioral nutrition and physical activity	<b>SO.3.21</b> The Latest Research on Disease Prevention and Management	<b>SO.3.22</b> The Latest Research on Behavior Change Studies	<b>SO.3.23</b> Working with participatory research designs in mental health	<b>SO.3.24</b> Studies on food and drink consumption, accessibility, and purchasing behavior	<b>SO.3.25</b> How can parenting support healthy behaviours in children and adolescents?	<b>SO.3.26</b> Lessons learned from implementation in the community setting	<b>SO.3.27</b> Novel interventions and studies on e & mHealth	<b>d2s.3.07</b> Improving the science/society loop by design: how can we strengthen the impact of behavioral science?
10:55–11:15 <b>Coffee Break</b> – Hall D (Level 2), Foyers Level 3 and 6										
11:15–11:45	<b>‘One to Watch’ Invited Talks</b>									
	Indigenous Sámi food systems in Sweden – resiliency, threats and possibilities <i>Dr. Lena Maria Nilsson</i>		Moon walking’ before Michael – Environmental rhythms and Indigenous systems of well-being <i>Dr. Isaac Warbrick</i>	Lessons learnt on the measurement of physical activity with movement sensors <i>Dr. Jairo H. Migueles</i>	Food behaviours and the environment: a social-ecological perspective <i>Dr. Maria Somaraki</i>		Behavioural intervention research- the value of formative and process evaluation <i>Dr. Jenny Rossen</i>			
11:45–13:00	<b>S.3.51</b> How to unlock the power of data, cities and systems in a new way to prevent childhood obesity: The Ending Childhood Obesity (ECHO) programme	<b>S.3.52</b> Reducing red and processed meat consumption: what works?	<b>S.3.54</b> Characterising the out-of-home food environment using big data sources	<b>S.3.55</b> Where, when, and how much? How to measure physical activity behaviors in the urban environment	<b>S.3.56</b> Improving the school food environment: challenges and solutions for children aged 5 to 18 years	<b>S.3.57</b> The Prospective Physical Activity, Sitting and Sleep consortium (ProPASS): First Results and Future Directions	<b>S.3.58</b> Implementation of digital health interventions promoting healthy lifestyle behaviours in the first 2000 days of life	<b>S.3.59</b> Supporting the lifestyle professional in the application of (digital) tools for supporting lifestyle change	<b>S.3.60</b> Using routinely collected physical activity and cardiorespiratory fitness data for longitudinal studies within cancer epidemiology	
13:00–14:00 <b>Lunch / Posters P.3.01–P.3.08 / Exhibits</b> – Hall D (Level 2), Foyers Level 3 and 6										
14:00–15:30	<b>O.3.19</b> How mental and physical health is associated with nutrition and movement	<b>O.3.20</b> Sustainable food and active environments	<b>O.3.21</b> From genes to physical and psychosocial health outcomes	<b>O.3.22</b> Improving physical activity measurements in adults	<b>O.3.23</b> Latest findings on metabolic health outcomes	<b>O.3.24</b> Healthy food and activity environments	<b>O.3.25</b> Lifestyle and healthy weight development	<b>O.3.26</b> Hot topics on physical activity and sleep	<b>O.3.27</b> Improving lifestyle behaviours in different population groups	
15:35–15:45 <b>Strategic Planning Climate Action Committee</b> – Main Hall (Level 6)										
15:45–16:30 <b>Keynote #4: Edward Maibach, PhD</b> <i>Protecting human and planetary health: New unique and necessary roles for health professionals</i>										
16:30–17:00 <b>What’s next @ISBNPA?</b>										





Congress  
2024



World Health  
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# International Society for Physical Activity and Health Congress

Palais des Congrès in Paris, France  
21 – 24 October 2024

Abstract submission opens  
November 6, 2023



# KEYNOTES

## Community-engaged Citizen Science to Advance Healthy Lifestyles & Health Equity Worldwide: Building the Science of Citizen Science

**Prof. Abby King**

**June 14, 2023, 2:45 PM - 3:45 PM**

A growing evidence base supports the promise of “research-to-action” citizen science in helping to generate locally relevant, real-world solutions to some of today’s most vexing challenges. Establishing productive partnerships between communities and researchers also can help to mitigate mistrust of science that has increasingly surfaced among some portions of the public. Yet, can such multi-component, qualitatively driven methods attain the scientific rigor often craved by many in the scientific community? The Our Voice Global Citizen Science Research Initiative represents one example of how this form of community-engaged mixed methods research can be built across the continuum of translational science. Global examples will be presented of the initiation of early exploratory studies in the field, followed by enhanced reproducibility, increasing scientific rigor, expanding levels of knowledge and impact, and methods for attaining global scalability. The presentation will end with an exploration of the future of such research-to-action approaches as a resource-efficient means for advancing health equity, environmental justice, and authentic community-researcher partnerships.

## Making an impact in behavioral nutrition! Are we there yet?

**Prof. Clare Collins**

**June 15, 2023, 9:50 AM - 10:50 AM**

Poor diet impacts one in five deaths globally. If population eating patterns were consistent with nutrition recommendations the global disease burden would drop dramatically. For example heart disease burden would drop by 58% and type 2 diabetes by 41%. There is a massive disparity between health costs incurred due to nutrition and weight-related poor health and the limited funding for nutrition prevention and treatment. While over 40% of the global population can’t afford a healthy diet, the worldwide revenue attributed to vitamin and mineral supplements was estimated at \$US27 billion in 2022. In terms of prevention an OECD report on obesity prevention estimated that policies targeting food labelling, advertising restrictions and mass media campaigns across 36 countries analysed has the potential to prevent 76 000 new non-communicable disease cases per year, while also increasing GDP through reduced health expenditure and increased participation in the workforce. Additionally, members of the public do appear very interested in food and nutrition. For example each month Instagram accounts for more than 250 million #food posts. Celebrity nutrition misinformation abounds and can seriously undermine evidence-based nutrition recommendations and guidelines endorsed by nutrition organisations. How does ISBNPA’s mission statement, which calls for ‘stimulation of impactful research in behavioural nutrition and physical activity to improve health and wellbeing worldwide’, address these current challenges? We face stiff competition from self-proclaimed food and nutrition gurus. But are we partly to blame for not meeting consumer needs? What should ISBNPA, that’s all 1000+ members, do? Can ISBNPA and IJBNPA lead the way in terms of communicating the research on nutrition to facilitate evidence translation and impact? It is timely to reflect on past success, while planning for evaluation of future impacts. When it comes specifically to making an impact in behavioural nutrition, we must strategically turn the volume up on our collective voices to influence development, implementation and evaluation of evidence-based nutrition policy and programs. This will ensure that we do ‘get there’ and achieve impact that is dynamic, quantifiable, and valuable.

# Dose-response associations, physical activity intensity and deaths attributable to physical inactivity – lessons learned from device-measured physical activity

**Prof. Ulf Ekelund**

**June 16, 2023, 9:50 AM - 10:50 AM**

Dose-response associations, physical activity intensity and deaths attributable to physical inactivity - lessons learned from device-measured physical activity Studies have shown a non-linear dose-response association between physical activity and the risk of non-communicable diseases and mortality. National and international public health authorities, including the World Health Organization (WHO), have recommended population levels of physical activity, primarily based on self-reported data. However, self-reporting is prone to bias and overestimates physical activity participation. Self-reporting may also overestimate the amount of physical activity needed to reduce the risk of chronic diseases, underestimate the magnitude of associations with these outcomes, and not capture all intensities of physical activity. Recent studies using accelerometry have shown that the shape of the dose-response association is similar to that of self-reporting, but the maximal risk reduction is larger and observed at lower levels of physical activity. Total physical activity and all intensities of physical activity assessed by accelerometry are associated with a lower risk of premature mortality, and high levels of physical activity can mitigate the negative impact of sedentary time. The population attributable fraction ( is a measure that estimates the number of events that can be averted if a risk factor is removed from the population. Recent estimates suggest that 4–5 million deaths every year globally are due to physical inactivity. In contrast, the Global Burden of Disease study estimated less than 1 million deaths annually due to physical inactivity. These studies used self-reported physical activity data and estimated the population-attributable fraction as a dichotomous variable or methods that deviated from established thresholds. Others have estimated that an increase in device measured moderate to vigorous intensity physical activity by 10 and 30 minutes per day, respectively were associated with 7% (245,000 deaths) and 17% (595,000 deaths) decrease in the number of deaths per year in the US population. However, this study estimated the PAFs for a fixed increase in moderate-to-vigorous intensity activity using the same referent and did not consider the nonlinear dose-response association between physical activity and risk for mortality. The lecturer will discuss how device-measured physical activity in large cohort studies has advanced our understanding of the association between physical activity and chronic disease risk. I also discuss differences in methodology when estimating the number of deaths that can be prevented by physical activity at the population level. Finally, I will discuss a method to estimate the theoretical number of deaths averted, taking into account the non-linear dose-response association between physical activity and the risk of death.

## Protecting human and planetary health: New unique and necessary roles for health professionals

**Prof. Maibach Edward W.**

**June 17, 2023, 3:45 PM - 4:30 PM**

Climate change and the burning of fossil fuels—which is the principal cause of climate change—are arguably the leading causes of preventable morbidity and mortality worldwide. In this talk Dr. Maibach will make the case that helping to lead efforts to rapidly decarbonize the world's energy supplies and limit global warming to the fullest extent possible is a necessary role for health professionals. Further, he will make the case that because health professionals are among the most trusted voices in communities worldwide, and because the climate/health narrative is uniquely effective in increasing public engagement with the issue, health professionals have a unique leadership role to play in the global effort.



# INVITED TALKS – ‘ONE TO WATCH’

## ‘Moon walking’ before Michael – Environmental rhythms and Indigenous systems of well-being

**Dr. Isaac Warbrick**

**June 17, 2023, 11:15 AM - 11:40 AM**

Indigenous knowledge and systems of well-being highlight the close connection between the natural environment and the health of people. Our relationship with the environment relates to our ability to provide food, the way we move and are active, and the maintenance of spiritual well-being, and cultural identity. Contemporary scientific literature has also shown that engagement with natural environments improves physical health, mental well-being, and management of stress. On the other hand, modern lifestyles are characterised by a disconnection from the natural environment and the natural rhythms and cycles that were once closely observed by our tūpuna (ancestors). Our ancestors observed the seasons, cycles, and rhythms on land, in oceans and waterways, and in the sky above to determine optimal times to perform certain activities, including when to plant, harvest, hunt, and collect food. In Aotearoa (New Zealand), this system of observation is known as the maramataka (often termed the ‘Māori lunar calendar’). Although some of these practices, and the knowledge underpinning this system have been diminished or lost due to colonisation, Indigenous peoples continue to observe, record, and pass down their observations, and align their lives and activities to natural cycles. What’s more, communities are leading the rejuvenation of these practices throughout Aotearoa and the Pacific. Our culture and the reclamation of cultural knowledge are drivers for lifestyle change. Thus, many are reclaiming culturally relevant approaches to health, where physically activity, healthy eating, and a lifestyle more attuned with the environment become secondary outcomes of strengthening cultural knowledge and identity.

## Behavioural intervention research- the value of formative and process evaluation

**Dr. Jenny Rossen**

**June 17, 2023, 11:15 AM - 11:40 AM**

Human behaviours such as lifestyle habits are challenging to change and complex to study. Whether implementing interventions in health care settings or using digital platforms a thorough planning phase including an underpinning programme theory and undertaking a process evaluation are key phases for a better understanding of what works. I will present some of my experiences from behavioural intervention research. We followed the Medical Research Council guidance for evaluating complex interventions to undertake a process evaluation of a two-year pedometer intervention with or without counselling in primary care. The process evaluation included the delivery of the interventions, intervention dose, and patterns of behavior change. Further, we studied intervention mechanisms as perceived by the participants through qualitative interviews. For an upcoming real-world study, we have performed a formative research phase, including focus group interviews, a systematic review, and co-development of the intervention in close collaboration with a tech company.

# Lessons learnt on the measurement of physical activity with movement sensors

**Dr. Jairo H. Migueles<sup>1</sup>**

<sup>1</sup>Department of Biosciences and Nutrition, Karolinska Institutet, Huddinge, Sweden

**June 17, 2023, 11:15 AM - 11:40 AM**

Accelerometers were first used to estimate energy expenditure and physical activity in the early 1980s. The vertiginous advancements in the technology made it possible to access to the raw data, increase precision in the recordings, measure different planes of movement, or record longer periods of time without having to recharge the devices. Researchers have developed methods to clean and analyse such amount of information as they had access to the data, which has led to many parallel efforts to address similar challenges. As a result, a myriad of methods with limited comparability to process the raw data and extract physical activity, sedentary behaviour, and sleep related characteristics have been developed. The flip side is that the harmonisation of the accelerometer-based measure of movement behaviours remains a challenge today. At a time when the field is moving from closed (proprietary) to open-source algorithms and methods, now is the time to reflect on what we can do as a field to address this challenge. This presentation will take a critical look at the measurement of physical activity with accelerometers, from the concepts to the decisions that should be made to process the accelerometer signal. Some of the contents shared in this presentation are personal opinions based on years of research and as such is open for discussion.

## Food behaviours and the environment: a social-ecological perspective

**Dr. Maria Somaraki**

**June 17, 2023, 11:15 AM - 11:40 AM**

Food behaviours are integral components of health behaviours that mobilise interdisciplinary research processes. The social-ecological framework describes the different levels of influence on individual food behaviours and health outcomes. These levels of influence involve different food environments encompassing socio-cultural processes and their interactions to shape how and what humans eat. My research has acknowledged such processes in regard to children's food behaviours in the context of childhood obesity and neurodevelopment. I focused on the home food environment that shapes children's eating habits and behaviours. This is defined by the parent-child feeding dynamics involving different components, namely parental feeding practices and child food behaviours. Obesity-related feeding practices and food behaviours were associated with mother's foreign background, i.e. a broader level of influence. In addition, early feeding practices that pertain to introduction to food texture were associated with lower scores for child developmental milestones, i.e. motor and cognitive skills, which represent the individual level of influence. Against a backdrop of higher obesity rates among children from disadvantaged backgrounds, I evaluated the effects of a treatment programme involving parents and how they can re-shape the home food environment. The findings showed that parents may influence the home environment, beyond their feeding practices, through clear rules and routines with the child. In addition, involvement of all caregivers is noteworthy, including fathers who are typically underrepresented in research. My current research seeks to unravel sustainable diets and food supply practices applying this social-ecological understanding of food behaviours. To this end, I am interested in further understanding levers for sustainable diets at the consumer level, considering different production modes, changing food environments and diverse backgrounds.

# Indigenous Sámi food systems in Sweden – resiliency, threats and possibilities

**Dr. Lena Maria Nilsson**

**June 17, 2023, 11:15 AM - 11:40 AM**

Sámi people are the only Indigenous people of the European Union with their traditional homelands situated in the northern half of Norway, Sweden, Finland and the Kola Peninsula of Russia. Sámi people live all over Sweden, with the highest population density in the northern inland. Traditional Sámi food is mainly based on natural resources in the Arctic environment such as wild berries, plants, fish, game and semi-domesticated reindeer. Some trade-based foods such as cereals and stove-top or campfire boiled un-filtered coffee are also significant for the Sámi cuisine. Previous studies based on data from the Northern Sweden Diet Database as well as recent indicators of traditional Sámi diet from the large registry population based cross-sectional study Sámi Health on Equal Terms (SamiHET, 2021) confirms a continued strong importance of traditional Sámi food in the Sámi population in Sweden. However, climate change and the so-called green transition is threatening the Sámi food system. In addition, EU legislation as well as knowledge gaps and ignorance of the nutritional value and health aspects of traditional Sámi food, means an obstacle to traditional knowledge transfer necessary for a sustainable and sovereign future food system in Arctic Sweden. This presentation is partly based on a book chapter, published last year in the Anthology “The Sámi word” edited by Sanna Valkonen et al, and partly on data from the SamiHET study.



# AWARD SESSION PRESENTATIONS

## Using the Behavior Change Wheel to identify and understand key facilitators and barriers for lifestyle care for postmenopausal breast cancer survivors: A Delphi-study

Mrs. Sandra van Cappellen – van Maldegem<sup>1</sup>, Dr. Floortje Mols<sup>1,2</sup>, Prof. Jacob C. Seidell<sup>3</sup>, Ms. Anja de Kruif<sup>4,5</sup>, Prof. Lonneke van de Poll- Franse<sup>1,2,6</sup>, **Dr. Meeke Hoedjes**<sup>1</sup>

<sup>1</sup>Tilburg University, Tilburg, Netherlands, <sup>2</sup>Netherlands Comprehensive Cancer Organisation (IKNL), Utrecht, Netherlands, <sup>3</sup>VU University, Amsterdam, Netherlands, <sup>4</sup>VUmc, Amsterdam, Netherlands, <sup>5</sup>HAN University of Applied Sciences, Nijmegen, Netherlands, <sup>6</sup>The Netherlands Cancer Institute, Amsterdam, Netherlands

**Award Session - Ageing | Cancer prevention and management, UKK - Hall D (Level 2 - main floor), June 14, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** C. Cancer prevention and management

**Purpose:** Lifestyle and body weight recommendations have been issued to improve health outcomes in postmenopausal breast cancer (PMBC) survivors. However, the majority of PMBC survivors does not meet these recommendations. Although health care professionals (HCPs) could play a key role in the promotion of favorable lifestyle behaviors among PMBC survivors, this is not structurally embedded in clinical care. Optimal approaches to promote sustained adherence to lifestyle and body weight recommendations in PMBC survivors are lacking. This Delphi-study aimed to identify and understand expert-opinion on potential barriers and facilitators for promoting adherence to these lifestyle and bodyweight recommendations in PMBC survivors.

**Methods:** The expert panel consisted of oncology HCPs (N=57), patient advocates (N=5) and PMBC survivors (N=38). They completed 3 questionnaires. Questionnaire 1 aimed to generate ideas. Questionnaire 2 aimed to validate and prioritize the barriers and facilitators obtained from the first questionnaire. Questionnaire 3 aimed to rank barriers and facilitators. The Behavior Change Wheel was used as theoretical framework for analysis. Thematic analysis was applied to identify key overarching themes based on the top-ranked facilitators and barriers. Potential Behavioral Change Techniques (BCTs) and intervention strategies were identified using the Behavior Change Technique Taxonomy version 1 and the Behavior Change Wheel.

**Results:** 11 core categories of key barriers/facilitators for the promotion of adherence to recommendations for lifestyle and body weight among PMBC survivors were identified. For each core category, relevant BCTs and practical potential intervention strategies were selected based on suggestions from the expert panel. These included: increasing knowledge about the link between lifestyle and cancer; enabling self-monitoring of lifestyle behaviors followed by evaluation; offering group lifestyle counselling for PMBC survivors, enhancing social support for favorable lifestyle behaviors; and stimulating multidisciplinary collaboration among HCPs.

**Conclusions:** Findings provide valuable insight for the development of interventions promoting healthy lifestyle behavior among PMBC survivors and on how to stimulate HCPs to provide lifestyle support to their patients.

# Engagement, acceptability, usability and satisfaction with Active for Life, a computer-tailored web-based physical activity intervention using Fitbits in older adults

**Dr. Stephanie Alley**<sup>1</sup>, Dr. Stephanie Schoeppe<sup>1</sup>, Dr. Quyen To<sup>1</sup>, Prof. Lynne Parkinson<sup>2</sup>, Associate Professor Jannique van Uffelen<sup>3</sup>, Dr. Susan Hunt<sup>1</sup>, Prof. Mitch Duncan<sup>2</sup>, Prof. Anthony Schneiders<sup>1</sup>, Prof. Corneel Vandelanotte<sup>1</sup>

<sup>1</sup>Central Queensland University, Rockhampton, Australia, <sup>2</sup>The University of Newcastle, Callaghan, Australia,

<sup>3</sup>KU Leuven, Leuven, Belgium

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## **SIG - Primary Choice:** A. Ageing

**Purpose:** Preliminary evidence suggests that web-based physical activity interventions with tailored advice and Fitbit integration are effective and may be well suited to older adults. Therefore, this study aimed to examine the engagement, acceptability, usability, and satisfaction with '*Active for Life*,' a web-based physical activity intervention providing computer-tailored physical activity advice to older adults.

**Methods:** Inactive older adults (n=243) were randomly assigned into 3 groups: 1) tailoring+Fitbit, 2) tailoring-only, or 3) a wait-list control. The tailoring+Fitbit group and the tailoring-only group received 6 modules of computer-tailored physical activity advice over 12 weeks. The advice was informed by objective Fitbit data in the tailoring+Fitbit group and self-reported physical activity in the tailoring-only group. This study examined the engagement, acceptability, usability, and satisfaction of *Active for Life* in intervention participants (tailoring+Fitbit n=78, tailoring only n=96). Wait-list participants were not included. Engagement (Module completion, time on site) were objectively recorded through the intervention website. Acceptability (7-point Likert scale), usability (System Usability Scale), and satisfaction (open-ended questions) were assessed using an online survey at post intervention. ANOVA and Chi square analyses were conducted to compare outcomes between intervention groups and content analysis was used to analyse program satisfaction.

**Results:** At post-intervention (week 12), study attrition was 28% (22/78) in the Fitbit+tailoring group and 39% (37/96) in the tailoring-only group. Engagement and acceptability were good in both groups, however there were no group differences (module completions: tailoring+Fitbit: 4.72±2.04, Tailoring-only: 4.23±2.25 out of 6 modules, p=.14, time on site: tailoring+Fitbit: 103.46±70.63, Tailoring-only: 96.90±76.37 minutes in total, p=.56, and acceptability of the advice: tailoring+Fitbit: 5.62±0.89, Tailoring-only: 5.75±0.75 out of 7, p=.41). Intervention usability was modest but significantly higher in the tailoring+Fitbit group (tailoring+Fitbit: 64.55±13.59, Tailoring-only: 57.04±2.58 out of 100, p=.003). Participants reported that *Active for Life* helped motivate them, held them accountable, improved their awareness of how active they were and helped them to become more active. Conversely, many participants felt as though they would prefer personal contact, more detailed tailoring and more survey response options.

**Conclusions:** This study supports web-based physical activity interventions with computer-tailored advice and Fitbit integration as engaging and acceptable in older adults.

# Reduction in diet quality is associated with a greater healthcare claims and charges over 21-years in Australian women

Dr. Erin Clarke<sup>1,2</sup>, Dr. Jennifer Baldwin<sup>3</sup>, **Prof. Clare Collins<sup>1,2</sup>**

<sup>1</sup>School of Health Sciences, College of Health, Medicine and Wellbeing, The University of Newcastle, Callaghan, Australia, <sup>2</sup>Food and Nutrition Research Program, Hunter Medical Research Institute, New Lambton Heights, Australia, <sup>3</sup>Institute for Musculoskeletal Health, The University of Sydney and Sydney Local Health District, Sydney, Australia

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**SIG - Primary Choice:** A. Ageing

**Purpose:** Research examining relationships between diet quality (DQ) and healthcare use over time is needed to inform healthcare policy. This study investigated the relationship between 1) baseline DQ and 2) change in DQ over time, cumulative Medicare claims and charges over 21-years in a cohort of mid-aged Australian women.

**Methods:** Secondary analysis of the Australian Longitudinal Study on Women's Health (ALSWH) cohort (1946-51). Dietary data from food frequency questionnaires at Survey 3 (2001, then aged 50-55years) and Survey 7 (2013) were used to construct DQ change trajectories using the Australian Recommended Food Score (ARFS), with higher ARFS scores indicating higher DQ. Cumulative Medicare Benefits Schedule data over the previous 21-years (2001-2021) were reported by baseline ARFS quintile (n=8,228) and category of DQ change (n=6,553). Linear regression models investigating study aims were adjusted for area of residence, socioeconomic status, lifestyle factors, and private health insurance status.

**Results/findings:** Women with higher vegetable ARFS sub-scale scores at baseline were associated with fewer 21-year cumulative Medicare claims ( $\beta=-4.9$ , 95%CI -7.4, -2.5) and charges ( $\beta=-\$AU315.40$ , 95%CI - $\$AU506.60$ , - $\$AU124.20$ ). For all women, baseline higher dairy sub-scale scores were associated with higher Medicare claims ( $\beta=16.3$ , 95%CI 10.3, 22.4) and charges ( $\beta=\$AU1,165.20$ , 95%CI  $\$AU695.10$ ,  $\$AU1,635.30$ ). No association identified between baseline total ARFS or fruit, grains and meat sub-scales with 21-year healthcare claims or charges. Compared to women whose DQ score remained stable, those with worsened DQ over time (change  $\leq -4$  points) made more claims and higher charges; median [Q1, Q3] 413 [277, 588] claims  $\$AU27,073$  [ $\$AU16,723$ ,  $\$AU42,134$ ], compared to 387 [259, 559] claims and  $\$AU25,686$  [ $\$AU15,201$ ,  $\$AU40,309$ ]. Change in total ARFS and ARFS subscales were identified as predictors of 21-year cumulative healthcare claims. For each 10-point increase in ARFS over time, 12 fewer healthcare claims were made (95% CI 3 – 22). Each 10-point increase in vegetable and dairy ARFS sub-scale scores were also associated with significantly fewer claims.

**Conclusions:** Greater baseline vegetable variety was associated with fewer 21-year healthcare claims and charges. Women whose DQ worsened over time had higher 21-year healthcare claims and charges compared with those whose DQ remained stable.



# A higher level of health-related fitness is related to better physical quality of life in newly diagnosed breast cancer patients

**Dr. Ki-Yong An**<sup>1</sup>, Mrs. Fernanda Arthuso<sup>1</sup>, Dr. Gordon Bell<sup>1</sup>, Dr. Andria Morielli<sup>2</sup>, Dr. Jessica McNeil<sup>3</sup>, Mr. Qinggang Wang<sup>2</sup>, Mr. Spencer Allen<sup>1</sup>, Miss Stephanie Ntoukas<sup>1</sup>, Dr. Margaret McNeely<sup>1</sup>, Dr. Jeff Vallance<sup>4</sup>, Dr. Nicole Culos-Reed<sup>5</sup>, Dr. Karen Kopciuk<sup>2</sup>, Ms. Myriam Filion<sup>1</sup>, Dr. Lin Yang<sup>2, 5</sup>, Dr. Charles Matthews<sup>6</sup>, Ms. Leanne Dickau<sup>2</sup>, Dr. John Mackey<sup>1</sup>, Dr. Christine Friedenreich<sup>2, 5</sup>, Dr. Kerry Courneya (corresponding author)<sup>1</sup>  
<sup>1</sup>University of Alberta, Edmonton, Canada, <sup>2</sup>Alberta Health Services, Calgary, Canada, <sup>3</sup>University of North Carolina, Greensboro, USA, <sup>4</sup>Athabasca University, Athabasca, Canada, <sup>5</sup>University of Calgary, Calgary, Canada, <sup>6</sup>National Cancer Institute, Rockville, USA

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**SIG - Primary Choice:** C. Cancer prevention and management

**Purpose:** Considerable distress and worries related to diagnosis, prognosis, and treatment in newly diagnosed breast cancer patients can cause poor quality of life (QoL) and potentially even poor treatment and cancer outcomes. Therefore, understanding the correlates of QoL may help breast cancer patients improve QoL and prepare for treatments and recovery. The primary purpose of the present study was to examine the associations between comprehensive health-related fitness (HRF) measures and physical and mental QoL in newly diagnosed breast cancer patients from the Alberta Moving Beyond Breast Cancer (AMBER) Cohort Study.

**Methods:** The current study is a cross-sectional design that was conducted in Edmonton and Calgary, Canada. A total of 1,458 newly diagnosed breast cancer patients who completed HRF and QoL assessments within 90 days of diagnosis were included in the study. HRF assessments consist of  $VO_{2peak}$  treadmill test, predicted one repetition maximum and muscular endurance tests using chest press and leg press, handgrip strength, curl-up, sit-and-reach test, and body composition by dual x-ray absorptiometry. QoL included physical component summary (PCS) and mental component summary (MCS) that were assessed by the SF-36. We analyzed the associations between quartiles of HRF and binary PCS and MCS (bottom 20%) using univariate and multivariate logistic regression adjusted for demographic, medical, and behavioral covariates.

**Results:** In univariate models, all health-related fitness variables except for total lean mass were significantly associated with PCS while only lean/fat ratio was associated with MCS. In multivariate models, relative  $VO_{2peak}$ , relative upper body strength, and lean mass percentage were significantly associated with PCS. More specifically, the least fit groups were 2-3 times (relative  $VO_{2peak}$ : OR=2.08, 95% CI=1.21-3.57; relative upper body strength: OR=3.19, 95% CI= 1.98-5.14; lean mass percentage: OR=2.31, 95% CI=1.37-3.89) more likely to report poor/fair PCS compared to the most fit groups. There were no meaningful associations for MCS.

**Conclusions:** All three major components of HRF (cardiorespiratory fitness, muscular fitness, and body composition) were independently associated with better physical QoL, but not mental QoL, in newly diagnosed breast cancer patients. An exercise intervention to improve comprehensive HRF may help newly diagnosed breast cancer patients maximize their physical QoL.

# Impact of physical activity on dynamic balance & prevention of falls in middle age: systematic review & meta-analysis

Dr. Juliana Oliveira<sup>1,2</sup>, Mr. Junze Chen<sup>3</sup>, Dr. Amabile Borges Dario<sup>3</sup>, Prof. Catherine Sherrington<sup>1,2</sup>, Ms. Geraldine Wallbank<sup>1,2</sup>, Miss Yuwei Lin<sup>4</sup>, Prof. Manuela Ferreira<sup>5</sup>, **Prof. Anne Tiedemann<sup>1,2</sup>**

<sup>1</sup>Institute for Musculoskeletal Health, The University of Sydney and Sydney Local Health District, Sydney, Australia, <sup>2</sup>School of Public Health, Faculty of Medicine and Health, Sydney, Australia, <sup>3</sup>School of Health Sciences, Faculty of Medicine and Health, The University of Sydney, Sydney, Australia, <sup>4</sup>Peking University Clinical Research Institute, Peking University Health Science Centre, Beijing, China, <sup>5</sup>Kolling Institute, School of Health Sciences, Faculty of Medicine and Health, The University of Sydney, Sydney, Australia

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## **SIG - Primary Choice:** A. Ageing

**Purpose:** To summarise the evidence of the impact of physical activity on dynamic balance and falls among middle-aged people.

**Methods:** We conducted a systematic review and meta-analysis of randomised controlled trials (RCTs). Data Sources included Medline, EMBASE, CINAHL, and LILACS from inception to July 2021. Studies were selected for inclusion if they were RCTs investigating the effect of physical activity on dynamic balance and falls in people aged 40-64 years compared to non-active control. We calculated pooled effect sizes using random-effects models. Standardised mean differences (SMD) and mean difference (MD) were calculated. The GRADE system was used to assess the certainty of the evidence. A meta-regression was conducted to examine the effect of participants' characteristics on the pooled effect size.

**Results/findings:** 16 trials with a total participant of 947 were included. Participation in physical activity improved dynamic balance (n=16 trials; SMD 1.10 95% CI 0.66 to 1.54; low certainty evidence), timed up and go test (n=8; MD=1.07 seconds, 95% CI 0.39s to 1.75s; low certainty evidence) and functional reach (n=5; MD=5.80cm, 95% CI 2.52cm to 9.08cm; very low certainty evidence), among middle-aged people. We found a significant difference in the impact of interventions that involved 3D exercises (i.e., yoga and Tai Chi) versus non-3D (p for comparison=0.006). We did not detect a significant difference in the effect of physical activity on dynamic balance in the trials involving multicomponent exercises compared to single exercises (p for comparison=0.74). Additionally, the size of the intervention effect on dynamic balance was not influenced by the methodological quality or length of the intervention. No included studies investigated falls as an outcome.

**Conclusions:** Participation in physical activity appears to offer significant promise for improving balance in middle-aged people, although the certainty of the evidence is low. Greater effects were seen from interventions involving more coordination, such as yoga and Tai Chi. Our results support the promotion and support of physical activity programs to improve balance during middle age to prepare for healthy ageing and potentially prevent falls. Further studies are needed to investigate the impact of physical activity on falls in this population.

# Feasibility and preliminary efficacy of an online-delivered resistance exercise intervention among racially diverse breast cancer survivors: The B-REP Trial

**Dr. Angela Fong**<sup>1</sup>, Ms. Gabriella Gonzalaz<sup>2</sup>, Dr. Shawna Hudson<sup>1</sup>, Dr. Kathryn Schmitz<sup>3</sup>, Dr. Sharon Manne<sup>1</sup>

<sup>1</sup>Rutgers Cancer Institute of New Jersey, New Brunswick, USA, <sup>2</sup>Rutgers University, New Brunswick, USA,

<sup>3</sup>University of Pittsburgh, Pittsburgh, USA

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**SIG - Primary Choice:** C. Cancer prevention and management

**Purpose:** The purpose is to determine the feasibility, acceptability, and preliminary efficacy of the Breast cancer and Resistance Exercise Program (B-REP) Trial among a diverse sample of breast cancer survivors.

**Methods:** The pilot study used a 2-arm randomized controlled trial design with  $N=47$  breast cancer survivors ( $M_{age}=55.1$ ,  $SD=11.9$ ; 42.6% self-identified as non-White; 58.1% Stage I diagnosis,  $M=35.4$ ,  $SD=18.2$  months since diagnosis). Intervention participants ( $n=28$ ) received 12, once-weekly synchronous 1:1 supervised exercise sessions delivered over Zoom. Minimal care participants ( $n=19$ ) received a printed exercise instruction booklet. All participants received resistance bands and an individualized exercise program based on their baseline strength assessment. Measures included attendance tracked by research staff throughout the study, 10 repetition maximum strength and self-reported physical activity minutes measured at baseline and post-intervention, and follow-up online semi-structured interviews at post-intervention. Descriptive statistics and repeated measures ANOVAs were used to analyze quantitative data. Deductive thematic analysis was used to analyze interviews.

**Results:** B-REP demonstrated high rates for feasibility outcomes of enrollment (78.6%) and post-intervention assessment completion (92.9%). The acceptability outcomes were high for session attendance (97.9%) and satisfaction ( $M_{score}=4.87$  out of 5,  $SD=.18$ ). The 2 x 2 condition by time repeated measures ANOVAs showed that upper body strength significantly increased ( $F(1,38)=7.298$   $p=.01$ ) for the intervention group ( $M_{baseline}=23.9$ ,  $SD=8.4$  and  $M_{post}=28.9$ ,  $SD=8.9$ ) versus minimal control ( $M_{baseline}=24.5$ ,  $SD=7.3$  and  $M_{post}=25.5$ ,  $SD=8.7$ ). Lower body strength also significantly increased ( $F(1,38)=6.209$ ,  $p=.02$ ) for the intervention group ( $M_{baseline}=28.6$ ,  $SD=12.7$  and  $M_{post}=27.7$ ,  $SD=14.9$ ) versus minimal control ( $M_{baseline}=37.7$ ,  $SD=16.2$  and  $M_{post}=30.0$ ,  $SD=16.2$ ). B-REP did not influence self-reported physical activity ( $p=.24$ ). From the interviews, participants enjoyed the focus on resistance exercise and the interventionist's gentle approach. Suggestion for improvement include using different exercise equipment and adding a social support component.

**Discussion:** Online-delivered resistance exercise is feasible, acceptable, and shows promising efficacy for improving strength among a diverse sample of breast cancer survivors. Limitations include a small sample recruited from one cancer center. Strengths include using a rigorous study design and objectively measured outcomes. Future research is needed to determine efficacy on muscular strength and cancer-related outcomes such as health-related quality of life and to incorporate participants' feedback.

# Feasibility of Daughters and Dads Cricket: a program targeting fathers to improve daughters' engagement and skills in cricket.

**Dr. Lee Ashton**<sup>1,2,3</sup>, Dr. Emma Pollock<sup>1,2</sup>, Miss Stevie-Lee Kennedy<sup>1,2</sup>, Dr. Myles Young<sup>1,4</sup>, Associate Professor Narelle Eather<sup>1,2</sup>, Prof. Philip Morgan<sup>1,2</sup>

<sup>1</sup>Active Living Research Program, Hunter Medical Research Institute (HMRI), Lot 1 Kookaburra Circuit, NSW 2305., New Lambton Heights, Australia, <sup>2</sup>Centre for Active Living and Learning, College of Human and Social Futures, School of Education, University of Newcastle, Callaghan, Australia, <sup>3</sup>College of Health, Medicine and Wellbeing, School of Health Sciences, University of Newcastle, NSW., Callaghan, Australia, <sup>4</sup>College of Engineering, Science and Environment, School of Psychological Sciences, University of Newcastle, NSW, Australia., Callaghan, Australia

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**SIG - Primary Choice:** G. Children and families

**Purpose:** Utilising fathers to support their daughters and enhance their cricket skills may be an innovative approach to addressing traditional socio-cultural views of cricket relating to gender, by improving girls' enjoyment of cricket, participation, and long-term retention in the sport. Therefore, the aim of this study was to assess the feasibility of the novel 'Daughters and Dads Cricket' program.

**Methods:** In a single arm, pre-post study, fathers (n=34, 43.1±4.4 years) and daughters (n=34, 9.4±1.5 years) from Newcastle, Australia were recruited. The 9-week program was delivered by trained facilitators and included weekly educational and practical sessions, plus home-based tasks. *A-priori* feasibility benchmarks targeted recruitment (20 dyads), fidelity (≥80%), attendance (≥70%), compliance with home-program (≥70%), program satisfaction (mean score ≥4 out of 5) and retention (≥85%). Preliminary efficacy outcomes were assessed, including cricket skill proficiency, daughters' enjoyment in cricket, intention to keep playing cricket and long-term retention in cricket.

**Results:** Feasibility benchmarks were exceeded for recruitment (n=34 dyads), fidelity (98% education, 100% for practical), attendance (88%), satisfaction (fathers: 4.6/5, daughters: 4.8/5) and retention (97%). The home-program compliance fell short of the compliance goal (64%). Preliminary efficacy was confirmed with medium-to-large effect size changes in 11 of the 13 daughters' cricket skill proficiency outcomes. Promising findings were also identified for daughters' enjoyment of cricket (daughters self-report at 9-weeks:  $d=0.3$ , fathers' proxy at 9-weeks:  $d=0.5$  and at 12-month:  $d=0.1$ ), intention to continue playing cricket (90% of fathers and 97% of daughters agreed/strongly agreed to keep playing informal cricket at end of the program) and long-term retention in cricket (at 12-months fathers were playing cricket with their daughters an average of 1.3 (0.6) days per week, while 67% of daughters (n=20) were playing informal cricket).

**Conclusion:** A cricket-focused program targeting daughters and dads was feasible and led to medium-to-large improvements in cricket skill proficiency among the daughters. At the end of the program, daughters were engaged with cricket, as shown by high levels of enjoyment, intention to continue playing and their long-term retention in cricket at 12-months. Examining the future efficacy in a larger trial is warranted.



# Are sitting, standing and stepping associated with adiposity markers in youth?: A compositional approach

**Dr. Ana Maria Contardo Ayala**<sup>1</sup>, Dr. Simone J.J.M. Verswijveren<sup>1</sup>, Associate Professor Nicola D. Ridgers<sup>1,2</sup>, Prof. Anna Timperio<sup>1</sup>, Prof. Kylie D. Hesketh<sup>1</sup>, Dr. Katherine L. Downing<sup>1</sup>, Dr. Lauren Arundell<sup>1</sup>, Prof. David W. Dunstan<sup>1,3</sup>, Prof. Jo Salmon<sup>1</sup>

<sup>1</sup>Institute for Physical Activity and Nutrition (IPAN), School of Exercise and Nutrition Sciences, Deakin University, Burwood, Australia, <sup>2</sup>Alliance for Research in Exercise, Nutrition and Activity (ARENA), Allied Health and Human Performance, University of South Australia, Adelaide, Australia, <sup>3</sup>Physical Activity Laboratory, Baker Heart and Diabetes Institute, Melbourne, Australia

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**SIG - Primary Choice:** G. Children and families

**Purpose:** Little research has examined the composition of waking behaviours assessed using postural devices and associations with health. The aim of this cross-sectional study was to examine the associations of posture-based device-measured waking movement behaviour compositions (i.e., sitting, standing [LPA], and stepping) with adiposity markers (i.e., waist circumference [WC] and body mass index [BMI]) among children and adolescents.

**Methods:** Pooled data from eight Australian (Melbourne, Victoria; 2007-2014) studies involving 1,199 children and youth (age range 1.8-20.0 years; age<sub>m</sub> 9.8±4.0; 51.5% girls). activPAL (i.e., posture monitor) measured waking movement behaviours (i.e., sitting, standing, and stepping time), anthropometric (WC and BMI) and demographic data (age, sex) were assessed. Waking 3-part compositions of sitting, standing and stepping were formed using compositional data analysis. Linear regression models, stratified by age bands (<5 years, 5-12 years, >12 years), tested associations of waking composition with standardized zBMI and zWC (adjusted for study and total wear time).

**Results:** No significant associations of overall composition with adiposity outcomes were found for children <5 years old (n=114). For children 5-12 years (n=702), the overall waking composition was associated with zWC but not zBMI. Specifically, a higher proportion of sitting time was associated with lower zWC ( $\beta = -0.230$ , SE=0.092), a higher proportion of standing time was associated with higher zWC ( $\beta = -0.159$ , SE=0.061), and no association was found for stepping proportion. For adolescents (n=304), the overall waking composition was associated with both adiposity outcomes. Specifically, a higher proportion of sitting time was associated with higher zBMI ( $\beta = -0.441$ , SE=0.198), a higher proportion of standing time was associated with lower zBMI ( $\beta = -6.020$ , SE=0.217) and lower zWC ( $\beta = -0.809$ , SE=0.218), and a higher proportion of stepping time was associated with a higher zWC ( $\beta = 0.467$ , SE=0.162).

**Conclusions:** Adiposity markers appear more consistently associated with movement behaviour compositions in adolescents than in younger children, although for waist circumference, some associations were in the opposite expected direction. No associations were detected for children under 5 years. Longitudinal analysis is needed to further understand these relationships.

# Parent-reported child appetite moderates relationships between child genetic obesity risk and parental feeding response

**Dr. Elena Jansen**<sup>1</sup>, Mr. Marcus Naymik<sup>2</sup>, Dr. Gita Thapaliya<sup>1</sup>, Dr. Matt Huentelman<sup>2</sup>, Dr. Sean Deoni<sup>3, 4, 5</sup>, Dr. Susan Carnell<sup>1</sup>

<sup>1</sup>Johns Hopkins School of Medicine, Baltimore, USA, <sup>2</sup>The Translational Genomics Research Institute (TGen), Phoenix, USA, <sup>3</sup>Hasbro Children's Hospital, Providence, USA, <sup>4</sup>Warren Alpert Medical School at Brown University, Providence, USA, <sup>5</sup>Bill & Melinda Gates Foundation, Seattle, USA

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**SIG - Primary Choice:** G. Children and families

**Background:** Food parenting practices are associated with child weight. Such associations may reflect effects of parents' practices on children's intake and weight. However, longitudinal, qualitative, and behavioral genetic evidence suggests these associations could in some cases reflect parents responding to children's genetic risk for obesity – an instance of gene-environment (GE) correlation. We aimed to test for GE correlation across multiple domains of food parenting, and to explore the role of parent-reported child appetite in GE relationships.

**Materials and methods:** Data on relevant variables were available for N=187 parent-child dyads (7.54±2.67 years; 44.4% girls) participating in RESONANCE, an ongoing pediatric cohort study. Children's polygenic risk scores (PRS) for obesity were derived based on adult GWAS data. Parents reported on their feeding practices (Comprehensive Feeding Practices Questionnaire) and their child's eating behavior (Child Eating Behavior Questionnaire). PROCESS was used to examine interaction effects of child eating behaviors on associations between child obesity PRS and parental feeding practices, adjusting for child age.

**Results:** Of the 12 parental feeding practices, 2 were associated with child obesity PRS, namely restriction for weight control ( $\beta = .182$ ,  $p = .011$ ) and teaching about nutrition ( $\beta = -.217$ ,  $p = .003$ ). Moderation analyses demonstrated that when children had high genetic obesity risk and showed high (vs. low/moderate) food responsiveness, or low (vs. moderate/high) satiety responsiveness, parents were more likely to restrict food intake to control weight.

**Conclusions:** Our results suggest that parents may mold their feeding practices in response to a child's propensity toward higher or lower body weight, and adoption of food restriction to control weight may depend on parental perceptions of child appetite. Research using prospective data on child weight and appetite and food parenting from infancy is needed to further investigate how gene-environment relationships evolve through development.

# Which components of a family-based obesity prevention intervention matter most in predicting change in preschool parents' empowerment and healthy weight parenting practices?

**Dr. Cristina Gago**<sup>1</sup>, Ms. Alyssa Aftosmes-Tobio<sup>2</sup>, Prof. Janine Jurkowski<sup>3</sup>, Dr. Jacob Beckerman-Hsu<sup>4</sup>, Ms. Evelin Garcia<sup>4</sup>, Ms. Kindra Lansburg<sup>5</sup>, Ms. Natalie Grafft<sup>2</sup>, Prof. Sebastien Hanuiese<sup>4</sup>, Prof. Kirsten Davison<sup>2</sup>  
<sup>1</sup>NYU Langone Health, New York, USA, <sup>2</sup>Boston College, Chestnut Hill, USA, <sup>3</sup>University at Albany State University of New York, Albany, USA, <sup>4</sup>TH Chan School of Public Health, Boston, USA, <sup>5</sup>Action for Boston Community Development (ABCD), Boston, USA

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**SIG - Primary Choice:** G. Children and families

**Purpose:** Researchers partnered with staff and parents of a federally funded preschool program for low-income families to develop and implement a family-centered obesity prevention intervention, known as Communities for Healthy Living, in a northeastern city in the United States. This study estimated associations between parents' perceived exposure (vs. not) to specific intervention subcomponents and changes in both parental empowerment and weight-related parenting practices over an academic year.

**Methods:** Preschool programs (n=16) were randomly assigned one of three start times for transition from control to intervention, following a stepped wedge design. During intervention periods, three intervention subcomponents were delivered: a media campaign (e.g., brochures on weight-related parenting), enhanced nutrition support (e.g., healthy growth letter mailed home, staff provided training regarding healthy weight discussions with parents), and an opt-in 10-week wellness program for parents (PConnect). All parents with children enrolled during intervention periods were invited to complete a survey in fall and spring of the 2017 and 2018 school years assessing empowerment (items=15; e.g., critical awareness, resource recognition, relationship building), weight-related parenting practices (items=9; e.g., diet, activity, sleep), and perceived exposure to intervention subcomponents. Approximately one-in-four eligible parents completed fall and spring surveys (n=363). We used mixed effects linear regression models to estimate adjusted mean change in empowerment and weight-related parenting, by perceived exposure (vs. not) to intervention subcomponents, including brochures (n=268 vs. 95), healthy growth letter (n=251 vs. 79), discussion with staff (n=192 vs. 171), and PConnect graduation (attended ≥ 70% of sessions vs. not, n=48 vs. 301).

**Findings:** Controlling for key confounders, change in weight-related parenting did not significantly differ by recall of any intervention subcomponent. However, parents who recalled exposure to the healthy growth letter (vs. not) and those who graduated from PConnect (vs. not) reported significantly greater mean estimated increases in parental empowerment (b=0.11 [95% CI=0.02,0.20]; b=0.20 [95% CI=0.07,0.33]; respectively).

**Conclusions:** These results suggest unique intervention subcomponents may pose differential impacts on participant outcomes, and underscore important implications regarding intervention design: tailored materials (e.g., growth letter) and sustained interpersonal interaction (e.g., graduating from PConnect) may be associated with meaningful changes in parental empowerment.

# A co-designed system of support for the health of young people experiencing first episode psychosis

**Dr. Matthew Jenkins<sup>1</sup>**, Dr. Victoria Chinn<sup>2</sup>, Ms. Tracey Gardiner<sup>1</sup>, Associate Professor Susanna Every-Palmer<sup>1</sup>

<sup>1</sup>University of Otago, Wellington, New Zealand, <sup>2</sup>Te Herenga Waka, Victoria University of Wellington, Wellington, New Zealand

**Award Session - Early care and education | Young Adults, K1 (+K2), June 14, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** J. Young Adults

**Background:** People experiencing psychosis often suffer from poor physical health, the result of complex interactions between medication adverse effects and maladaptive health behaviours (e.g., physical inactivity, unhealthy eating, smoking, substance abuse). Modifiable health behaviours (e.g., regular physical activity, abstinence from smoking, alcohol, and other substances) can significantly mitigate health risks, but it is critical that intervention or support for such behaviours occurs early - at the onset of first episode psychosis (FEP) - before unhealthy habits and associated health conditions take hold. Further, any intervention or system of support must draw from the lived experiences of people living with psychosis and the barriers they face in remaining 'healthy' within the context of healthcare services.

**Methods:** Our research used a process of iterative experience-based co-design to create a system of support for the health of young people experiencing FEP and to create a set of principles to guide healthcare within early intervention services. Participants included FEP service users, members of their family, and mental health service providers. The co-design process incorporated indigenous Māori knowledge and creative outputs by which young people could communicate their lived experiences of psychosis and state what they wanted to see in an ideal system of support. Data collection involved a series of workshops, focus groups, online surveys, and interviews, which resulted in written responses, audio recordings, and creative outputs (e.g., art). The research team are using phenomenographic and thematic analyses to understand the data and to achieve the research objectives.

**Results and implications:** Data are still being analysed, and so we will present an outline of the co-design process and the preliminary outcomes. Co-design processes that account for the lived experience of people living with serious mental illness should guide mental health care. This research will hopefully provide a template for such co-design, in addition to tangible outcomes that support the health and well-being of those experiencing FEP.



# Effectiveness of digital health interventions targeting lifestyle risk behaviours on improving adolescent mental health or wellbeing: a systematic review with meta-analysis

**Miss Rebecca Raeside<sup>1</sup>**, Miss Si Si Jia<sup>1</sup>, Miss Allyson Todd<sup>1</sup>, Dr. Karice Hyun<sup>1,2</sup>, Dr. Anna Singleton<sup>1</sup>, Dr. Lauren Gardner<sup>3</sup>, Dr. Katrina Champion<sup>3</sup>, Prof. Julie Redfern<sup>1,4</sup>, Dr. Stephanie Partridge<sup>1</sup>

<sup>1</sup>Engagement and Co-Design Research Hub, University of Sydney, Sydney, Australia, <sup>2</sup>Department of Cardiology, Concord Repatriation General Hospital, Sydney, Australia, <sup>3</sup>The Matilda Centre for Research in Mental Health and Substance Use, The University of Sydney, Sydney, Australia, <sup>4</sup>The George Institute for Global Health, University of New South Wales, Sydney, Australia

**Award Session – Early care and education | Young Adults, K1 (+K2), June 14, 2023, 4:15 PM – 5:30 PM**

## **SIG - Primary Choice:** J. Young Adults

**Purpose:** Research has established associations between lifestyle risk behaviours (physical inactivity, poor diet) and poor mental health among adolescents. Digital interventions which target multiple lifestyle risk behaviours are efficient, scalable and may improve mental health outcomes (e.g. quality of life [QoL], depression). However, limited evidence exists to determine effectiveness. We aimed to assess the effectiveness of digital health interventions targeting lifestyle risk behaviours on mental health or wellbeing outcomes in adolescents.

**Methods:** Systematic review with meta-analysis of 10 electronic databases from 01 January 2005 to 17 August 2022 including: (i) cluster/randomized controlled trials (cRCT/RCT) of digital health interventions; (ii) participants 10-24 years old, without significant acute or chronic disease(s); (iii) intervention targeting  $\geq 1$  lifestyle risk behaviour (physical activity, diet, sedentary behaviour, sleep, alcohol or smoking); (iv) study outcome of mental health or wellbeing. Review is registered with PROSPERO (CRD42021247738) and conducted and reported in accordance with PRISMA statement guidelines. Primary outcome was objective or self-reported change in any mental health or wellbeing outcome. Outcomes were grouped, summarized qualitatively, and combined using a random effects meta-analysis.

**Results:** 17 studies were identified (13 RCTs, 4 cRCTs) including 9070 participants, mean age  $15.3 \pm 1.2$  years, 55.8% female (16-100%). A variety of digital health interventions were used including text messaging (n=5), mobile applications (n=3), websites (n=4), email (n=1), or a combination of these (n=4). Mental health or wellbeing outcomes identified included QoL (n=4), self-efficacy (n=5), depression (n=6), anxiety (n=4), negative affect (n=2) and self-esteem (n=1). One study measured mental health or wellbeing as a primary outcome. Interventions had small but non-significant positive effects on physical (standardized mean difference 0.30, [95% CI -0.05-0.66];  $p=0.10$ ) and psychosocial QoL (0.38, [-0.08-0.83];  $p=0.10$ ), depression (-0.02, [-0.09-0.05];  $p=0.60$ ), anxiety (-0.13, [-0.45-0.19];  $p=0.42$ ) and negative affect (-0.61, [-1.59-0.37];  $p=0.22$ ) at post intervention follow-up compared to usual care controls.

**Conclusions:** Despite known associations between lifestyle risk behaviours and mental health among adolescents, reporting of effects on mental health is limited. Small changes demonstrate potential for digital health interventions to improve these outcomes among adolescents, yet studies with a greater focus on mental health or wellbeing are needed.

# Nurturing Healthy Teachers: A cluster quasi-experimental trial to improve the health, well-being, and food security of early care and education (ECE) professionals

**Dr. Shreela Sharma**, Dr. Nalini Ranjit, Mr. Michael Pomeroy, Ms. Jill Cox, Dr. William Perkison, Ms. Bethany Jana, Ms. Azar Gaminian, Ms. Mackenzie Senn, Dr. Ru-Jye Chuang, Mr. Miao Tang, Dr. Courtney Byrd-Williams

<sup>1</sup>University Of Texas School Of Public Health, Houston, USA

**Award Session - Early care and education | Young Adults, K1 (+K2), June 14, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** F. Early care and education

**Purpose:** More than 2 million early care and education (ECE) providers, mostly women, provide care to over 10 million preschool-age and elementary school age children in the US. Our prior studies demonstrate that over 30% of ECE providers are food insecure with concurrent poor diet quality. We present the conceptual framework, design and study measures of Nurturing Healthy Teachers, a quasi-experimental cluster, non-randomized controlled study to examine the short- and long-term effectiveness of the Nurturing Healthy Teachers (NHT) nutrition intervention on food insecurity, dietary behaviors, mental health and cardiometabolic health among ECE teachers.

**Methods:** A convenience sample of 30 elementary schools with pre-kindergarten classrooms meeting the eligibility criteria are currently being recruited in Houston, Texas. Eligible schools (n=30) are assigned 1:1 into the intervention or comparison group. All teachers/providers in the 15 intervention schools will be eligible to receive NHT intervention, while those in the 15 comparison schools will receive CHF online modules-only in the 2022-2023 and 2023-2024 school years. The primary outcome of is food insecurity. Secondary outcomes include diet quality, mental health, and metabolic health. Metabolic markers and skin carotenoid levels will be assessed using in person assessments (finger-stick blood measure for HbA1c, weight measurement, blood pressure measurement, and Veggie Meter), while all other measures will be obtained via questionnaire. Process evaluation data using mixed methods will measure dosage, reach, fidelity and acceptability.

**Results/findings:** Grounded in the Social Cognitive Theory constructs, NHT combines strategies from two evidence-based programs that are currently being implemented at scale: Create Healthy Futures and Brighter Bites. Developed by Penn State Extension Better Kid Care, CHF is a web-based nutrition education plus peer support strategies to improve nutrition knowledge, self-efficacy, mindfulness, and social support to create healthy dietary habits. Brighter Bites provides a weekly distribution of ~20 pounds of donated fresh fruits and vegetables, plus healthy recipe tastings, and nutrition education. We will present the study design, intervention logic model and results of our baseline data collection.

**Conclusions:** Given the scalability of Brighter Bites and CHF, if found to be effective, a platform for rapid dissemination of NHT among ECE providers already exists.

# Gardening in Childcare Centers: A Cluster Randomized Controlled Trial Examining Effects on Physical Activity among Children

**Dr. Nancy Wells<sup>1</sup>**, Dr. Nilda Cosco<sup>2</sup>, Dr. Derek Hales<sup>3</sup>, Dr. Muntazar Monsur<sup>4</sup>

<sup>1</sup>Cornell University, Ithaca, NY, USA, <sup>2</sup>North Carolina State University, Raleigh, NC, USA, <sup>3</sup>University of North Carolina, Chapel Hill, NC, USA, <sup>4</sup>Texas Tech University, Lubbock, TX, USA

**Award Session - Early care and education | Young Adults, K1 (+K2), June 14, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** F. Early care and education

**Purpose:** Around the globe, young children fall short of daily physical activity recommendations. Early childhood education and care environments (i.e. childcare) have the potential to shape physical activity habits early in life. Gardening may contribute to children's physical activity however childcare center gardening is seldom studied. We examine the impact of a gardening intervention on children's time in moderate or vigorous (MVPA) and sedentary (SED) activity while at the childcare center.

**Methods:** In this randomized controlled trial (RCT) 15 childcare centers in low-income areas of Wake County, North Carolina, were randomly assigned to: (1) intervention (year 1), (2) waitlist control (year 1-control; year 2 - intervention), or (3) control year 2. The sample includes 325 children aged 3–5 years, with n=293 having physical activity data for at least one time point. The garden intervention comprised six raised garden beds planted with vegetables and fruits, and a booklet of 12 gardening activities. Physical activity was measured at each data collection period for 3 days using Actigraph GT3x accelerometers, secured at the waist. Analyses employ repeated measures linear mixed models (SAS v9.4 proc mixed) accounting for clustering of children within center. Model covariates included number of days with no outside time (0-2), number of days with rain (0-2), cohort (year 1 or 2), and accelerometer wear minutes.

**Results/ findings:** At baseline, children ( $3.9 \pm 0.53$  years; 51% girls;  $58.6 \pm 28.9$  BMI%) accumulated  $34.8 \pm 12.6$  minutes of MVPA and  $273 \pm 37$  minutes of sedentary time each day. Accelerometer wear days were similar across groups (2.5 days). A significant intervention effect was found for both MVPA ( $p < 0.0001$ ) and SED minutes ( $p = 0.0004$ ). With children attending the intervention centers getting 5.8 minutes more MVPA and 15.2 minutes less sedentary time each day.

**Conclusions:** This study employs compelling research design and measures to address an important gap in the empirical literature. Results suggest that FV gardening within childcare centers may be an effective strategy to encourage physical activity early in life.

# Play Active Program for Early Childhood Education and Care: A Pragmatic RCT

**Associate Professor Hayley Christian**<sup>1,2</sup>, Dr. Andrea Nathan<sup>1</sup>, Ms. Emma Adams<sup>1,2</sup>, Dr. Matthew McLaughlin<sup>1</sup>, Ms. Phoebe George<sup>1,2</sup>, Ms. Elizabeth Wenden<sup>1,2</sup>, Prof. Stewart Trost<sup>3</sup>, Prof. Jasper Schipperijn<sup>4</sup>, Associate Professor Kevin Murray<sup>2</sup>

<sup>1</sup>Telethon Kids Institute, University of Western Australia, Perth, Australia, <sup>2</sup>School of Population and Global Health, The University of Western Australia, Perth, Australia, <sup>3</sup>School of Human Movement and Nutrition Sciences, University of Queensland, Brisbane, Australia, <sup>4</sup>Department of Sports Science Clinical Biomechanics, University of Southern Denmark, Odense, Australia

**Award Session - Early care and education | Young Adults, K1 (+K2), June 14, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** F. Early care and education

**Purpose:** Early Childhood Education and Care (ECEC) services are important for supporting young children to establish positive physical activity (PA) and sedentary behaviours (SB), yet many children do not achieve movement guidelines. Play Active is an evidence-informed PA policy intervention combined with resources and training to enable ECEC services to successfully implement their policy. SB findings from the Play Active pragmatic cluster randomised trial will be presented.

**Methods:** In 2021-22 a pragmatic trial to test the effectiveness and implementation of the Play Active intervention was conducted with 81 ECEC services (646 educators) in Perth, Western Australia. Educator practices associated with children's PA and SB (sitting and screen time, confining equipment use e.g., highchairs) were assessed using established items (EPAO, NAPSACC, PLAYCE) in an online survey. Services randomised to the intervention (n=40) selected 3-5 policy strategies to employ during the 3-month trial implementation period. 38% selected at least one SB-focused policy strategy. Process evaluation outcomes included awareness, fidelity, reach, and acceptability of the intervention and implementation strategies. Analysis included descriptive statistics and generalised linear mixed effects models.

**Results/findings:** Intervention group educators reported high awareness of the Play Active policy recommendations (90%). Play Active acceptability was high for both educators (83%) and directors (78%). Fidelity and reach were high for most implementation strategies (75%-100%). There was a significant increase in the uptake of policy practices, however there were no changes in educator practices related to child sedentary time or use of confining equipment. Approximately 80% of children were expected to sit for <20 minutes at a time and 65% had zero minutes of screen time/day.

**Conclusions:** The Play Active intervention resulted in increased uptake of policy practices. However, there was no change in educator practices related to child sedentary time, which may be explained by the policy focus on PA, the relatively short 3-to-5-month policy implementation period and extensive staff turnover and shortages exacerbated by the impact of COVID-19 on the ECEC sector. Importantly, Play Active had high awareness, acceptability, fidelity and reach. Future research should investigate the effectiveness of Play Active over longer implementation periods and its potential for scale up.



# What predicts food and physical activity tracking among young adults: Results from the longitudinal Canadian NDIT study

Dr. Erin K. O'Loughlin<sup>1,2</sup>, **Ms. Maryam Marashi**<sup>2</sup>, Ms. Catherine M. Sabiston<sup>2</sup>, Dr. Kristen M. Lucibello<sup>2</sup>, Dr. Marie-Pierre Sylvestre<sup>1,3</sup>, Dr. Jennifer L. O'Loughlin<sup>1,3</sup>

<sup>1</sup>Centre de recherche du centre hospitalier de l'Université de Montréal (CRCHUM), Montreal, Canada, <sup>2</sup>Faculty of Kinesiology and Physical Education, University of Toronto, Toronto, Canada, <sup>3</sup>Department of Social and Preventive Medicine, Université de Montréal, Montreal, Canada

**Award Session - Early care and education | Young Adults, K1 (+K2), June 14, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** J. Young Adults

**Background & objective:** Monitoring food intake and physical activity (PA) using tracking applications may support behavior change. However, few longitudinal studies identify the characteristics of people who track their behavior, findings that could be useful in the design and targeting of tracking-related interventions. Our objective was to identify predictors of past-year food and PA tracking among young adults.

**Methods:** Data were available for 676 young adults participating in the ongoing longitudinal Nicotine Dependence in Teens Study. Potential predictors were measured in 2017-20, and past-year food and PA tracking were measured in 2021-22 at age 34. Each potential predictor was studied in a separate multivariable logistic regression model controlling for age, sex, and educational attainment.

**Results:** One-third (37%) of participants reported past-year PA tracking and 14% reported past-year food tracking (10% reported both). Attended university, higher household income, being employed, meeting MVPA guidelines, compensatory behaviors after overeating, self-report overweight, trying to lose weight, higher identified behavior regulation, reporting a variety of exercise behaviors, pressure to lose weight, and eating disorder diagnosis predicted past-year PA tracking. Female sex, compensatory behaviors after overeating, self-report overweight, trying to lose weight, body-related embarrassment, higher introjected regulation, reporting a wide variety of exercise behaviors, and pressure to lose weight predicted past-year food tracking.

**Conclusion:** Food and PA tracking is relatively common among young adults. However, the association between tracking and maladaptive behaviors (such as compensatory behaviors after overeating) and the link between tracking and eating disorders, warrant further investigation.

# Effect of Capacity Building Interventions on Classroom Teacher and Early Childhood Educator Perceived Capabilities, Knowledge, and Attitudes Relating to Physical Activity and Fundamental Movement Skills: A Systematic Review and Meta-Analysis

**Dr. Matthew Bourke**<sup>1</sup>, Miss Ameena Haddara<sup>1</sup>, Mr. Aidan Loh<sup>1</sup>, Miss Kendall Saravanamuttoo<sup>1</sup>, Dr. Brianne Bruijns<sup>1</sup>, Dr. Patricia Tucker<sup>1</sup>

<sup>1</sup>Western University, London, Canada

**Award Session - Implementation & scalability | Policies and environments, UKK - Hall C (Level 3), June 14, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**BACKGROUND:** Classroom teachers and early childhood educators (ECEs) play an important role in promoting physical activity and fundamental movement skills in children. However, teachers face several barriers to promoting physical activity and fundamental movement skills, including inadequate training and professional development. Capacity building interventions, such as training and professional development workshops, provision of resources, or communities of practise, may improve teachers' and ECEs' perceived capabilities, knowledge, and attitudes related to physical activity and fundamental movement skills.

**PURPOSE:** This systematic review and meta-analysis aimed to determine the efficacy of capacity building interventions on teachers' and ECEs' perceived capabilities, knowledge, and attitudes relating to physical activity and fundamental movement skills.

**METHODS:** An exhaustive literature search of six electronic databases was conducted and machine-learning assisted systematic review was used to identify relevant studies. Controlled trials and single-group pre-post studies were included if they measured the effect of a capacity building intervention on in-service or pre-service classroom teachers' or ECEs' physical activity or fundamental skills related perceived capabilities, knowledge, or attitudes. The effects of interventions were synthesised using random effects meta-analysis.

**RESULTS:** A total of 22 studies reporting on 25 unique samples were included in the meta-analyses. A total of 19 studies reported on perceived capabilities, eight studies reported on knowledge, and eight studies reported on attitudes. Interventions most commonly included training/professional development, resources and toolkits, communities of practice, mentorships, and ongoing support. Results showed that capacity building interventions significantly improved teachers' and ECEs' perceived capabilities ( $g = 0.614$ , 95% CI = 0.442, 0.786), knowledge ( $g = 0.792$  95% CI = 0.459, 1.125), and attitudes ( $g = 0.376$  95% CI = 0.181, 0.571).

**CONCLUSION:** Findings from this review provide strong support that capacity building interventions are efficacious at improving teachers' and ECEs' perceived capabilities, knowledge, and attitudes related to promoting physical activity and teaching fundamental movement skills. Pre-service teachers and ECEs should be provided training in physical activity and fundamental movement skills as part of their degrees, and continual professional development and capacity building should be offered to in-service teachers and ECEs to promote physical activity and fundamental movement skills in children.

# The effects of the “Grow Green” urban greening improvements on physical activity and other wellbeing behaviours in Manchester UK: A natural experimental study

Dr. Jamie Anderson<sup>1</sup>, **Dr. Jack Benton**<sup>1</sup>, Dr. Matthew Dennis<sup>1</sup>, Prof. James Rothwell<sup>1</sup>, Dr. Jack Wilkinson<sup>1</sup>, Prof. David French<sup>1</sup>

<sup>1</sup>University of Manchester, Manchester, United Kingdom

**Award Session - Implementation & scalability | Policies and environments, UKK - Hall C (Level 3), June 14, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** There is a dearth of robust natural experimental studies examining the effects of urban green space interventions on physical activity and wellbeing. The aim of this study was to examine the impact of a new sustainable “sponge park” in a deprived and high flood-risk area in Manchester (UK) on park use, physical activity and other wellbeing-promoting behaviours. The 1.4-hectare park was co-designed with the local community and includes rain and sunken gardens, a permeable piazza, play equipment and biodiverse planting.

**Methods:** Two comparison sites were matched to two intervention sites using eight correlates of physical activity at neighbourhood (e.g., population density) and site levels (e.g., pedestrian infrastructure). All sites were in the 10% most deprived areas in the UK. The primary outcome (observed walking) and secondary outcomes (vigorous physical activity, socialising, taking notice) were assessed using the MOHAWk behaviour observation tool. Observations involved baseline data collection (2018) before the intervention was implemented in 2020, and follow-ups at 3-months (2020) and 15-months (2021) post-intervention. Negative binomial regression models were used to estimate the effects of the intervention compared to the comparison group, controlling for key covariates. Intercept surveys were also used to assess self-reported outdoor space usage in the intervention and control sites at baseline and 12-months post-intervention.

**Results:** Compared to the comparison sites, the total number of people observed walking at the intervention park increased at 3-months (incidence rate ratio (IRR) 2.18, 95% CI 1.07–4.43) and 15-months post-intervention (IRR 3.44, 95% CI 2.11–5.62). There were also similar observed increases at the intervention sites compared to the comparison sites in vigorous physical activity, socialising and taking notice. Self-reported increases in outdoor space usage from baseline to follow-up were twice as large in the intervention sites compared to the comparison sites.

**Conclusions:** Creating sustainable parks is a promising intervention to encourage walking and support wellbeing activities, especially within deprived areas. Interventions that involve community collaboration may be particularly effective. More robust natural experimental studies like this are now needed to inform policy and decision-makers on the effectiveness of a wider range of urban green space interventions in different contexts.

# Environmental impact of Norwegian self-selected diets and potential benefits of transitions to diets consistent with national and international dietary guidelines

**Ms. Julie Lengle<sup>1</sup>**, Ms. Marie Michaelsen Bjøntegaard<sup>1</sup>, Associate Professor Monica Hauger Carlsen<sup>1</sup>, Prof. Lene Frost Andersen<sup>1</sup>

<sup>1</sup>University of Oslo, Oslo, Norway

**Award Session - Implementation & scalability | Policies and environments, UKK - Hall C (Level 3), June 14, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** The purpose of this study was to determine the environmental impact of current Norwegian diets, measured by global warming potential (GWP, kg CO<sub>2</sub>-eq), acidification (ACID, kg SO<sub>2</sub>-eq), freshwater- (EUTF, kg P-eq) and marine eutrophication (EUTM, kg N-eq), water use (WU, m<sup>3</sup>), and land use (LU/LUC, m<sup>2</sup>a). Further, the analysis aimed to compare the environmental impact of the current diet with two scenarios based on the Norwegian Food-Based Dietary Guidelines (FBDGs) and the EAT-Lancet Planetary Health Diet.

**Methods:** Information on current consumption was derived from the Norwegian national dietary survey Norkost 3 (2x24-hour recall; n= 1,787; ages 18-71 years). The two modelled diets were designed to follow the respective guidelines while mimicking the current diet in terms of food choices. Environmental impact values were estimated using a newly developed database including cradle-to-fork life cycle assessment values for foods on the Norwegian market.

**Results:** The food groups contributing most to environmental impact of current Norwegian diets were meat and meat products (GWP, EUTF, ACID, LU/LUC), dairy and dairy products (WU), and cereal grains and cereal grain products (EUTM). Women on average had lower total dietary environmental impact per day than men (25-45% lower across all impact categories), largely due to disparities in energy intake.

Transitioning to a diet following the Norwegian FBDGs resulted in reductions in GWP, EUTF, ACID, WU, LU/LUC, ranging from 4-26%, while an increase was observed for EUTM. Further, a transition to a diet falling within EAT-Lancet Planetary Health Diet ranges resulted in 17-67% reductions in all impact category totals.

**Conclusions:** To our knowledge, this is the first study to estimate the environmental impact of self-reported Norwegian diets using nationally representative environmental impact data. Results indicate that overall environmental burden of Norwegian diets is in line with that seen in other Scandinavian countries and Western Europe, and that an adjustment to diets following the national FBDGs could lead to reductions across multiple impact categories. Further, a more dramatic shift to a diet following EAT-Lancet guidelines could offer additional environmental benefits.



# Using sequential randomised and controlled trials to optimise a physical activity policy implementation strategy: the PACE case study

**Dr. Cassandra Lane**<sup>1,2,3</sup>, Dr. Nicole Nathan<sup>1,2,3</sup>, Dr. Alix Hall<sup>1,2,3</sup>, Mr. Adam Shoesmith<sup>1,2,3</sup>, Prof. Luke Wolfenden<sup>1,2,3</sup>

<sup>1</sup>The University of Newcastle, Newcastle, Australia, <sup>2</sup>Hunter New England Population Health, Newcastle, Australia, <sup>3</sup>Hunter Medical Research Institute, New Lambton Heights, Australia

**Award Session - Implementation & scalability | Policies and environments, UKK - Hall C (Level 3), June 14, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** In the field of public health, optimisation processes (cyclical and data-driven) are increasingly recognised for their potential to improve interventions and maximise health impacts; however, the experimental methods vary greatly. Here, we describe a novel optimisation approach, via sequential randomised and controlled trials (RCTs), that we successfully used to improve a school-based physical activity policy implementation intervention known as *Physically Active Children in Education* (PACE).

**Methods:** In response to an identified need to enhance the suitability of PACE for delivery at scale, we embarked on an optimisation project to improve PACE using a series of three RCTs conducted in primary schools in NSW, Australia. Within each trial we collected data on effectiveness, costs and implementation indicators (e.g., acceptability, fidelity, qualitative feedback) to inform incremental improvements. Effectiveness data was used to ensure that PACE remained an effective model for policy implementation. Other data were used to weigh the relative impact and cost of discrete PACE components to determine, in consult with stakeholders, where potential adaptations could be made.

**Results:** *Trial 1:* A 2017 pilot study in 12 schools showed the efficacy of PACE: school's policy implementation improved leading to increased physical activity of students. Minor changes were made to delivery of components and addition of three components to address outstanding barriers. *Trial 2:* A 2018 implementation-effectiveness trial in 61 schools showed that PACE was effective and cost-effective. Three components that were costly and challenging for scale-up due to in-person delivery were adapted to distance delivery (Adapted PACE). *Trial 3:* A 2019 noninferiority trial in 48 schools showed that Adapted PACE minimised the relative cost of delivery without losing its meaningful effect on policy implementation. The remaining in-person components were adapted for the option of online delivery.-

**Conclusion:** The optimisation of PACE is the first of its kind to employ sequential RCTs to improve an implementation strategy. Through this process we identified a scalable PACE model that is as effective as possible within the resource constraints of end-users (delivery providers and schools). This approach was well-suited to our research setting and may set precedence for optimisation research undertaken in similar contexts.

# Optimising the effectiveness, cost effectiveness, reach and adoption of a school nutrition intervention for national scale up

**Dr. Rachel Sutherland**<sup>1,2,3,4</sup>, Dr. Jannah Jones<sup>1,2,3,4</sup>, Mrs. Alison Brown<sup>1,2,3,4</sup>, Dr. Courtney Barnes<sup>1,2,3,4</sup>, Mrs. Lisa Janssen<sup>1</sup>, Prof. Luke Wolfenden<sup>1,2,3,4</sup>

<sup>1</sup>University Of Newcastle, Newcatsle, Australia, <sup>2</sup>Hunter New England Population Health, Newcastle, Australia,

<sup>3</sup>National Centre for Implementation Science, Newcastle, Australia, <sup>4</sup>Hunter Medical Research Institute, Newcastle, Australia

**Award Session - Implementation & scalability | Policies and environments, UKK - Hall C (Level 3), June 14, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Background:** Everyday in Australia, almost 2 million primary school aged children pack a school lunchbox, containing on average, three serves of discretionary foods. Despite the size of the problem, limited interventions targeting the nutritional quality of school lunchboxes exist. We aim to outline the optimisation process to design and scale-up a school nutrition intervention that is effective at improving the nutritional quality of school lunchboxes that can be implemented with high fidelity, low cost and achieve high reach.

**Methods:** A series of sequential studies were undertaken which aimed to optimise the effectiveness, cost effectiveness, reach and adoption of a school nutrition intervention. An mHealth intervention was developed targeting parents lunchbox packing behaviours. The process to optimise the mHealth intervention included: 1) Formative research to identify parental barriers to packing healthier lunchboxes; 2) a pilot cluster RCT to assess the feasibility, acceptability, effectiveness and cost effectiveness of the mHealth intervention (n= 12 schools, 3022 students); 3) an optimisation study designed to increase parental engagement with the intervention (n=511 parents); 4) a hybrid implementation-effectiveness trial conducted across a broad range of schools to determine effectiveness of the intervention on discretionary lunchbox energy, cost effectiveness and potential for scale-up (n= 32 schools); 5). Comparative effectiveness research to identify core intervention components and 6) dissemination strategies were piloted to inform scale-up to increase program adoption.

**Results:** The mHealth intervention aimed to address four key parental barriers to packing healthier lunchboxes including child preference, convenience, time, and cost. The pilot RCT was effective at increasing lunchbox energy from healthier foods aligned to dietary guidelines (79.2kJ, p=0.04), was acceptable to 95% of parents at a cost of \$31/student. Using optimised parental messages, the implementation-effective trial was effective at decreasing discretionary foods packed in school lunchboxes (--117.26kJ, p=<0.01), at a cost of \$6.02, which was further reduced to \$0.07/student following comparative effectiveness research.

**Conclusions:** The use of sequential studies resulted in the development of an effective, cost effective and highly scalable school nutrition intervention. Dissemination strategies have been identified to inform a national scale-up.

# Investments in community-wide initiative in physical activity: how do we evaluate its implementation and public participation?

**Mr. Narakorn Wongsingha<sup>1</sup>**, Dr. Dyah Anantalia Widyastari<sup>2</sup>, Associate Professor Piyawat Katewongsa<sup>2</sup>

<sup>1</sup>Thailand Physical Activity Knowledge Development Centre (TPAK), Institute for Population and Social Research, Mahidol University, Nakhon Pathom, Thailand, <sup>2</sup>Institute for Population and Social Research, Mahidol University, Thailand Physical Activity Knowledge Development Centre (TPAK), Nakhon Pathom, Thailand

**Award Session - Implementation & scalability | Policies and environments, UKK - Hall C (Level 3), June 14, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Inequality in accessing physical activity (PA) amenities has been shown as a consistent predictor of low levels of PA among the underprivileged population. Community-wide initiative interventions, therefore, are expected to narrow the gaps of inequalities in access and create more opportunities for PA. This study aims to evaluate community-wide program/policies, in terms of their availability, implementation and public participation.

**Methods:** Policy availability was assessed by using Comprehensive Analysis of Policy on Physical Activity (CAPPA) framework in terms of the stage of policy cycle, policy sector, type of policy and policy level - whether each investment covered international, national, subnational, regional or institutional/local. The weighted score is expressed in percentage. Data for evaluating policy implementation and public participation was driven from Thailand's Surveillance on Physical Activity 2021 comprising 7,665 national representative samples from 77 provinces. Policy implementation and public participation was assessed from the public perception and participation in the community-wide initiative programs/policies. Descriptive analysis was employed to evaluate the availability, implementation and participation rate, whereas binary logistic regression was applied to examine sociodemographic factors associated to participation rate.

**Results:** The availability of community-wide initiative policies scored 43.5%, suggesting there have been inadequate amounts of policies/programs available either at the national or community level. Only 11.6% of the investments were accessible to the public, and only 8.7% of the community participated in the programs. Females (OR 0.759, p-value 0.000) and children/ adolescents (OR 0.576, p-value 0.000) were less likely to access and participate in the programs compared to males and adults. Those with secondary and post-secondary education are more likely to participate in community-wide initiative programs than their counterparts with lower educational attainment. Regional differences also determine participation rate to community-wide investments.

**Conclusion:** Low accessibility and public participation in community-wide initiative investments indicated that the existing policies have not been able to serve the whole community members. To improve access and participation rate of community-wide initiative programs, future investments should consider to address more the underprivileged in order to provide a more-equitable access to all community members.

# Drivers with and without obesity respond differently to a multi-component health intervention in heavy goods vehicle drivers

**Miss Katharina Ruettger**<sup>1</sup>, Prof. Stacy A Clemes<sup>1,2</sup>, Dr. Yu-Ling Chen<sup>1</sup>, Dr. Charlotte L Edwardson<sup>2,3</sup>, Dr. Amber Guest<sup>1</sup>, Dr. Nicholas D Gilson<sup>4</sup>, Prof. Laura J Gray<sup>5</sup>, Mrs. Vicki Johnson<sup>6</sup>, Dr. Nicola J Paine<sup>1,2</sup>, Dr. Aron P Sherry<sup>1,2</sup>, Dr. Mohsen Sayyah<sup>1</sup>, Mrs. Jacqui Troughton<sup>6</sup>, Dr. Veronica Varela-Mato<sup>1,2</sup>, Prof. Tom Yates<sup>2,3</sup>, Dr. James A King<sup>1,2</sup>

<sup>1</sup>School of Sport, Exercise and Health Sciences, Loughborough University, Loughborough, United Kingdom,

<sup>2</sup>NIHR Leicester Biomedical Research Centre, Leicester, United Kingdom, <sup>3</sup>Diabetes Research Centre, University of Leicester, Leicester, United Kingdom, <sup>4</sup>School of Human Movement and Nutrition Sciences, The University of Queensland, Queensland, Australia, <sup>5</sup>Department of Health Sciences, University of Leicester, Leicester, United Kingdom, <sup>6</sup>Leicester Diabetes Centre, University Hospitals of Leicester NHS Trust, Leicester, United Kingdom

**Award Session - Motivation and Behavior Change | e- & mHealth, UKK - Level 6 Foyer, June 14, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Introduction:** Physical inactivity and obesity are widely prevalent in Heavy Goods Vehicle (HGV) drivers. We analysed whether obesity classification influenced the effectiveness of a bespoke structured lifestyle intervention (SHIFT study) for HGV drivers.

**Methods:** The SHIFT programme was evaluated within a cluster randomised controlled trial, across 25 transport depots in the UK. After baseline assessments, participants within intervention sites received a 6-month multi-component health behaviour change intervention. Intervention responses (verses control) were stratified by obesity status (BMI <30 kg/m<sup>2</sup>, n = 131; BMI ≥30 kg/m<sup>2</sup>, n = 113) and compared using generalised estimating equations.

**Results:** At 6-months, favourable differences were found in daily steps (adjusted mean difference 1827 steps/day, p<0.001) and sedentary time (adjusted mean difference -57 mins/day, p<0.001), in drivers with obesity undertaking the intervention, relative to controls with obesity. Similarly, in drivers with obesity, the intervention reduced body weight (adjusted mean difference -2.37 kg, p=0.002) and led to other favourable anthropometric outcomes, verses controls with obesity. Intervention effects were absent for drivers without obesity, and for all drivers at 16-18 months.

**Conclusion:** Obesity classification influenced HGV drivers' behavioural responses to a multi-component health-behaviour change intervention. Therefore, the most at-risk commercial drivers appear receptive to a health promotion programme.



# The annual rhythms in physical activity, sedentary behavior and sleep of Australian adults: a prospective cohort study

**Mr. Ty Ferguson**<sup>1</sup>, Dr. Rachel Curtis<sup>1</sup>, Dr. François Frayssé<sup>1</sup>, Prof. Timothy Olds<sup>1</sup>, Dr. Dorothea Dumuid<sup>1</sup>, Prof. Wendy Brown<sup>2</sup>, Prof. Adrian Esterman<sup>1</sup>, Prof. Carol Maher<sup>1</sup>

<sup>1</sup>University of South Australia, Adelaide, Australia, <sup>2</sup>University of Queensland, Brisbane, Australia

**Award Session - Motivation and Behavior Change | e- & mHealth, UKK - Level 6 Foyer, June 14, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Physical activity, sedentary behavior and sleep have fundamental impacts on health and well-being. Their sociodemographic and environmental correlates are well understood. Far less is known about how these behaviors fluctuate across the year. The aim was to explore how device-measured movement patterns change across the week, seasons, and around temporal events (Christmas-New year, daylight saving time [DST] transitions).

**Methods:** This cohort study included 368 parents from Adelaide, Australia (mean age = 40.2 years [SD = 5.9]) who wore Fitbit activity trackers 24 hours a day for 12 months. Minute-by-minute data on sleep, sedentary behavior (SB), light physical activity (LPA), and moderate-to-vigorous physical activity (MVPA) was collected using purpose-design “FitnessLink” data capture software. Temporal patterns of each behavior were analysed descriptively. Associations with specific temporal cycles (day of the week, season) and events (Christmas-New year, DST transitions) were explored using multi-level mixed-effects linear regression.

**Results:** Movement patterns varied significantly ( $p < 0.05$ ) by day of the week and season, and at annual events. Participants slept more on weekends relative to weekdays (+32 min/day), during autumn and winter relative to summer (+4 and +11 min/day), and over Christmas-New Year relative to the week before the holiday (+24 min/day), and slept less in the week after DST ended (April) relative to the week prior (-7 min/day). Participants had longer sedentary time on weekdays, during winter, after Christmas-New Year and after DST ended (+45, +7, +12 and +8 min/day respectively). They also had more LPA in autumn, winter, and during and after Christmas-New Year (-6, -15, -17 and -31 min/day respectively). Finally, participants had less MVPA on weekends and during winter (-5 min/day and -2 min/day respectively). Across the year, 14-day moving averages varied by 30 min/day for sleep (6% of mean sleep duration), 35 min/day for sedentary behavior (6%), 43 min/day for LPA (14%) and 7 min/day for MVPA (21%).

**Conclusions:** Movement behavior fluctuations associated with temporal events are overlaid on a weekly and seasonal rhythm. Understanding these fluctuations may inform the design and timely implementation of health promotion campaigns and interventions.

# Bridging the Gap: Development and evaluation of digital tools to support adoption and implementation of the New Zealand Healthy Food and Drink Policy

**Miss Magda Rosin<sup>1</sup>**, Dr. Sally Mackay<sup>1</sup>, Mrs. Elaine Umali<sup>2</sup>, Prof. Cliona Ni Mhurchu<sup>2</sup>

<sup>1</sup>School of Population Health, Faculty of Medical and Health Sciences, The University of Auckland, Auckland, New Zealand, <sup>2</sup>National Institute for Health Innovation, The University of Auckland, Auckland, New Zealand

**Award Session - Motivation and Behavior Change | e- & mHealth, UKK - Level 6 Foyer, June 14, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** A voluntary National Healthy Food and Drink Policy was released in 2016 to improve the healthiness of food and drinks for staff and visitors in New Zealand healthcare facilities and other public sector organizations. However, tools to support policy implementation were not developed, representing a significant gap. This study aimed to design, develop and evaluate a new tool to support food providers in implementing the National Policy.

**Methods:** The Double Diamond Model was used to co-design and co-develop a new web-based tool. Authors' previous research findings: (i) systematic review of barriers and enablers to workplace healthy food policy implementation, (ii) review of current supportive tools and resources, and (iii) interviews with food providers and public health professionals in New Zealand healthcare facilities, were used by a user experience (UX) designer in the Discover and Define phases. The MoSCoW framework was used to prioritize the functions and features of the prototype. During the Develop phase, project stakeholders and advisers provided feedback on the low-fidelity prototype used in the subsequent stages. UX testing of the high-fidelity prototype through interactive interviews with the end users (food providers) will be completed in the Deliver phase early in 2023. UX testing data will be used to organize and prioritize identified issues to improve the tool's usability.

**Results/findings:** A new digital tool, Healthy Kai (Food) Finder, a searchable packaged food and drink product database, was identified as the most necessary tool to support Policy implementation. Essential functions were basic and advanced searches for policy-compliant products, sorting list options, and compiling a list of selected products. Future features included reporting products missing from the database and the ability for users to self-assess products and recipes against the Policy's criteria.

**Conclusion:** Comprehensive research informing the development of the Healthy Kai Finder, and UX testing with food providers, will enhance the acceptance and usability of the new digital tool. Incorporation of more functions to support implementation of healthy food policies, with the possibility of including foods/drinks compliant with school food policies in the tool's database, would increase Healthy Kai Finder's usefulness.

# Could supporting routinization be key to improving physical activity?

**Dr. Dot Dumuid**<sup>1</sup>, Prof. Tim Olds<sup>1</sup>, Dr. Francois Frayssé<sup>1</sup>, Prof. Wendy Brown<sup>2</sup>, Dr. Ben Singh<sup>1</sup>, Dr. Rachel Curtis<sup>1</sup>, Dr. Ty Ferguson<sup>1</sup>, Prof. Adrian Esterman<sup>1</sup>, Dr. Gilly Hendrie<sup>3</sup>, Prof. Carol Maher<sup>1</sup>

<sup>1</sup>University of South Australia, Adelaide, Australia, <sup>2</sup>University of Queensland, Brisbane, Australia,

<sup>3</sup>Commonwealth Scientific and Industrial Research Organisation (CSIRO), Adelaide, Australia

**Award Session - Motivation and Behavior Change | e- & mHealth, UKK - Level 6 Foyer, June 14, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** It is difficult to increase physical activity (which necessitates compensatory changes in other daily activities), as people quickly return to their old habits once interventions finish. Embedding behavior change in daily routines may be the key to ongoing success. This study aimed to explore how routinization was associated with prospective variation in daily 24-h activity behaviors over a full year, and to examine cross-sectional associations with these behaviors.

**Methods:** At baseline, participants in the ARIA study (n=340, mean age=40y (SD 6), 56% female) completed an 8-item routinization questionnaire. For the 13 months following, they wore Fitbit activity trackers from which daily times spent in moderate-to-vigorous physical activity, light physical activity, sedentary behavior and sleep were derived. Total variation in these behaviors was calculated for each participant using the sum of the values in their 13-month day-to-day compositional variation matrix. Mixed models to account for clustering within families were used to regress the routinization score (independent) against total activity variation (dependent), and to regress routinization (independent) against the baseline (averaged over first month) 24-hour activity composition (independent). All models were adjusted for age, sex, education and study cohort.

**Results:** Higher routinization was associated with lower day-to-day total activity variation over the 13 months (std beta -0.22, p<0.001). Routinization was associated with the baseline activity composition (ChiSq 8.7, p=0.03). A +1 SD difference in routinization was associated with 15 min/d less sedentary behavior, which was compensated by +9 min/d light physical activity, +4 min/d sleep and +2 min/d moderate-to-vigorous physical activity.

**Conclusion:** Subjective measurement of routinization broadly aligns with device measured daily activity variation. Stronger routinization appears to be beneficially related to daily 24-hour activity behaviors. Understanding how to strengthen routinization may contribute to the success of activity behavior interventions.

# Using the Intervention Mapping Framework to develop a mHealth Snackivity™ intervention to promote physical activity

**Dr. James Sanders<sup>1</sup>**, Dr. Kajal Gokal<sup>1</sup>, Mr. Jonah Thomas<sup>1</sup>, Dr. Jonathan Rawstorn<sup>2</sup>, Prof. Lauren Sherar<sup>1</sup>, Prof. Ralph Maddison<sup>2</sup>, Prof. Colin Greaves<sup>3</sup>, Dr. Dale Esliger<sup>1</sup>, Prof. Amanda Daley<sup>1</sup>

<sup>1</sup>Loughborough University, Loughborough, United Kingdom, <sup>2</sup>Deakin University, Victoria, Australia, <sup>3</sup>University of Birmingham, Birmingham, United Kingdom

**Award Session - Motivation and Behavior Change | e- & mHealth, UKK - Level 6 Foyer, June 14, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Background:** Few people meet the weekly recommended guidelines for participation in physical activity, which is unlikely to change without the development and implementation of innovative interventions. One such intervention is Snackivity™. Snackivity™ is a novel and complementary approach that could motivate people to be physically active. It focuses on promoting short (2–5 min) and frequent bouts, or ‘snacks’ of physical activity throughout the whole day. The use of mobile health technologies has been suggested as a mechanism to implement innovative health behaviour change interventions, such as Snackivity™, at scale. This study reports the systematic, theory-driven processes and user testing applied to develop a smartphone-based physical activity application called SnackApp, that aims to support the public with their participation in Snackivity™.

**Methods and Results:** Intervention mapping was used to develop the SnackApp via a six-step process. These steps included a needs assessment and the identification of the determinants of physical activity and behaviour change techniques. SnackApp was based on control theory and the habit formation model. The SnackApp was linked with a wearable device (Fitbit Versa Lite) to facilitate automated capture of Snackivity™. To promote participation in Snackivity™ the SnackApp includes the provision for goal setting, activity planning and social support. The SnackApp was user-tested for 28-days in 15 inactive adults. App engagement (as measured by mobile app analytics) was analysed to determine SnackApp usage to aid further app development.

Over the 28-day study period participants engaged with the SnackApp on average 77 times, for an average total SnackApp time use of 12.6 mins/p/w, with most of this time spent on the SnackApp dashboard (14 bouts lasting 7.5 minutes p/w). On average, engagement with SnackApp was higher among males than females when considering overall use. App rating score (User Mobile Application Rating Scale) was 3.5/5 suggesting the SnackApp was rated as moderate to good on this scale.

**Conclusion:** User testing of the SnackApp suggests that physically inactive adults are keen to engage with novel interventions such as Snackivity™ to promote their participation in physical activity. The SnackApp was considered useful to support engagement with Snackivity™.



# Operationalizing behavioral theory in a communications campaign to improve physical activity (PA) parenting behaviors

**Ms. Breanne Wilhite<sup>1</sup>**, Dr. Erin Hennessy, PhD, MPH<sup>1</sup>, Dr. Christina Economos<sup>1</sup>, Dr. Jennifer Sacheck<sup>2</sup>, Ms. Rachel Zive<sup>3</sup>, Ms. Christine Odalen<sup>3</sup>, Ms. Stephanie Herrick<sup>3</sup>, Dr. Daniel Hatfield<sup>1</sup>

<sup>1</sup>Tufts University Friedman School of Nutrition Science and Policy, Boston, MA, USA, <sup>2</sup>George Washington University Milken School of Public Health, Washington, DC, USA, <sup>3</sup>New York Road Runners, New York, New York, USA

**Award Session - Motivation and Behavior Change | e- &mHealth, UKK - Level 6 Foyer, June 14, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Theory-based strategies are considered best-practice for effective behavior change, yet few studies document how theoretical constructs are operationalized in intervention materials. This study elucidates how two behavior change theories were used to inform a 20-week multichannel communications campaign, nested within a multilevel (school-home) intervention.

**Methods:** Parent communications development included three stages: (1) formulation of evidence-based objectives for improving physical activity (PA) parenting behaviors; (2) identification of priority constructs from Social Cognitive Theory (SCT) and Self Determination Theory (SDT) to advance objectives; (3) operationalization of SCT/SDT constructs in parent communication messages. Messages were deployed during a 20-week pilot trial through printed materials and electronic channels, such as email, text message, Facebook, and activity videos.

**Findings:** Evidence-based objectives for PA parenting behaviors included parental role modeling, social support, and praise/encouragement. For role modeling, priority constructs included knowledge, outcome expectations, observational learning, behavioral skills, self-efficacy, and collective efficacy (SCT) and perceived competence (SDT) (sample message: *"What's your favorite way to add more movement to your day? Adults play a powerful role in helping their kids stay active and healthy. Talk to your kids today about fun and enjoyable ways that you can all be more active together!"*). For social support, priority constructs included knowledge, self-efficacy, overcoming barriers (SCT) and autonomy (SDT) (sample message: *"Creativity doesn't just happen in art class - it can happen in physical activity, too! Getting creative can help your family to get active in fun and new ways, and you don't need a ton of space."*). For praise/encouragement, priority constructs included setting goals and intentions, reinforcement, self-efficacy and collective efficacy (SCT) and perceived competence (SDT) (sample message: *"Giving specific, descriptive feedback encourages kids to keep working at being their very best."*).

**Conclusions:** This study makes a novel contribution to the research by detailing how behavior-change theories can be operationalized in messages to improve PA parenting behaviors. This methodology is valuable for others seeking to translate theoretical constructs into behavior-change messages.

# The accumulation of social vulnerabilities directly associates with obesity and weight gain over adolescence.

**Dr. Juan Miguel Fernández-Alvira<sup>1</sup>**, Mr. Jesús Martínez-Gómez<sup>1</sup>, Miss Patricia Bodega<sup>1,2</sup>, Miss Amaya de Cos-Gandoy<sup>1,2</sup>, Miss Mercedes de Miguel<sup>1,2</sup>, Dr. Anna Tresserra-Rimbau<sup>3,4</sup>, Miss Camila Arancibia-Riveros<sup>3</sup>, Dr. Emily Laveriano-Santos<sup>3,4</sup>, Miss Ana Ruíz-León<sup>5</sup>, Dr. Ramón Estruch<sup>4,5</sup>, Prof. Rosa M Lamuela-Raventós<sup>3,4</sup>, Dr. Gloria Santos-Beneit<sup>1,2,6</sup>, Dr. Rodrigo Fernández-Jiménez<sup>1,7,8</sup>

<sup>1</sup>Centro Nacional de Investigaciones Cardiovasculares (CNIC), 28029, Madrid, Spain, <sup>2</sup>Foundation for Science, Health and Education (SHE), 08008, Barcelona, Spain, <sup>3</sup>Departament de Nutrició, Ciències de l'Alimentació i Gastronomia, Xarxa d'Innovació Alimentària (XIA), Facultat de Farmàcia i Ciències de l'Alimentació, Institut de Nutrició i Seguretat Alimentària (INSA-UB), Universitat de Barcelona (UB), 08921, Barcelona, Spain,

<sup>4</sup>Consorcio CIBER, M.P. Fisiopatología de la Obesidad y Nutrición (CIBEROBN), Instituto de Salud Carlos III (ISCIII), 28029, Madrid, Spain, <sup>5</sup>Department of Internal Medicine, Hospital Clínic, Institut d'Investigacions Biomèdiques August Pi i Sunyer (IDIBAPS), University of Barcelona, 08036, Barcelona, Spain, <sup>6</sup>The Zena and Michael A. Wiener Cardiovascular Institute, Icahn School of Medicine at Mount Sinai, NY 10029, New York, USA, <sup>7</sup>Centro de Investigación Biomédica En Red en enfermedades Cardiovasculares (CIBERCV), 28029, Madrid, Spain, <sup>8</sup>Hospital Universitario Clínico San Carlos, 28040, Madrid, Spain

**Award Session - Socio-economic inequalities | Participatory research in health promotion, UKK - K3+4 (Level 3), June 14, 2023, 4:15 PM - 5:30 PM**

## **SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose.** Childhood obesity usually presents a socioeconomic gradient with higher prevalence in children and adolescents from lower socioeconomic status families, especially in high-income countries. However, less is known about the effect of the accumulation of several social vulnerabilities over time on adolescent's weight status. The main purpose of this study was to explore cross-sectional and prospective associations between the accumulation of social vulnerabilities and weight status in adolescents in Spain.

**Methods.** This study includes data from a large cohort of adolescents enrolled in the SI! Program for Secondary Schools trial in Spain, evaluated at baseline [n=1282 (48.0% girls; 12.5(0.5) years)], at 2-year [n=1174 (48.0% girls; 13.9(0.4) years)] and at 4-year [n=1067 (47.7% girls; 15.8 (0.4) years)] follow-ups. Four socioeconomic vulnerabilities were taken into account to construct a socioeconomic vulnerability score, namely low household income, low parental education, a migrant background (at least one parent/caregiver born outside Spain), and parental unemployment (at least one parent unemployed or living on social assistance). Obesity was defined according to age- and sex-adjusted z-scores using validated cut-off points for body mass index (BMI) at each assessment. Associations between vulnerabilities and BMI/obesity were analysed using generalized linear and Poisson distribution-adjusted models.

**Results.** At baseline, 9.7% of participants presented obesity. Compared to adolescents without any, participants exposed to "one" or "2 or more" socioeconomic vulnerabilities at baseline presented higher obesity prevalence ratio (PR: 1.93 (95% CI:1.65-2.24) and PR: 3.01 (95% CI: 2.79-3.24), respectively). This obesity gradient was observed throughout the study and accentuated over time, especially when considering adolescents with "2 or more" vulnerabilities [2-year follow-up PR: 3.91 (95% CI:2.15-7.10); 4-year follow-up PR: 4.25 (95% CI: 4.25-4.26)]. Additionally, weight gain over time was significantly higher in participants accumulating "2 or more" vulnerabilities compared to adolescents without any [between-group difference in z-BMI between baseline and 4-year follow-up: 0.11 (95% CI: 0.03-0.18)].

**Conclusions.** A significant gradient in obesity linked to the exposure to social disadvantages in adolescents was found, being stronger as the number of vulnerabilities increased and as the adolescent aged. Therefore, tailored preventive policy actions are required in adolescents, particularly targeting the most vulnerable groups.

# Socioeconomic inequalities in health and health behavior mapped out from a complex systems perspective: A systematic review

**Ms. Andrea Mudd**<sup>1</sup>, Assistant Professor Michèle Bal<sup>1</sup>, Ms. Sanne Verra<sup>1</sup>, Dr. Maartje Poelman<sup>3</sup>, Prof. John de Wit<sup>1</sup>, Prof. Frank van Lenthe<sup>2</sup>, Associate Professor Carlijn Kamphuis<sup>1</sup>

<sup>1</sup>Utrecht University, Utrecht, Netherlands, <sup>2</sup>Erasmus University Medical Centre, Rotterdam, Netherlands,

<sup>3</sup>Wageningen University & Research, Wageningen, Netherlands

**Award Session - Socio-economic inequalities | Participatory research in health promotion, UKK - K3+4 (Level 3), June 14, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** I. Socio-economic inequalities

**PURPOSE:** Socioeconomic inequalities in health and health behavior are increasingly viewed as emerging from complex systems characterized by interrelated mechanisms at multiple levels, feedback loops, and nonlinearities. A systematic review of research that examined this topic from a systems perspective is needed to understand the (shared) drivers of socioeconomic inequalities in health and health behavior and to identify knowledge gaps.

**METHODS:** SCOPUS, Web of Science, and PubMed databases were searched in August 2021 for peer-reviewed studies in English in high-income OECD countries containing a conceptual systems model or a simulation model of socioeconomic inequalities in health or health behavior in adulthood. Two independent reviewers screened abstracts and full texts. For each included publication, data on type of model, extent of application of a complex systems approach, model evidence base, and direction and polarity of model relationships were extracted. Model elements were categorized based on the Commission on Social Determinants of Health framework and relationships were summarized in a conceptual systems map.

**RESULTS:** A total of 34 publications were included; 15 contained a conceptual systems model and 19 contained a simulation model. General health outcomes (e.g., health status, well-being) were more commonly modeled than specific outcomes like obesity. Dietary behavior and physical activity were by far the most commonly modeled health behaviors, and sleep was only included in one model. Intermediary determinants (e.g., material circumstances, psychosocial factors) were included in all but one model, whereas structural determinants (e.g., ethnicity, policies, societal values) were included in 62% of models. The summary conceptual systems map visualizes important feedback loops and shared drivers, like social cohesion and housing, of multiple outcomes. Key concepts of a complex systems approach (i.e., feedback loops, nonlinearities) were explicitly applied by about half of the included studies.

**CONCLUSIONS:** Empirical research applying a complex systems approach to understanding socioeconomic inequalities in health and health behavior is in its infancy. This review analyzes the existing literature on the topic, including the main shared drivers and feedback loops, for researchers to build upon and to guide researchers and policymakers aiming to apply a complex systems approach to understand socioeconomic inequalities in health.

# Gender gap for accelerometer-measured physical activity throughout the lifespan: A longitudinal analysis using five Brazilian cohort studies

**Dr. Luiza Ricardo**<sup>1,2</sup>, Dr. Andrea Wendt<sup>3</sup>, Dr. Debora Tornquist<sup>5</sup>, Dr. Renata Bielemann<sup>4</sup>, Dr. Inacio Crochemore-Silva<sup>2,5</sup>

<sup>1</sup>MRC Epidemiology Unit - University of Cambridge, Cambridge, United Kingdom, <sup>2</sup>Postgraduate Program in Epidemiology - Federal University of Pelotas, Pelotas, Brazil, <sup>3</sup>Programa de Pós-Graduação em Tecnologia em Saúde, Pontifícia Universidade Católica do Paraná, Curitiba, Brazil, <sup>4</sup>Posgraduate Program in Nutrition and Foods - Federal University of Pelotas, Pelotas, Brazil, <sup>5</sup>Postgraduate Program in Physical Education - Federal University of Pelotas, Pelotas, Brazil

**Award Session - Socio-economic inequalities | Participatory research in health promotion, UKK - K3+4 (Level 3), June 14, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** Evaluate gender differences in physical activity (PA) across age groups based on five Brazilian cohorts. The main research question is how does the gender gap change with age? The innovative aspect relies on exploring gender inequalities in PA throughout several age groups.

**Methods:** Data comes from four Pelotas birth cohort studies, following all live births in urban area for each respective year (1982, 1993, 2004, and 2015), and the 'Como vai?' Pelotas cohort study (60+y). Wrist-worn accelerometry (Actigraph or GENEActive) data was obtained from 1, 2, 4, 6, 11, 15, 18, 23, 30, and 60+ year-old participants. Raw PA data were processed with GGIR package (v2.2) using five-second epoch. Overall PA (OPA) was defined as the average of ENMO per day (mg). MVPA was defined as the average daily minutes spent >100mg, only calculated from age 6y onwards. Cohort-specific mean and 95%CI for OPA and MVPA were calculated by sex (male/female). To estimate pooled effects, random effects meta-analysis for relative (ratio: male/female) and absolute (difference: male-female) gender inequalities were calculated using Stata 17.

**Results/findings:** The analytical sample per cohort ranged from N=965 to N=3462. Pooled absolute difference was 5 mg for OPA (95%CI 3.1-7), and 19.3 minutes for MVPA (95%CI 12.7-25.9), in favour of males. For OPA the widest gap was found at age 11y (9.8 mg; 95%CI 8.7-11), while for MVPA the largest difference was found at age 18y (32.9 minutes; 95%CI 30.1-35.7). Older adults (60+y) showed no significant absolute gender gap for OPA. Pooled OPA relative ratio results showed males did 0.13 times more OPA than females (1.13; 95%CI 1.09-1.16), with highest ratio for 18-year-olds (1.24; 95%CI 1.23-1.25). Regarding MVPA, the pooled ratio was 1.70 (95%CI 1.57-1.84), with highest relative inequalities among older adults (2.00; 95%CI 1.92-2.08).

**Conclusions:** The PA gender gap begins early in life and remains marked in all age groups, being late adolescence the period with largest absolute gap and older adults the group with highest relative inequalities. PA promotion actions targeting women and efforts to tackle sociocultural barriers to PA are essential and must start early in life.



# The barriers and facilitators to reducing sedentarism amongst home-office employees: An employer's perspective

**Mr. Alan Coffey**<sup>1</sup>, Ms. Iris Parés-Salomón<sup>2</sup>, Ms. Päivi Reckman<sup>3</sup>, Mr. Malcolm Jones<sup>3</sup>, Dr. Judit Bort-Roig<sup>2</sup>, Prof. Karin Proper<sup>3</sup>, Dr. Anna Puig-Ribera<sup>2</sup>, Dr. Anna Señé-Mir<sup>2</sup>, Prof. Cristina Vaqué-Crusellas<sup>2</sup>, Dr. Kieran Dowd<sup>1</sup>

<sup>1</sup>Technological University of the Shannon, Athlone, Ireland, <sup>2</sup>University of Vic, Barcelona, Spain, <sup>3</sup>National Institute for Public Health and the Environment, Utrecht, Netherlands

**Award Session - Socio-economic inequalities | Participatory research in health promotion, UKK - K3+4 (Level 3), June 14, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** Office-workers spend up to two-thirds of their daytime sitting. The Covid-19 pandemic resulted in a shift from office-based working to home-office working, or a hybrid of both. Recent evidence suggests that home-office working further increases sedentarism compared to the office environment, which may have further deleterious effects on the health of employees unless addressed. To successfully implement interventions that reduce sedentarism while working remotely, it is important to understand, from an employer's perspective, the barriers and facilitators to reducing sedentarism. The Click2move project aims to support active and healthy jobs in Europe by developing a co-created intervention to reduce sedentarism in home-office workers.

**Methods:** Participants were recruited through an expression of interest form circulated via the European Network for Workplace Health Promotion, through personal communication with companies and social media. Semi-structured interviews were conducted, with all interviews recorded, transcribed and subsequently coded using MAXQDA and thematic analysis, guided by the COM-B model and the Behaviour Change Wheel, was performed.

**Results:** A total of 20 employers, 8 from Spain, 9 from Ireland and 3 from The Netherlands, aged between 18-65, participated in the interviews. Meeting schedules and workload, such as back-to-back meetings or achieving deadlines, were identified as barriers to reducing sedentarism. Adapting the culture to reduce sedentarism through participating in physical activity (PA) during work hours (e.g., normalising taking brief walks between meetings by managers) was identified as a key target to reduce sedentarism in a home-office context. The use of technology as a delivery method, the use of PA competitions amongst employees and offering numerous/personalised approaches for any future intervention were seen as feasible approaches, with all interviewees showing a willingness to promote digital strategies to support this.

**Conclusion:** Future interventions aimed at reducing sedentarism in a home-office context should consider a variety of behaviour change techniques that consider the aforementioned barriers and facilitators. There is a need for managers to lead by example, through normalising increased participation in PA amongst staff, while delivering the intervention in a digital form appears to be a feasible approach that would be supported by managers.

# Perspectives of Spanish children on drivers of their energy balance-related behaviors: ‘¡Chic@s en Acción!’

Dr. Pilar De Miguel-etyay<sup>1,2</sup>, **Ms. Laura Belmon<sup>3</sup>**, Prof. Luis Moreno<sup>1,2</sup>, Dr. Teatske Altenburg<sup>3</sup>, Other - on behalf of the GrowH! consortium<sup>4</sup>

<sup>1</sup>Growth, Exercise, Nutrition and Development (GENUD) Research Group, University of Zaragoza, Zaragoza, Spain. Instituto Agroalimentario de Aragón (IA2), Instituto de Investigación Sanitaria de Aragón (IIS Aragón), Zaragoza, Spain, <sup>2</sup>CIBEROBN, (Physiopathology of Obesity and Nutrition CB15/00043), Institute of Health Carlos III (ISCIII), Madrid, Spain, <sup>3</sup>Amsterdam UMC, Vrije Universiteit Amsterdam, Department of Public and Occupational Health, Amsterdam Public Health research institute, Amsterdam, Netherlands, <sup>4</sup>Department Prevention and Evaluation, Leibniz Institute for Prevention Research and Epidemiology – BIPS, Bremen, Germany

**Award Session - Socio-economic inequalities | Participatory research in health promotion, UKK - K3+4 (Level 3), June 14, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** Both Participatory Action Research (PAR) and systems dynamics are increasingly used to tackle the complex problem of childhood obesity. In the ‘¡Chic@s en Acción!’ study, youth-centered PAR is combined with Intervention Mapping and systems thinking tools to develop, implement and evaluate actions aimed at promoting healthy energy balance-related behaviors (EBRBs) together with 9-12-year-old children from a disadvantaged neighborhood in Zaragoza, Spain. In this participatory needs assessment, we aimed to gain insight in children’s perspectives on factors that drive their EBRBs.

**Methods:** During the school year (2021-2022), in so called ‘action teams’, children conducted peer-research to assess the needs of same-aged children in their neighborhood, in terms of EBRBs and aspects in their environment contributing to their EBRBs. Data was collected through 18 participatory group meetings with three groups of 9–12-year-old children (n = 6-8 per group) from two schools. The action teams collected data from their peers through questionnaires, that were completed by 75 children. Based on this data, the action teams created three causal loop diagrams (one focused on physical activity and sedentary behavior, one on dietary behavior, and one on sleep), depicting the most important drivers of children’s EBRBs and its interconnectedness.

**Results:** The most important factors driving children’s EBRBs perceived by children were: being alone at home, using screens before sleep and unhealthy family behaviors (focused on food choices and family rules) are barriers for children’s healthy behaviors. The factor being alone at home showed to be a link between all three CLDs. Children identified the following needs: creating healthy celebrations, providing ideas for healthy recipes, more possibilities for playing outside, availability of parks close by for playing outside, being active within the family context, and increasing individual motivation to being physically active.

**Conclusions:** Our participatory health needs assessment resulted in a comprehensive overview of child-perceived important drivers of children’s EBRBs and their needs. Insights in children’s perspectives on the mechanism through which their EBRBs are shaped are essential for developing better tailored, and thereby potentially more effective, interventions.

# Toowoomba Healthy Towns: A citizen science initiative on active transport in Regional South-East Queensland, Australia

**Prof. Tracy Kolbe-Alexander**<sup>1,2</sup>, Dr. Paul Gardiner<sup>1,3</sup>, Dr. Ann Banchoff<sup>4</sup>, Mr. Adam Schmidt<sup>1</sup>, Ms. Melinda Covey-Hansen<sup>1</sup>, Prof. Abby King<sup>4</sup>

<sup>1</sup>School of Health and Wellbeing and Centre for Health Research, University of Southern Queensland, Ipswich, Australia, <sup>2</sup>Division of Exercise Science and Sports Medicine, Department of Human Biology, Faculty of Health Sciences, University of Cape Town, Cape Town, South Africa, <sup>3</sup>School of Public Health, The University of Queensland, Brisbane, Australia, <sup>4</sup>Stanford Prevention Research Center, Stanford University School of Medicine, Stanford, USA

**Award Session - Socio-economic inequalities | Participatory research in health promotion, UKK - K3+4 (Level 3), June 14, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** Engaging in active transport will enable individuals to increase their habitual levels of physical activity. However, 90% of trips in Toowoomba, a town in regional Southeast Queensland Australia, is made with private vehicles despite the average distance being less than 5 km. The aim of this study was to engage citizen scientists (CS) to identify factors that help or hinder their active transport choices.

**Methods:** We used the *Our Voice* citizen science methodology developed at Stanford University. After recruiting CS, they completed a 'discovery walk' in their neighbourhood taking photos of things that help or hinder active transport choices. They rated each photo and provided a narrative explaining their reason for taking the photo. Once all CS in the group has completed the walk, they met for a group discussion. The CS worked together to analyse the data (photo's) arranging them into themes and highlighting priority actions. Two CS from each group were selected to advocate for the actions to decision makers.

**Results:** Three groups of CS were recruited; children aged 10-12 years (n=10), adults (n=10) and adults >65 years (n=10), representing a life course approach. An average of 160 photos, which were geo-coded, was taken per CS group. The children highlighted the need for safer crossings especially from their school to the park. They requested a zebra crossing closer to the school's bus stop. Similar to the children, safety of crossings was a major theme identified by the adults. The adults highlighted that road signs at crossings prioritizes vehicles, not pedestrians, and requested that this be reversed. The CS noted that the poor condition of the pavements made it harder for people with prams or wheelchairs to navigate. Improved maintenance of the paths was requested as they were uneven and could lead to tripping. Four CS delivered a presentation to a local council committee and the Deputy Mayor. The CS recommendations have informed the council's walking program with some of the changes being implemented.

**Conclusion:** Engaging the community as CS using the *Our Voice* methodology highlighted components of the built environment that should be addressed to encourage active transport.

# CHAired POSTER PRESENTATIONS

## Investigating Evidence of a Digital Divide in the Recruitment, Randomization, Engagement, Retention, and Efficacy in Post-Smoking Cessation Weight Management Clinical Trial

**Dr. Rebecca Krukowski<sup>1</sup>**, Dr. Melissa Little<sup>1</sup>, Dr. Zoran Bursac<sup>2</sup>

<sup>1</sup>University of Virginia, Charlottesville, USA, <sup>2</sup>Florida International University, Miami, USA

Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Diverse samples in research trials are important to the generalizability of findings and providing access to cutting-edge treatments. Thus, we evaluated whether there were indications of a digital divide in the recruitment, randomization, engagement, retention, and/or efficacy in a post-smoking cessation weight management trial.

**Methods:** The study initially recruited participants near Memphis, Tennessee, USA and later transitioned to remote assessment and national recruitment, due to the COVID-19 pandemic. All 305 randomized participants (32.1% men, 43.3% identified as Black, 10.5% non-urban, 58.0% with income <\$50,000) received 7-20 telephone-based interventions sessions over 2-8 months (depending on randomization assignment) and cellular scales for self-weighing.

**Results:** Recruitment: Radio advertisements were the best method for recruiting participants who identified as Black, and electronic recruitment strategies (e.g., Google, Facebook advertisements) were most effective for non-urban participants. Randomization: Individuals identifying as Black (OR = 0.53, 95% CI: 0.33-0.84) had decreased odds of proceeding from recruitment to randomization, and individuals residing in non-urban areas (OR = 8.76, 95% CI: 1.15-66.77,  $p = 0.036$ ) had increased odds of being randomized. Engagement: Participants identifying as White self-weighed more frequently than participants identifying with other racial groups (M(SD)=3.0(1.9) days/week vs. 2.3(1.8),  $p=0.002$ ), with no differences observed by rurality or income. Similarly, individuals identifying as White had higher session attendance (47%) compared to those who identified with other racial groups (39% of sessions,  $p=0.01$ ), with no differences by rurality or income. Retention: While 12-month retention was overall high (89%), individuals who identified as Black (16.7% vs. 6.3% for White participants,  $p = 0.005$ ) and participants with lower incomes (i.e., <\$50,000) (15.7% vs. 2.4% of participants with higher incomes,  $p = 0.0002$ ) had significantly higher attrition. Efficacy: All three weight management interventions were successful at reducing or eliminating post-cessation weight gain, and 46.9% of participants were successful at quitting smoking, with no race, rurality, or income-based differences ( $ps > 0.05$ ).

**Conclusions:** Findings indicate that this behavioral intervention trial with minimal technology requirements was successful at recruiting and treating a diverse sample of participants. Future research should test additional strategies for reducing disparities in the recruitment-to-randomization pipeline, retention, and engagement.



# Using Intervention Mapping in adapting a smartphone-based cardiac rehabilitation programme for older adults living with and beyond cancer: A work in progress

**Dr. Cindy Forbes**<sup>1</sup>, Dr. Jonathan Rawstorn<sup>2</sup>, Dr. Judith Cohen<sup>1</sup>, Dr. Chao Huang<sup>1</sup>, Prof. Michael Lind<sup>1</sup>, Prof. Ralph Maddison<sup>2</sup>, Mr. Ciaran McNaughton<sup>1</sup>, Dr. Mark Pearson<sup>1</sup>, Dr. Flavia Swan<sup>1</sup>, Dr. Maureen Twiddy<sup>1</sup>, Prof. Miriam Johnson<sup>1</sup>

<sup>1</sup>University of Hull, Hull, United Kingdom, <sup>2</sup>Deakin University, Melbourne, Australia

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** C. Cancer prevention and management

**Purpose:** The purpose of this mixed-methods intervention development study is to adapt an existing, feasible, smartphone-based cardiac rehabilitation programme (REMOTE-CR) for older adults LWBC. The overarching study addresses the development, modelling, and formative testing phases of the MRC Framework for Complex Intervention Development. In this abstract, we will focus on Part 1; which aims to explore the needs and preferences of older adults living LWBC and allied/healthcare professionals (A/HCPs) for a smartphone-based, tailored rehabilitation programme.

**Methods:** Recruitment is currently ongoing, however, we aim to recruit 30 older adults LWBC (10 in each age group; 65-74, 75-84, 85+) and 20 A/HCPs. Patient participants are interviewed via web-based video conference or telephone. A/HCPs participate in either focus groups of ~five people or individual interviews. These are held online where possible. Patient interviews ask, i) current mobile and internet use, supportive care needs, previous supportive care advice received during their cancer care pathway, and activity-related behaviour, ii) what they would want to get from (e.g. what they would want to see change in) and would need to be able to use a smartphone-based programme designed to increase physical activity. Examples of content and design from REMOTE-CR and previous research in physical activity counselling and programme preferences and online supportive care among older adult cancer survivors are discussed and apparent gaps explored. Topics for A/HCP focus groups include acceptability of a remote-delivered wellbeing programme, education needs for patients and clinicians for usage and content, supervision requirements, and ideas for potential scalability.

**Results:** Interviews and focus groups are recorded and transcribed verbatim. Data is analysed using a thematic framework, using a deductive and inductive approach. We will report on emerging themes that will guide the mapping of intervention components to desired outcomes for Parts 2 and 3.

**Conclusions:** Part 1 will provide components that will lead to a cancer-specific version (Part 2: REMOTE-GO) of the cardiac programme. Part 3 of this study will be user testing the programme among an older adult cancer population. This study will deliver a co-adapted smartphone-based wellbeing programme with older adults LWBC ready for feasibility testing.

# Changes in Physical Activity, Sedentary Behavior and Cognitive Function among Cancer Survivors During the COVID-19 Pandemic

**Dr. Linda Trinh<sup>1</sup>**, Miss Allyson Tabaczynski<sup>1</sup>, Miss Denise Bastas<sup>1</sup>, Miss Alyssa Neville<sup>1</sup>, Miss Lauren Voss<sup>1</sup>, Miss Alexis Whitehorn<sup>1</sup>

<sup>1</sup>Faculty of Kinesiology and Physical Education, University of Toronto, Toronto, Canada

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** C. Cancer prevention and management

**Purpose:** Physical activity (PA) and reductions in sedentary time (SED) may mitigate cancer-related cognitive impairment (CRCI). The purpose of this study was to: a) examine the associations between changes in PA, SED, and cognitive function in cancer survivors during the pandemic; and b) examine clinical subgroups that moderate this association.

**Methods:** An online, cross-sectional survey was administered globally to adult cancer survivors. Cancer survivors self-reported demographic and clinical variables, regional COVID-19 restrictions, moderate-to-vigorous PA (MVPA) prior to and during the pandemic using the modified Godin Leisure Time Exercise Questionnaire, and cognitive function using the Functional Assessment of Cancer Therapy Cognitive Scale (FACT-Cog). SED was measured using the Domain-specific Sitting Time questionnaire. Meaningful changes in MVPA (i.e., increase to  $\geq 150$  or decrease to  $< 150$  min/week) and SED (i.e.,  $\geq 60$  min/day) were used to categorize cancer survivors with no change in behavior, a desirable change in behavior (i.e., increase MVPA to meet PA guidelines or decrease SED by  $\geq 60$  min/day) and an undesirable change in activity behaviors (i.e., decrease MVPA to  $< 150$  min/week or increase SED by  $\geq 60$  min/day). Analysis of covariance examined differences in FACT-Cog scores across the activity change categories in the total sample and clinical subgroups. Planned contrasts compared differences in FACT-Cog scores between cancer survivors with (1) no meaningful change vs. any change, and (2) a desirable change vs. undesirable change.

**Results:** Cancer survivors ( $N=372$ ;  $M_{age}=48.7\pm 15.3$  years) were primarily female (71.7%), diagnosed with mainly breast (30.6%), gynecologic (14.2%) and hematologic (13.2%) cancer, and had a mean months since diagnosis of  $87.8\pm 83.1$ . There were no significant differences in FACT-Cog scores across activity change categories in the full sample. Cancer survivors diagnosed  $\geq 5$  years ago ( $t(165)=-2.00$ ;  $p=.048$ ) or received treatment  $\geq 5$  years ago ( $t(106)=-2.24$ ;  $p=.03$ ) that had a desirable change in activity reported better perceived cognitive abilities than those who had an undesirable change. No differences were found in the FACT-Cog for cancer survivors who had no meaningful change compared to those who did.

**Conclusions:** PA promotion efforts during the COVID-19 pandemic should consider reducing SED in addition to maintaining MVPA in long-term cancer survivors to mitigate CRCI.

# Better Late Than Never?! Five Compelling Reasons for Putting Physical Activity in Low- and Middle-Income Countries High Up on the Public Health Research Agenda

**Prof. Katja Siefken**<sup>1</sup>, Prof. Andrea Varela Ramirez<sup>2</sup>, Dr. Temo Waqanivalu<sup>3</sup>, Prof. Nico Schulenkorf<sup>4</sup>

<sup>1</sup>MSH Medical School Hamburg, Hamburg, Germany, <sup>2</sup>Universidad de los Andes, Bogota, Colombia, <sup>3</sup>World Health Organization, Geneva, Switzerland, <sup>4</sup>University of Technology Sydney, Sydney, Australia

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** The aim of this manuscript is to acknowledge the uncertainty of evidence in the field of domain-specific physical activity in low- and middle-income countries. The unique disposition of people from low- and middle income countries and their relationship with physical activity (social and cultural norms, priority setting) is discussed and social, cultural, environmental and structural factors that shape physical activity behaviour from low- and middle income country contexts are explored.

**Methods:** 39 established researchers presented their expertise in the field of physical in low- and middle income countries in a discussion. Key messages have been drawn from the expert knowledge to present future avenues for physical activity policy, intervention and multisectoral collaboration.

**Results:** Since 2020, the world has been navigating an epidemiologic transition with both infectious diseases (COVID-19) and noncommunicable diseases intertwined in complex and diverse ways. People in low- and middle-income countries not only have the highest risk of developing chronic diseases, they also develop the diseases at a younger age, they suffer longer, and they die earlier than people in high-income countries.

**Conclusions:** Only through concerted efforts and multisectoral actions—combined with targeted and sustained interventions, as well as local voices—may we succeed in putting LMICs firmly on the global PA agenda and thus create the inclusive change that is long overdue. Therefore, we present 5 compelling reasons for putting physical activity in low- and middle-income countries high up on the public health research agenda and we call for more commitment to inclusive and context-specific public health practices that are paired with locally relevant promotion and facilitation of PA practice, research, and policymaking. The 5 reasons include 1) Preconditions and varying awareness; 2) Limited opportunities; 3) Lifestyle changes; 4) Increased urbanization; and 5) Restricted support.

# Using community-based participatory research to support increased compliance to DASH diet recommendations in immigrant, Hispanic/Latinx individuals with cardiovascular disease and obesity

**Dr. Ambria Crusan<sup>1</sup>**, Ms. Kerrie Roozen<sup>1</sup>, Ms. Anayeli Remache<sup>1</sup>

<sup>1</sup>St. Catherine University, St. Paul, USA

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** The primary aim of this project is to determine preference-based, culturally-appropriate fruits/vegetables (F/V) meeting the Dietary Approaches to Stop Hypertension (DASH) diet recommendations for immigrant, Hispanic/Latinx individuals with hypertension and obesity via a phased, iterative process.

**Methods:** Phase 1, the initial conceptualization of a culturally-appropriate, medically-tailored “DASH box” utilized a 21-question survey of validated tools to understand patient demographics, social determinants of health, and F/V preference. The survey was administered to 49 patients or providers at a community health clinic, originating from varying Latin American countries. Phase 1 informed the development of 3 F/V boxes consisting of culturally appropriate, high-preference F/V in varying modalities (fresh, frozen, canned) and 3 F/V boxes with culturally-appropriate, high carotenoid F/V in varying modalities utilized in the next phase of the study. Phase 2, or the formative intervention, includes 7 individual interviews to gather qualitative feedback on the DASH box contents and perceptions of health.

**Results:** For the 38 women (78%) and 11 men (22%) who completed surveys, highest preferences for fruits were mango (58.3%), watermelon (52.1%), and banana (47.9%), and vegetable preferences included tomato (41.7%), cucumber (43.8%), and lettuce (37.5%). In the patient sample, 41.7% reported food insecurity, and 46.9% indicated they were unable to afford healthful foods for balanced meals. Emerging themes from the formative interviews show participants prefer fresh F/V to frozen, with little preference for canned foods. The F/V boxes containing all fresh items were unanimously preferred over other boxes with some frozen or canned foods. Additionally, all participants expressed that “the foods in the box were appropriate for their culture”, and interviewee 3 said, “all of the [boxes] have something good, I think that the best option is the most natural”. Financial and transportation barriers were identified as challenges to obtaining F/V in the diet.

**Conclusions:** Little research displays the work highlighting community opinions to encompass cultural food preferences. Our study provides formative contributions to research regarding culturally-appropriate fruit and vegetable preferences in a Hispanic/Latinx community.



# Effect of a physical activity-based lifestyle intervention on mental wellbeing of vocational education and training student

**Miss Mara Kirschner<sup>1</sup>**, Dr. Rianne Golsteijn<sup>1</sup>, Mrs. Roelina Kikkert<sup>1</sup>, Prof. Hans Saveberg<sup>2</sup>, Prof. Renate de Groot<sup>1</sup>

<sup>1</sup>Open University, Heerlen, Netherlands, <sup>2</sup>Maastricht University, Maastricht, Netherlands

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** F. Early care and education

**Purpose:** Low student mental wellbeing (SMW) is increasingly reported amongst adolescents worldwide. Changing physical activity behaviour (PAB), i.e., increasing moderate-to-vigorous physical activity (MVPA) and decreasing sedentary behaviour (SB) can potentially improve SMW. Vocational education and training (VET) students are a vulnerable group that are prone to insufficient physical activity (PA) and SMW problems. Therefore, this study aims to evaluate the effect of a PA-based lifestyle intervention on PAB and SMW of VET-students.

**Methods:** In a quasi-experimental study 126 VET-students were non-randomly allocated to a 20-week PA-based lifestyle intervention or an education-as-usual control group. Measurements were conducted before and after the intervention. PAB(i.e., SB and MVPA) was measured using the international physical activity questionnaire. SMW, operationalized as lack of depressive symptoms and presence of self-esteem, were measured with the Centre for Epidemiologic Studies Depression scale and the Rosenberg self-esteem scale, respectively. Repeated measures ANOVAs were used to evaluate the intervention effects on PAB and SMW.

**Results:** Repeated measures ANOVA revealed a significant time\*group effect ( $F(1, 89) = 8.40, p = .01$ ) for SB but not for MVPA. SB decreased in the intervention group and increased in the control group. For MVPA a significant negative main effect of time was found ( $F(1, 89) = 5.74, p = .02$ ), thus in both groups MVPA decreased significantly over time. No time\*group effects were found for depressive symptoms or self-esteem.

**Conclusion:** In summary, the PA-based lifestyle intervention significantly decreased the amount of SB, but had no effect on MVPA. Unfortunately, the intervention did not influence any of the SMW concepts. A possible reason could be that the PA-based lifestyle intervention in this study focused on more than only increasing PA. Thus, it is possible that the intervention was not intensive enough to change MVPA levels in the intervention group, resulting in not finding significant effects on SMW. Future research should investigate whether more intensive PA-based lifestyle interventions are more effective in increasing MVPA and subsequently SMW. Future research could also take additional lifestyle factors (e.g. sleep and nutrition) into account, since several lifestyle factors can have an effect on SMW.

# Co-Designing a Lifestyle-Focused Social Media Intervention for Young Women

**Ms. Jessica Malloy<sup>1</sup>**, Dr Rajshri Roy<sup>1</sup>, Dr. Stephanie Partridge<sup>2,3</sup>, Dr. Joya A Kemper<sup>4</sup>, Dr. Andrea Braakhuis<sup>1</sup>

<sup>1</sup>Discipline of Nutrition & Dietetics, Faculty of Medical & Health Sciences, University of Auckland, Auckland, New Zealand, <sup>2</sup>Westmead Applied Research Centre, Faculty of Medicine and Health, The University of Sydney, Sydney, Australia, <sup>3</sup>Prevention Research Collaboration, Sydney School of Public Health, The University of Sydney, Sydney, Australia, <sup>4</sup>Department of Management, Marketing, and Entrepreneurship, University of Canterbury Business School, University of Canterbury, Christchurch, New Zealand

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** Young women spend an average of 50 minutes daily on social media. Therefore, social media platforms may be promising intervention tools to address pertinent aspects of women's health including body image and health literacy. We aimed to co-design a lifestyle intervention on social media targeting eating, physical activity, and social well-being behaviours that is evidence-based, acceptable and engaging for young women aged 18-24 years.

**Methods:** The study used a participatory design framework and previously published iterative mixed methods approach between August-October 2022. A participatory needs assessment was conducted with young women, dietitians, and digital marketers. Data were collected in two phases. Phase 1 involved expert discussions (n=12), with experts being consulted on intervention objectives. Phase 2 involved codesign workshops, where 19 young women (n=6-9 in each workshop) and two researchers met weekly over three weeks. We used a structural approach for designing and planning interventions, known as Intervention Mapping.

**Results:** Matrices for the intervention objectives were constructed using expert panel discussions, and feedback was sought from young women in participatory workshops. In collaboration with young women, the intervention is being designed and produced using an iterative process. Preliminary analysis shows that most participants prefer Instagram for daily stories and static posts and TikTok for video content. Regarding health, all participants agreed that self-care and mental health is equally as important as physical health. The participatory groups and professional experts will design the implementation plan. The protocol of the process and effect evaluation will be executed by academic researchers with input from young women.

**Conclusions:** The study involves end-users throughout the process while at the same time developing interventions based on existing evidence. This study may guide other researchers or health professionals seeking to engage young women in the co-design of women's health promotion or intervention content on social media. The effectiveness of the social media lifestyle program will be tested in a pilot randomized controlled trial.

# Associations between profiles of the 24-hour activity cycle and cognitive function in older adults

**Dr. Dori E. Rosenberg<sup>1</sup>**, Mr. Yinxiang Wu<sup>2</sup>, Ms. Mikael Anne Greenwood-Hickman<sup>1</sup>, Dr. Susan M. McCurry<sup>2</sup>, Dr. Pamela A. Shaw<sup>1</sup>

<sup>1</sup>Kaiser Permanente Washington Health Research Institute, Seattle, USA, <sup>2</sup>University of Washington, Seattle, USA

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** Studies show that physical activity (PA) and adequate sleep protect cognitive health as people age. Few studies have examined activity patterns across the 24-hour activity cycle (24HAC) which includes PA, sedentary time (ST), and sleep, in older adults, despite interdependencies among these behaviors. We used data from the Adult Changes in Thought activity monitor (ACT-AM) study to explore cross-sectional associations between the 24HAC and cognition in older adults.

**Methods:** Participants (N=1034) in the ACT-AM study were dementia-free adults over age 65 who wore activPAL accelerometers for 7-days between April 2016 and July 2018. We extracted daily activPAL sitting, standing, stepping, and in-bed (representing sleep) time to represent 24HAC behaviors. We used Latent Profile Analysis (LPA) to define 24HAC profiles and assigned each participant to the profile with highest posterior probability using Latent GOLD 6.0 software. Cognitive Abilities Screening Instrument item response theory (CASI-IRT) scores measured global cognition. The association between cognition and 24HAC profile was estimated using a linear regression model adjusted for age, sex, race/ethnicity, BMI, education, depressive symptoms, and self-rated health, and corrected for profile assignment uncertainty. P-values were obtained using a Wald-type test.

**Results:** Participants were mean age 77 +/- 7 years, 55.8% female, 90.2% White, 1.4% Hispanic, with mean CASI-IRT 0.61 +/- 0.69. Participants' average sit, stand, step, and sleep hours/day were: 10 (2), 4 (1.6), 1.4 (0.7), and 8.5 (1.1). We identified 4 classes: 1) "most active/least sedentary" (12.8%); 2) "moderately active low sleepers" (24.9%); 3) "average activity/sleep" (43.8%); and 4) "least active" (18.6%). Compared to class 3, profiles 1 and 2 had more women, were younger, had lower BMI, and better physical function, sleep quality, and CASI-IRT scores. Compared to the "average activity" group, the "least active" class had lower CASI-IRT scores ( $\beta = -0.24$ ,  $p = 0.017$ ) in unadjusted associations that were non-significant in adjusted models ( $\beta = -0.027$ ,  $p = 0.80$ ).

**Conclusions:** LPA is a helpful approach for describing 24HAC behaviors in older adults. We did not see cross-sectional associations between 24HAC classes and cognition in this relatively healthy sample. Future studies can use LPA to link 24HAC profiles to changes in cognition over time.

# Developing and testing an online quality improvement tool for service providers and educators in family day care to improve nutrition and physical activity practices

**Miss Georgie Tran<sup>1</sup>**, Associate Professor Bridget Kelly<sup>1</sup>, Prof. Anthony Okely<sup>1</sup>

<sup>1</sup>University of Wollongong, Early Start, Faculty of the Arts, Humanities and Social Sciences, Wollongong, Australia

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** F. Early care and education

**Purpose:** In Australia, family day care (FDC) is a form of childcare where education and care are provided for up to four children below school age and an additional three school-aged children, in a home environment. Research shows that the food and physical activity environments in FDC can be improved to better support healthy behaviours. As online platforms can be a practical method to assist in quality improvement, it is feasible to consider the development of an online support tool in this sector. The aim was to develop an online support tool to improve nutrition and physical activity practices in FDC.

**Methods:** Formative work included review of FDC food and movement policies ( $n=23$ ), an observational study ( $n=33$ ) and online survey ( $n=186$ ) of the healthy eating and active living (HEAL) environments and practices within FDC, and online focus groups ( $n=10$ ) to obtain feedback on the tool from stakeholders. Regular meetings with stakeholders ensured co-development of the tool with the sector. A pilot study will be conducted to test the feasibility and acceptability of the tool, followed by a randomised controlled trial (RCT) to explore efficacy of the tool. An online survey will be used to collect data. For the RCT, the survey will collect data at baseline and at six months after commencement of the intervention to measure improvements in the ways that HEAL policies and practices are reflected in quality improvement planning.

**Results:** Key priority areas for improving HEAL practices in FDC identified in the formative work were role modelling healthy eating behaviours, decreasing screen time, and increasing time for physical activity. For the RCT, the efficacy of the intervention will be tested using an intention to treat approach and linear mixed models. Outcome variables at six months post-intervention will be validated against a checklist, which will be used to rate the quality of the FDC service provider's quality improvement plan.

**Conclusions:** The tool is predicted to serve as a platform for reporting against the National Quality Standard, to identify gaps between policy and practice, and to facilitate HEAL practice improvements.



# Physical activity energy expenditure of active commuting to/from school: The ENERGYCO Study

Mr. Pablo Campos-Garzón<sup>1</sup>, Dr. Yaira Barranco-Ruiz<sup>2</sup>, Dr. Francisco Javier Huertas-Delgado<sup>1</sup>, Dr. Manuel Herrador-Colmenero<sup>1</sup>, Dr. Palma Chillón<sup>1</sup>, **Dr. Emilio Villa-González<sup>2</sup>**

<sup>1</sup>University of Granada, PROFITH: PROMoting FITness and Health through physical activity Research Group, Sport and Health University Research Institute (iMUDS), Department of Physical Education and Sports, Faculty of Sport Sciences, Granada, Spain, <sup>2</sup>University of Granada, PROMoting FITness and Health through physical activity Research Group, Sport and Health University Research Institute (iMUDS). Department of Physical and Sports Education, Faculty of Education and Sport Sciences, Melilla, Spain

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Active commuting to/from school (ACS) rate in Spanish youth is around 60%, but cycling trips are very scarce (<1%), and to date it is unknown what is the physical activity energy expenditure (PAEE) derived from different modes of commuting to/from school. Therefore, the ENERGYCO study aims to address this gap through two phases: the phase one will focus on the validation and testing of a protocol to measure Physical Activity Energy Expenditure (PAEE) derived from different modes of commuting to/from school (i.e., walking, cycling, and driving). While the phase two will consist of quantifying the PAEE derived from an eight-week cycling to/from school intervention using the validated protocol and its effect on different health outcomes.

**Methods:** Participants will be Spanish adolescents (phase 1: ~50 adolescents aged 12 to 16 years from one city; phase 2: ~300 adolescents aged 13 to 14 years from 3 cities). In phase one, different instruments will be used to measure the PAEE of commuting to/from school: 1) Global Positioning System + accelerometer, 2) Senseware PRO3 Armband, and 3) COSMED K5. In phase two, a cycling program will be implemented as familiarization and after that, participants will cycle to/from school for a total of 8 weeks. During phase two, participants will self-report their sociodemographic characteristics, mode of commuting to/from school and other destinations, and psychosocial and health status. In addition, PAEE, body composition, physical fitness, and blood pressure will be evaluated.

**Results:** After quantifying the PAEE derived from different modes of commuting to/from school, the real PAEE of these activities will be known. Furthermore, we consider that an intervention based on completing eight weeks of cycling to/from school will impact different health parameters in the adolescents.

**Conclusions:** The ENERGYCO study will contribute substantially to society, providing knowledge about the contribution of a daily behaviour. Moreover, a positive impact in the health and quality of life of adolescents is expected through the increase of their PAEE. Future research on youth health may consider these findings to quantify the PAEE of commuting to/from school that occurs daily and in every scholar.

# Environmentally sustainable, healthy, and affordable food provision in childcare: a fine balancing act.

**Mrs. Audrey Elford<sup>1</sup>**, Dr. Alison Spence<sup>1</sup>, Ms. Margaret Rozman<sup>2</sup>, Prof. Karen Campbell<sup>1</sup>, Dr. Penelope Love<sup>1</sup>

<sup>1</sup>Institute for Physical Activity and Nutrition, Deakin University, Waurin Ponds, Australia, <sup>2</sup>Healthy Eating Advisory Service, Nutrition Australia, Melbourne, Australia

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** F. Early care and education

**Purpose:** Childcare centres are opportune settings for cultivating food provision practices that align with both human and planetary health, as they are widely accessed for substantial time periods. This is the first study to describe environmentally sustainable and healthy food provision practices including food budgets and explore staff perceptions on these domains in Victorian (Australian) childcare.

**Methods:** An explanatory sequential design was utilised with quantitative data collection (surveys and audits), followed by qualitative (semi-structured interviews). Surveys captured food cost/child/day and environmentally sustainable food practices based on the World Health Organisation's Sustainable Healthy Diets Guiding Principles. Frequency of practices were assessed via likert scale and scored from 1 (never) to 4 (always). Mann-Whitney U tests analysed differences by centre type, location, and socioeconomic position. Food served/wasted for one day was measured using calibrated scales and entered into a web-based menu assessment tool. Semi-structured interviews explored staff perceptions on the findings. Themes were coded to the Theoretical Domains Framework.

**Results:** Survey results (n=129) showed lowest average scores were for “reduced packaged foods” (2.7/4). Only 23% purchased food locally from farmers/markets. This was lower in regional centres (8%) (p=0.04). Average food cost/child/day was AUD3.80, with 27% spending ≤AUD2.50/child/day and no differences by centre type, location, or socioeconomic position. Less than half (47%) of staff had previous nutrition training. One menu in the audits (n=12) was compliant with nutrition guidelines with the remainder serving insufficient quantities of some food groups, yet 9-64% of food served was wasted. Interview themes (n=12) were “knowledge”- *uncertainty about environmentally sustainable food and the need for resources*, “skills” – *support needed for planning, shopping, and budgeting*, and “belief about consequences” – *local food is expensive and will not fit budgets*.

**Conclusions:** There appears to be a lack of sustainable food knowledge and skills, insufficient training, and restrictive food budgets. The intersection of healthy, environmentally sustainable, and budget-friendly food provision remains under-researched and likely difficult to achieve. This sector requires strong government policy action, research, and practice guidelines that supports food provision that is environmentally sustainable, healthy, and affordable, to contribute positively to human and planetary health at scale

# The Relationship Between Intuitive Eating and Dining Out Frequency in Undergraduates in the United States

**Ms. Kayla Parsons**, Ms. Leigh Neptune, Ms. Amelia Sullivan, Dr. Jade McNamara

<sup>1</sup>University of Maine, Orono, USA

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** J. Young Adults

**Purpose:** Intuitive eating (IE) is a non-dieting approach to health, emphasizing internal cue recognition. This cross-sectional study evaluated the relationship between IE and dining out frequency (DOF) in undergraduates, providing insight regarding the role of the college food environment in IE behaviors.

**Methods:** A convenience sample of Northeastern undergraduates were recruited via email to participate in an online health survey assessing IE and weekly DOF. IE was measured using Tylka's IE scale-2, with higher scores indicating greater frequency of IE. Inclusion criteria included undergraduates between 18-25 years old with complete data sets. A MANOVA indicated differences in IE among participants with different DOF. Pearson's *r* identified associations between DOF, IE, and IE subscales.

**Results:** Undergraduates (N=845) were primarily White (90.7%) and female (66.4%). The average IE score was 3.2 ( $\pm 0.5$ ) out of 5. Most dined out 1-2 times per week (61.9%, n=524), followed by participants who never dined out (18.5%, n=155), those who dined out 3-4 times per week (16.4%, n=139), and 5-7 times per week (3.2%, n=27). There was a significant difference in IE based on DOF,  $F(12, 2217.4)=7.96$ ,  $p<.001$ ; Wilk's  $\Lambda = 0.940$ , partial  $\eta^2=.028$ . Tukey's HSD test for multiple group comparisons revealed IE was significantly different between those who never dined out ( $M=3.4 \pm 0.04$ ) and those who dined out 1-2 times per week ( $M=3.2 \pm 0.02$ ), ( $p<0.05$ ), 95% CI= [0.02, 0.26]. There were significant negative associations between DOF and IE scores ( $r(844)= -0.2$ ,  $p<0.001$ ), and several IE subscales including *eating for physical rather than emotional reasons* ( $r(844)=-0.2$ ,  $p<0.001$ ), *reliance on hunger and satiety cues* ( $r(844)=-0.1$ ,  $p<0.001$ ), and *body-food choice congruence* ( $r(844)=-0.2$ ,  $p<0.001$ ).

**Conclusions:** DOF indicated significantly different IE behaviors within undergraduates, suggesting the college food environment is a possible determinant in IE. This research warrants exploration of facilitating wellness interventions within the college food environment to improve health behaviors.

# Active Transportation and Community Participation in Older Adults: Results from the WHO Survey of Global Ageing and Adult Health

**Ms. Jessica Stroope<sup>1,2</sup>**, Dr. Alex Garn<sup>2</sup>

<sup>1</sup>Louisiana State University AgCenter, Baton Rouge, USA, <sup>2</sup>Louisiana State University, Baton Rouge, USA

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** Active transportation provides an array of health and societal benefits, including social capital. Previous research examining active transportation and behaviors of community participation has exclusively sampled high-income Western countries. However, little is known about how active transportation relates to community participation in low- and middle-income countries with diverse cultural, political, and physical climates. The current cross-cultural study investigates the relationship between active transportation and community participation to assess if and how this relationship varies across contexts.

**Methods:** This investigation uses a cross-sectional research design with the World Health Association Study on Global Ageing and Adult Health (SAGE) Wave 1 data (2007-2010). SAGE examines health, health behaviors, and aging in adults aged 50 and older (N = 47,103) in China, Russia, Ghana, South Africa, India, and Mexico. Active transportation is a continuous variable (0-7 days per week of walking or biking for transportation). Community participation is a 4-item scale that assesses meeting with local community leaders, working with neighbors to make community improvements, and attending meetings to address community issues. Each country is modeled independently using linear regression to assess the relationships between active transportation and community participation, controlling for an array of important covariates, including education, gender, and self-rated health.

**Results:** Findings show that active transportation has a positive relationship to community participation in Mexico ( $b = .03$ ;  $p = .028$ ), Russia ( $b = .04$ ;  $p = .002$ ), South Africa ( $b = .05$ ;  $p = .044$ ), and Ghana ( $b = .04$ ;  $p = .000$ ). Active transportation was not related to community participation in China. In India, active transportation has a very small negative relationship to community participation ( $b = -.01$ ;  $p = .048$ ).

**Conclusions:** Active transportation has societal benefits beyond individual health, including a positive association with community participation in Mexico, Russia, Ghana, and South Africa in adults aged 50 and older. Infrastructure supportive of active transportation is critical not only for individual health outcomes in older adults, but also to support the involvement of older adults in community affairs. More work is needed to understand cultural dynamics that may change the relationship between active transportation and community participation.



# Influence of parental health on children's health behaviors from the SI! Program for Elementary Schools

**Ms. Amaya de Cos-Gandoy<sup>1,2</sup>**, Ms. Patricia Bodega<sup>1,2</sup>, Miss Mercedes de Miguel<sup>1,2</sup>, Mr. Jesús Martínez-Gómez<sup>2</sup>, Miss Carla Rodríguez<sup>1</sup>, Dr. Xavier Òrrit<sup>1</sup>, Dr. Juan Miguel Fernández Alvira<sup>2</sup>, Dr. Rodrigo Fernández-Jiménez<sup>2,3,4</sup>, Dr. Gloria Santos-Beneit<sup>1,5</sup>

<sup>1</sup>Foundation for Science Health and Education (SHE), Barcelona, Spain, <sup>2</sup>Centro Nacional de Investigaciones Cardiovasculares (CNIC), Madrid, Spain, <sup>3</sup>Hospital Universitario Clínico San Carlos, Madrid, Spain, <sup>4</sup>Centro de Investigación Biomédica En Red en enfermedades CardioVasculares (CIBERCV), Madrid, Spain, <sup>5</sup>The Zena and Michael A. Wiener Cardiovascular Institute, Icahn School of Medicine at Mount Sinai, New York, USA

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Children's health habits tend to worsen as they approach adolescence. Parental health can play an important role in their children's health behaviors. The main purpose of this study was to explore the association between children's health behaviors and parental health throughout middle childhood and preadolescence.

**Methods:** The SI! Program for Elementary schools included 1770 children from 48 schools in Madrid, Spain. Children were assessed at baseline (6.3 years, 47.4% girls), first follow-up (FU) (8.9 years, 47.5% girls) and second FU (12.0 years, 47.0% girls). Families completed a series of validated questionnaires on their children's adherence to the Mediterranean diet, physical activity, screen time, and sleep behaviors. Additionally, families self-reported their Blood pressure, Exercise, (body) Weight, diet (Alimentation), and Tobacco use, which were used to calculate the validated Fuster-BEWAT health score (FBS). Children meeting the recommendations for each health behavior were compared overtime and according to parental FBS.

**Results:** The percentage of children with high adherence to the Mediterranean diet and meeting the recommendations for screen time and sleep behavior decreased over time. Conversely, the number of children meeting the recommendations for physical activity increased. The odds of meeting the recommendations for screen time and sleep behavior significantly decreased from baseline to the second FU (0.09 [95%CI: 0.07; 0.11]; 0.07 [95%CI: 0.05; 0.11], respectively). The odds of meeting the recommendations were significantly higher at baseline in children from families with ideal FBS score in adherence to the Mediterranean diet (2.93 [95%CI: 2.02; 4.25]), physical activity (2.02 [95%CI: 1.40; 2.92]), and screen time (1.52 [95%CI: 1.06; 2.20]) than those with intermediate or poor FBS. This trend was maintained over time for all health behaviors, although no statistically significant differences were found at subsequent assessments.

**Conclusions:** Healthy habits decline during middle childhood, particularly diet, screen time, and sleep behaviors. Children from families with ideal FBS were consistently associated with meeting recommendations more frequently than those from families with intermediate or poor FBS. Parental health behaviors directly influence children's health, and therefore health promotion programs on children should also aim to improve families' health habits.

# Perceptions of Strengths and Needs Emerging During the COVID-19 Pandemic in Minnesota's Emergency Food System

**Dr. Patrick Brady<sup>1</sup>**, Ms. Natalie Vandenburg<sup>1</sup>, Dr. Emily Becher<sup>2</sup>, Dr. Melissa Laska<sup>1</sup>

<sup>1</sup>Division of Epidemiology and Community Health, University of Minnesota School of Public Health, Minneapolis, USA, <sup>2</sup>University of Minnesota Extension, St. Paul, USA

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** Food insecurity has been a public health concern throughout the COVID-19 pandemic, with a range of responses to support household food security through governmental action and the emergency food system (food banks, food pantries, and other organizations that distribute food at no cost). Emergency food providers have navigated many changes since the pandemic began. We aimed to capture the experiences of stakeholders in the emergency food system and describe current needs in Minnesota (USA).

**Methods:** We conducted semi-structured interviews with key stakeholders in Minnesota's emergency food system between September and October 2022, including nine state- and regional-level stakeholders and four food pantry managers. State- and regional-level stakeholders worked in government, at food banks, in Cooperative Extension (the community outreach division of the university system), or at non-profit organizations supporting or working with the emergency food system. Each of the food pantry managers we interviewed served rural communities and worked in their positions during the COVID-19 pandemic. We analyzed data using rapid qualitative analysis methods to identify recurring experiences and perceptions across interviews.

**Results:** Key strengths we identified included the presence of established networks of emergency food providers in Minnesota, the ability to share best practices with other providers and adapt to quickly changing contexts, support provided through governmental and non-profit organizations, and on-going provider commitments to ensure receiving emergency food is a dignified experience with choice. Enhancing labor capacity was a key need identified by all state- and regional level and two food pantry managers. All participants described how increased economic and food support early in the pandemic allowed them to adapt, but now support has decreased while, concurrently, inflation and other factors, but particularly high food prices, have limited supply and driven need.

**Conclusion:** The emergency food system successfully adapted to the dynamic situation and safely provided food in their communities during the pandemic. Despite this, emergency food providers require support in the form of quality food, funding, and labor support to enhance their ability to respond to increasing demand. Policymakers and industry should pursue strategies to support the emergency food system's capacity to meet expanded need.

# Evaluating correlates of healthy eating and dietary quality among older adults: A mixed-methods approach to development and application of a new survey instrument

**Associate Professor Sara Rosenkranz<sup>1,2</sup>**, Ms. Anna Biggins<sup>2,3</sup>, Associate Professor Emily Mailey<sup>2</sup>, Prof. Richard Rosenkranz<sup>1,2</sup>

<sup>1</sup>University of Nevada Las Vegas, Las Vegas, NV, USA, <sup>2</sup>Kansas State University, Manhattan, KS, USA,

<sup>3</sup>Georgia Heart Institute, Gainesville, GA, USA

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** Community-dwelling older adults face unique challenges related to nutrition and health, but little is known about their unique barriers and facilitators for healthy eating behaviors. Using the COM-B model as a theoretical framework, this study sought to develop a new instrument to measure the capability, opportunity, and motivation for healthy eating behaviors (COM-HE) among community-dwelling older adults. The study also aimed to assess the validity, reliability, and acceptability of the new COM-HE instrument and to examine associations between the instrument and self-reported dietary quality.

**Methods:** A mixed-methods approach was used to obtain both qualitative and quantitative data. Participants were aged 65 years or older, community-dwelling, and English-speaking. Qualitative data were generated through four focus groups ( $n = 12$ ) with semi-structured interview questions. Focus group conversations were transcribed and content analysis was performed to assess the level of understanding of each individual COM-HE item. The instrument was revised according to initial qualitative findings. Quantitative data were generated through pilot-testing the revised COM-HE instrument ( $n = 81$ ) to evaluate the psychometric properties. The REAP-S questionnaire was utilized to examine correlations between the COM-HE instrument and self-reported dietary quality. Cronbach's alpha, principal component analysis, and regression analysis were used to assess psychometric properties and potential relationships between study variables using SPSS (v.27.0).

**Results:** Following content analysis of focus group data on the COM-HE instrument, 26 items (79%) achieved sufficient levels of understanding and did not require revision. After revision, a total of 33 items were pilot-tested. The COM-HE instrument achieved acceptable internal consistency (Cronbach's alpha = 0.847–0.986), displayed varying levels of unidimensionality based on multiple principal component analyses (total variance explained by three components = 86.7%), and was correlated with self-reported dietary quality scores ( $R = .409$ , adjusted  $R^2 = .099$ ,  $p = .031$ ).

**Conclusions:** The new COM-HE instrument demonstrated adequate acceptability, reliability, and validity for assessing influences on healthy eating among a homogenous sample of adults over 65 years of age. There is a need for additional development, evaluation, and refinement of the instrument in diverse populations.

# A qualitative analysis examining the impact of a biosensor feedback-based physical activity intervention on motivation and behavior change in cancer survivors

**Dr. Grace Brannon**<sup>1</sup>, Ms. Madison Ray<sup>1</sup>, Associate Professor Susan M Schembre<sup>2</sup>, Dr. Karen Basen-Engquist<sup>3</sup>, **Dr. Yue Liao**<sup>1</sup>

<sup>1</sup>The University of Texas at Arlington, Arlington, USA, <sup>2</sup>Georgetown Lombardi Cancer Center, Washington D.C., USA, <sup>3</sup>The University of Texas MD Anderson Cancer Center, Houston, USA

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** C. Cancer prevention and management

**Purpose:** Physical activity (PA) affects blood glucose levels, which can be measured by continuous glucose monitors (CGMs). Feedback based on data from wearable devices like Fitbit and CGMs provide health information to users in real-time and are used for remotely delivered interventions to promote healthy behaviors like PA. Providing feedback via text messages using data collected from sensors provide opportunities for increasingly personalized motivational messages tailored to promote healthy behaviors at an individual level. The objectives of this study were to qualitatively examine participant perceptions of lessons learned and behaviors changed throughout a remotely delivered mHealth PA intervention utilizing wearable sensors.

**Methods:** Twelve insufficiently active overweight/obese cancer survivors (aged 35-75) were recruited from a local tumor registry and participated in a pilot PA intervention study (November 2019 - September 2020). In the study, participants wore a Fitbit wristband and a CGM sensor for four weeks. They received personalized feedback messages 3-4 times a week, based on their real-time Fitbit and CGM data, via text messages during the intervention. At the end of the four-week intervention period, participants answered questions in individual interviews (semi-structured interview guide) on their CGM and Fitbit experience and usage, followed by their thoughts on what they'd learned throughout the study procedures.

**Results:** Participants reported learning about their health habits throughout the study, further indicating that they perceived take-a-ways from their participation that they could continue to carry over into their daily lives post-intervention. These lessons encompassed topics from PA patterns, glucose patterns, and diet, plus combinations of these topics. Because of the CGM, participants were more aware of the biological consequences of their behavior, leading to health behavior rumination and motivating them to change those behaviors – in contrast with mere Fitbit tracking or food diary tracking.

**Conclusions:** This research shows how personalized text messages using biological feedback provided motivation to improve participant's diet and PA, expanding previous research describing barriers to PA engagement. It demonstrates how increasing access to personal biological information can positively relate with motivation to engage in PA. Health messaging should focus on avoiding health-related problems and instead focus on health improvement.

# The development and testing of a website (ExerciseGuide UK) for people with lung cancer: reflections on the added value of patient and public involvement within a doctoral degree

**Mr. Jordan Curry<sup>1</sup>**, Mrs. Helen Roberts<sup>1</sup>, Dr. Mark Pearson<sup>1</sup>, Mr. Alan Smith<sup>2</sup>, Ms. Diane Riley<sup>2</sup>  
<sup>1</sup>Hull York Medical School, Hull, United Kingdom, <sup>2</sup>Involve Hull, Hull, United Kingdom

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** People diagnosed with lung cancer typically have a higher symptom burden than other prevalent cancers. Additionally, people diagnosed with lung cancer are older adults (65y+) with comorbidities. Physical activity has shown to be beneficial for those with lung cancer for physical and psychological health, though few in this group meet physical activity guidelines. Digital technology can provide tailored and relatively low-cost interventions. Older adults are often wrongly assumed to lack digital skills, interest and not engage with digital technology regularly. Would involving intended users in designing these digital interventions result in better engagement?

**Methods:** A Patient Advisory Group (PAG) was formed using online dissemination of a recruitment flyer and the Involve Hull network. All members of the PAG had received or cared for someone diagnosed with lung cancer. In a series of workshops, the PAG helped to adapt a website for those diagnosed with cancer iteratively. After the first two workshops, Think-Aloud interviews were conducted with participants without prior knowledge of ExerciseGuideUK (n=7). Anonymised results were presented to the PAG to discuss potential revisions. All PAG workshops and interviews were conducted via Zoom.

**Results:** Twenty-five of the 41 comments raised in the Think-Aloud interviews were taken to the PAG. Sixteen comments were not presented to the PAG, 13 simple functionality revisions, and three were not feasible. The doctoral researcher (JC) presented suggested revisions to the PAG. The PAG unanimously disagreed with 56% of the initial suggestions, including the phrasing of physical activity information and language regarding behaviour change techniques.

**Conclusion:** It was challenging to hear, after initial revisions, the platform did not meet the needs of those with lung cancer from their perspective. Though often difficult to hear such feedback, it is vital for intervention and personal academic development. Including a sustained PAG over several months with intended users of digital interventions will lead to more relevant, accessible, and usable interventions. Through engaging with those who have cared for or living with a lung cancer diagnosis, JC gained insight into the needs of the study population and what to consider during the development of a digitally-based physical activity intervention.



# Design, technical challenges, solutions, and participant feedback of the mobile Lifestyle Intervention for Food and Exercise (mLIFE) app

**Mr. Matt McGrievy**<sup>1</sup>, Mr. Andrew Hester<sup>1</sup>, Dr. Brie Turner-McGrievy<sup>1</sup>, Mr. Lex Whalen<sup>1</sup>, Dr. Courtney Monroe<sup>1</sup>, Dr. Carolina Delgado-Diaz<sup>1</sup>, Dr. Kelli DuBois<sup>1</sup>, Ms. Halide Aydin<sup>1</sup>, Dr. Sara Wilcox<sup>1</sup>

<sup>1</sup>University of South Carolina, Columbia, USA

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** To describe the design of the mobile Lifestyle Intervention for Food and Exercise (mLIFE) app, the technical challenges that were encountered and addressed, and the 3-month participant feedback on intervention components. mLIFE is a 12-month randomized, remotely delivered, behavioral weight loss, physical activity (PA), and nutrition intervention.

**Methods:** The mLIFE app components included self-monitoring of diet (using a nutrient and food database), PA (syncing to FitBit Charge2), and weight (connecting Aria scale), as well as intervention delivery (via podcasts and tips of the day) and activities to facilitate social support. Participants earned points within the app by providing social support to fellow participants. A log of technical challenges with designing and implementing the app was maintained. At 3 months, participants were asked to rate each intervention component on a scale of 1 (completely unsatisfied) to 7 (completely satisfied). Themes for open ended comments were categorized.

**Results:** Technical challenges (n=4) were identified and addressed over the design and implementation of the mLIFE app. These included 1) finding a comprehensive, searchable nutrient database that could be easily integrated into mLIFE, 2) change of FitBit Aria scale from wifi to Bluetooth, which limited automatic syncing, 3) time zone and daylight savings time challenges, and 4) adding interactive discussion features. There were 106 participants in cohort 1 (mean age 49.3±11.8 y, 93% female, mean BMI 33.6±5.5 kg/m<sup>2</sup>) and 83 (78%) completed the 3-month feedback survey. Participants rated the overall study as 5.8±1.4 out of 7. Mean feedback ratings for each of the components from highest to lowest were 6.0±1.2 for tips of the day, 6.0±1.4 for weight monitoring, 5.9±1.5 for PA monitoring, 4.9±1.6 for podcasts, 4.5±1.6 for social interactions, and 4.4±1.9 for diet tracking. Of the 32 written comments on the overall intervention, the major themes identified were related to difficulties with the diet tracking feature (50% of comments), limited discussion interactions (13%), and lack of personalization (13%).

**Conclusions:** The findings of this descriptive analysis can help to inform future mobile health interventions to avoid or resolve these identified technical challenges.

# Connecting with Cultural Foods: Exploring food security among people from refugee backgrounds

**Ms. Tina Gingell<sup>1</sup>**, Ms. Nehal Eltahir<sup>2</sup>, Mrs. Evelyn Pe<sup>3</sup>, Associate Professor Kate Murray<sup>1</sup>, Dr. Ignacio Correa-Velez<sup>1</sup>, Prof. Danielle Gallegos<sup>1</sup>

<sup>1</sup>Queensland University of Technology, Brisbane, Australia, <sup>2</sup>Islamic Women's Association of Australia, Brisbane, Australia, <sup>3</sup>Ethnic Communities Council of Queensland, Brisbane, Australia

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** People with lived refugee experiences have fled their homes and that experience is forced, generally sudden and stressful, and often coupled with dislocation from family and friends. Food security is essential for families from refugee backgrounds and is vital to understand the motivations behind food selection behaviours. Food is intimately intertwined with self-identity, connects people to loved ones and therefore plays a vital role following forced displacement. To understand the facilitators and barriers of accessing cultural foods during the settlement journey for refugee-background families, from the perspectives of workers who support the settlement journey

**Methods:** Participatory action research methodology was used and governed by a steering committee of academic researchers and community members. Focus group participants were adult settlement and other workers who regularly interacted with people from refugee backgrounds, spoke English, and preferably self-identified with a refugee background. Participants were recruited through community organisations in Brisbane, Australia, and focus groups were held at organisational workplaces or online. The focus group guide was co-designed, focus groups were co-facilitated (where possible), and data analysis was conducted collaboratively by the steering committee.

**Results:** Eight focus groups (n=32) were conducted between June and October 2021. Food security (specifically cultural foods access), culture and mental health were interrelated. This was fundamental to all discussions, and when cultural food access, culture or mental health were maintained or adversely impacted, all three factors were likewise affected. The behaviours around purchasing cultural foods were motivated by the desire to express and validate culture, which in turn improved mental health. It was also found that individual and community support systems sustained access to cultural foods, while social, environmental, institutional and political structures impacted access to cultural foods, sometimes detrimentally.

**Conclusions:** This study highlights the need for behavioural interventions that foster social capital for refugee-background families, and consider food security, culture and mental health collectively. Additionally, there is need for increased awareness of the settlement journey, and policy makers should incorporate cultural inclusivity into policies, by working with communities and providing opportunities for people to express their culture, improve access to cultural foods, and maintain mental health.

# Nutrition and physical activity data harmonisation across complex community interventions to support pooled analysis and generate generalisable insights

**Dr. Melanie Nichols<sup>1</sup>**, Dr. Jane Jacobs<sup>1</sup>, Dr. Victoria Brown<sup>1</sup>, Prof. Marj Moodie<sup>1</sup>, Ms. Nicole Ward<sup>1</sup>, Prof. Steven Allender<sup>1</sup>

<sup>1</sup>Deakin University, Geelong, Australia

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** In the last two decades, there have been many community-wide initiatives aiming to prevent or reduce childhood obesity, and promote healthier nutrition and activity behaviours, with mixed results. Combining primary data in a way that enables analysis across multiple studies and communities will enable us to gain greater insights into the combinations of factors associated with the greatest impact on child behaviours and weight status, and to understand differential effects across population sub-groups. This presentation aims to describe the data harmonisation framework and process used in the 'PRECIS' project, and present the pilot results using data from seven completed Australian initiatives.

**Methods:** Adapting existing best practice data harmonisation guidelines, we implemented a process combining 'top down' (theory-driven) and 'bottom up' (data-driven, iterative) approaches to classify and transform variables in each dataset. This process aimed to find a balance between the conceptual ideals and the pragmatic realities of existing datasets, and will be used to collate and harmonise the nutrition and physical activity data from the evaluations of over 20 diverse, international child obesity prevention initiatives.

**Results:** Pilot data harmonisation included seven Australian childhood obesity prevention interventions, conducted between 2003 and 2022. Combined, these studies included data from 34,342 children, who were each assessed between 1 and 3 times over 2 to 4 year intervention periods. In total there were 94 different activity variables, and 121 diet variables collected across the seven studies, predominantly from child self-report surveys. Following the harmonisation process, there were 8 activity and 11 diet variables in the final dataset. Key challenges included changing data collection practices over time, and adjudicating compromises between coverage and detail for specific concepts and variables.

**Conclusions:** Harmonisation of pre-existing data drawn from multiple complex intervention evaluations presents significant opportunities to advance our understanding of intervention effects and the influence of community, intervention and system variables. The process is, however, challenging and resource intensive and inevitably requires compromises. Progressing toward development and use of core outcome sets for community interventions would contribute to ensuring that future evaluations can more readily contribute to a growing international evidence base.

# The extent and nature of children's participation in investigations of food practice determinants: a scoping review

**Ms. Sophie Wright-Pedersen<sup>1</sup>**, Associate Professor Helen Vidgen<sup>1</sup>, Dr. Foluké Abigail Badejo<sup>1</sup>, Prof. Danielle Gallegos<sup>1</sup>

<sup>1</sup>Queensland University of Technology, Brisbane, Australia

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** Children as the subject of many investigations into their food practices, should have their voices amplified and included to produce more appropriately and contextually tailored food and nutrition strategies that better cater to their needs and thus are more likely to garner intended nutritional outcomes. However, the extent and nature of children's participation in research investigating factors affecting their food practices is unknown. Therefore, a scoping review was conducted to identify the extent of primary-school age children's (aged 6-11 years) participation in qualitative research investigating food practice determinants across high income countries, and the methods used to perform this research.

**Methods:** Six electronic databases were searched (Cochrane Library, CINAHL, Embase, ERIC, Medline and PsychInfo) for articles published up until February 2022. Hart's Ladder of Children's Participation was used to assess children's level of participation.

**Findings:** The search identified 107 peer-reviewed studies (121 papers). Ten percent (10%, n=11) were classified as non-participatory, 60% (n=64) as participatory, where 30% (n =32) were unable to be assessed due to a lack of information. Of the 64 participatory studies, 69% (n=44) achieved a more passive form of participation at all research stages (Level 4 on Hart's Ladder, assigned but informed). Thirty-one percent (31%, n=20) reached Levels 5 and/or 6 (consulted and informed; and adult initiated, shared decisions with children) within later research stages (i.e., data collection, analysis and dissemination). No studies were found to have any research stage at the most active child-led degrees of participation, Levels 7 and 8.

**Conclusion:** The findings of this review highlight the need for more opportunities to be presented to children to actively participate in food-related research, as well as an exploration of the methods and structures to support this. This review also hopes to inform how future food and nutrition research may more actively incorporate children's perspectives.

# Barriers and facilitators to physical activity for young adult women: a systematic review of qualitative research

**Miss Bo Peng<sup>1</sup>**, Professor Amy Ha<sup>1</sup>, Dr. Johan Y Y Ng<sup>1</sup>

<sup>1</sup>The Chinese University of Hong Kong, Hong Kong, Hong Kong

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** J. Young Adults

**Purpose:** Physical activity (PA) has many health benefits for young people. However, young adult women generally face a sharp decline in PA from transition into young adulthood, possibly due to negative societal and cultural norms influences. Therefore, this review aims to identify the self-perceived barriers and facilitators of young adult women's PA by reviewing qualitative studies and providing some contextual implications for future research.

**Methods:** Medline, Pubmed, Scopus, SPORTDiscus, and Web of Science were searched to identify qualitative studies published between January 2000 and February 2022 that examined the barriers and facilitators of young adult women's PA between ages 18 and 40. Research quality was appraised using the Critical Appraisal Skills Programme tool. Data were extracted and thematically analyzed based on the social-ecological model (SEM) tenets.

**Results:** Barriers and facilitators from 23 studies were correspondingly distributed at five levels of SEM. The most frequently cited facilitators at the intrapersonal level were health and body-related goals, and barriers included lacking time and low self-awareness. Interpersonally, social relatedness and support were facilitators, while family commitment and social embarrassment were strong barriers. At the organizational level, organizations (family, workplace, neighbor, etc.) that provide sufficient facilities and a PA-friendly environment were facilitators and vice versa. PA venues (gym, etc.) provide women-centered programs with tailored and inclusive programs were strong facilitators. At the community level, gender stereotypes and norms such as body image concerns and mainstream beauty, femininity and PA choice, mother identity and family obligations, and women's religious identity were outstanding barriers. Facilitators were providing a more inclusive environment and greater social acceptance. At the environmental level, the distinct barriers for women were possible risks like sexual harassment and violence.

**Conclusion:** This systematic qualitative review showed that young adult women's self-report barriers and facilitators to PA are often gendered and beyond the personal level. Research in the future should emphasize the social-cultural influences rather than merely targeting individual education and behavior changes. Future studies may benefit from applying multilevel strategies employing the SEM model. Moreover, qualitative research is also needed to fully understand the implementation context and compensate for the gaps in quantitative analysis.



# Utilizing technology for Diet and Exercise Change In complex chronic conditions across Diverse Environments (U-DECIDE Study): feasibility randomised controlled trial

**Mr. Riley Brown**<sup>1</sup>, Dr. Dev K Jegatheesan<sup>2, 3</sup>, Mrs. Marguerite M Conley<sup>4</sup>, Dr. Hannah L Mayr<sup>3, 4, 5</sup>, Dr. Jaimon T Kelly<sup>6, 7</sup>, Mrs. Lindsey Webb<sup>4</sup>, Ms. Amandine Barnett<sup>6, 7</sup>, Dr. Heidi M Staudacher<sup>8</sup>, Associate Professor Nicola W Burton<sup>9</sup>, Dr. Nicole M Isbel<sup>2, 3</sup>, Prof. Graeme A Macdonald<sup>3, 10</sup>, Prof. Katrina L Campbell<sup>11, 12</sup>, Prof. Jeff Coombes<sup>1</sup>, Dr. Shelley E Keating<sup>1</sup>, Associate Professor Ingrid Hickman<sup>3, 4</sup>

<sup>1</sup>School of Human Movement and Nutrition Sciences, The University of Queensland, Brisbane, Australia, <sup>2</sup>Department of Nephrology, Princess Alexandra Hospital, Brisbane, Australia, <sup>3</sup>Faculty of Medicine, The University of Queensland, Brisbane, Australia, <sup>4</sup>Department of Nutrition and Dietetics, Princess Alexandra Hospital, Brisbane, Australia, <sup>5</sup>Nutrition and Dietetics Research Group, Bond University, Robina, Australia, <sup>6</sup>Centre for Online Health, The University of Queensland, Brisbane, Australia, <sup>7</sup>Centre for Health Services Research, The University of Queensland, Brisbane, Australia, <sup>8</sup>Food & Mood Centre, Institute for Mental and Physical Health and Clinical Translation, Deakin University, Melbourne, Australia, <sup>9</sup>School of Applied Psychology, Griffith University, Brisbane, Australia, <sup>10</sup>Department of Gastroenterology and Hepatology, Princess Alexandra Hospital, Brisbane, Australia, <sup>11</sup>Healthcare Excellence and Innovation, Metro North Health, Brisbane, Australia, <sup>12</sup>Menzies Health Institute Queensland, Griffith University, Brisbane, Australia

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Health technologies provide opportunities to deliver lifestyle interventions targeting the metabolic syndrome (MetS). The purpose of this study was to test the feasibility of a health technology-assisted lifestyle intervention with imposed and self-selected components in adults with complex chronic conditions designed to decrease MetS risk.

**Methods:** U-DECIDE was a single-centre, 26-week, randomised controlled trial. The setting was specialist kidney and liver disease outpatient clinics in an Australian tertiary hospital. Patients had at least one feature of the MetS and had been referred for dietetic consultation. All participants received an individualised dietary assessment from a dietitian, an activity monitor (Fitbit® Inspire HR) and usual multidisciplinary care. Intervention participants received all follow-up contacts virtually. Additionally, they had access to a suite of health technology options from which to choose including frequency of text-messages (1-3 per week), online and mobile app-based nutrition and exercise information and group-based telehealth with diet (monthly) and exercise (weekly) specialists. The primary outcome was feasibility of delivery, determined by *a priori* criteria for safety (number of study-related serious adverse events (SRSAEs)), recruitment (≥50% of eligible patients), retention (≥70% participants completing end-of-program assessments), exposure (≥75% of intervention group have greater access to health professional contact than controls) and telehealth adherence (≥80% attendance at scheduled sessions). Secondary outcomes included difference in MetS severity score (MetSSS) at 26 weeks.

**Results:** Of 67 randomised participants (intervention n=33, control n=34), 37 (55%) were men, median (IQR) age was 51 (41-58) years. Amongst intervention participants, 76% chose 2-3 text messages per week, 76% and 79% chose telehealth exercise and diet sessions respectively. The intervention group had no SRSAEs, and exceeded targets for recruitment (52%), retention (81%) and exposure (94%). Telehealth adherence was below target at 46% attendance. There were no differences between groups for changes in MetSSS (N=26; intervention 0.4±1.1AU; control -0.4±2.1AU; MD (I-C), 95%CI: 0.78, -0.52-2.07; *p*=0.23).

**Conclusion:** Health technology-assisted lifestyle interventions for adults with complex chronic conditions are feasible in tertiary healthcare. Targeted solutions to support telehealth attendance are needed. Given the

requirement for physical assessment, the utility of MetSSS as an outcome measure for telehealth interventions requires further consideration.

# Understanding the perspectives of the food retail sector towards policies to reduce sodium in the food supply

Mr. Gabriel Wong<sup>1</sup>, Ms. Xin Hui Chua<sup>2</sup>, **Dr. Salome Rebello**<sup>2</sup>

<sup>1</sup>Ng Teng Fong General Hospital, Singapore, Singapore, <sup>2</sup>Saw Swee Hock School of Public Health, National University of Singapore, Singapore, Singapore

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** High sodium intake remains a pressing public health concern in Singapore with over 90% of the adult population exceeding the WHO daily limit, despite governmental efforts. As over 75% of adults usually eat out daily and given the high level of sodium in popular outside foods, the food service sector is a key focus for policy interventions. We therefore explored the food supply chain stakeholders' experience and perspectives towards existing and potential sodium reduction interventions.

**Methods:** We conducted 22 semi-structured interviews among food service vendors, suppliers and manufacturers. Participants were recruited by purposive sampling and thematic analyses using both deductive and inductive approaches were used.

**Results:** Commercial considerations were a dominant motivating factor. Existing and potential interventions were seen as requiring considerable effort with varying degrees of risk, and without comparable benefits. Systemic issues such as limited healthier food supplies challenged the implementation of interventions while strong institutional leadership was viewed as an important facilitator. Technical barriers including lack of nutrition knowledge increased the perceived effort for programme implementation. Perceived fairness was key to policy acceptability and compliance. However, constructs of fairness varied. Mandatory regulations were seen as a way of facilitating fairness and driving systemic change. Policies leveraging on negative emotional appeals such as warning labels were thought to be more effective in influencing supply chain and consumers' behaviour. Yet, if the policy posed reputational or earnings risks, it was perceived as being restrictive and prompted participants to consider measures of evasion. Vendors viewed themselves as having to negotiate between policy requirements and customers' expectations. The suitability of the policy was viewed to be context dependant, with certain settings being more appropriate for healthier food policy measures.

**Conclusion:** A comprehensive suite of policy measures are needed to shift the current status-quo where the benefits of selling healthier foods are vastly outweighed by the perceived efforts and risks involved. Key efforts to support this shift include creating a dominant supply of alternative healthier options, generating consumer demand for healthier foods, and reducing technical barriers for policy implementation

# Multilevel Physical Activity Intervention for Low Income Public Housing Residents in the U.S.: Protocol for the Community Walks Trial

**Dr. Lisa Quintiliani**<sup>1,2</sup>, Ms. Marislena Amezcuita<sup>2</sup>, Ms. Melibea Sierra<sup>2</sup>, Dr. Melody Goodman<sup>3</sup>, Dr. Julien Dedier<sup>1,2</sup>, Mr. John Kane<sup>4</sup>, Mr. Iolando Spinola<sup>5</sup>, Dr. Scott Crouter<sup>6</sup>

<sup>1</sup>Boston University, Boston, USA, <sup>2</sup>Boston Medical Center, Boston, USA, <sup>3</sup>New York University, New York, USA, <sup>4</sup>Boston Housing Authority, Boston, USA, <sup>5</sup>WalkBoston, Boston, USA, <sup>6</sup>The University of Tennessee, Knoxville, USA

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Many physical activity behavioral interventions to change individual-level drivers of activity, like motivation, attitudes, and self-efficacy, are often not sustained beyond the intervention period. One possible cause of this lack of sustainability is that insufficient attention was paid to environmental factors that facilitate physical activity. A focus on interventions at both the environmental and individual levels might facilitate change in the long-term. This community-based study seeks to test a new multi-level (both environmental and individual levels), multi-component intervention to increase moderate intensity physical activity among people with low-incomes living in U.S. public housing developments, over a 2-year period.

**Methods:** The design of this study is a prospective, cluster randomized controlled trial, with housing developments (n=12) as the units of randomization. In a four-group, factorial trial, we will compare an environmental intervention (E) alone (3 developments), an individual intervention (I) alone (3 developments), an environmental plus individual intervention (E+I, 3 developments), against an assessment only control group (3 developments). The E only intervention consists of community health workers leading walking groups, an advocacy program for residents, and provision of walking maps/signage. The I only intervention consists of a 12-week automated telephone program to increase physical activity motivation and self-efficacy. All residents are invited to participate in the intervention activities being delivered at their development. The primary outcome is moderate intensity physical activity measured by accelerometry among an evaluation cohort (n=50 individuals at each of 12 developments) at 2-year follow up. Mediation (e.g., neighborhood walkability, social support, motivation) and moderation (e.g., neighborhood stress) of our interventions will be assessed. Lastly, we will interview key informants to assess factors from the Consolidated Framework for Implementation Research domains to examine future implementation of multi-level physical activity interventions among public housing residents.

**Results:** This ongoing trial is currently recruiting the baseline evaluation cohort; 154 individuals have been enrolled to date. Final results are anticipated in 2025.

**Conclusions:** Findings will inform whether a community-based multi-level approach will lead to sustained physical activity promotion over two years. If effective, this trial has the potential for implementation through other federal and state housing authorities.

# The association between sleep quality and the need for recovery among nurses working irregular shifts: A cross-sectional study

**Mr. Uthman Albakri<sup>1,2</sup>**, Mr. Nick Smeets<sup>3</sup>, Ms. Elizabeth Drotos<sup>1</sup>, Prof. IJmert Kant<sup>4</sup>, Assistant Professor Andrea Gabrio<sup>5</sup>, Associate Professor Ree Meertens<sup>1</sup>

<sup>1</sup>Department of Health Promotion, NUTRIM School of Nutrition and Translational Research in Metabolism, and Care and Public Health Research Institute (CAPHRI), Maastricht University, Maastricht, Netherlands,

<sup>2</sup>Department of Public Health, Faculty of Applied Medical Sciences, Albaha University, Albaha, Saudi Arabia,

<sup>3</sup>Maastricht University Medical Center (MUMC+), department Human Resources, Maastricht, Netherlands,

<sup>4</sup>Department of Epidemiology, Care and Public Health Research Institute (CAPHRI), Maastricht University, Maastricht, Netherlands, <sup>5</sup>Methodology & Statistic, School for Public Health and Prim Care (CAPHRI), Faculty of Health, Medicine & Life Sciences, Maastricht, Netherlands

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** The purpose of this study was to investigate the sleep quality of nurses working irregular shifts (including night shifts) and to determine whether sleep quality is associated with the need for recovery.

**Methods:** A descriptive cross-sectional study design was used. The study was conducted with 405 nurses working irregular shifts at Maastricht University Medical Center in Maastricht, the Netherlands, from September 2019 to January 2020. Data were collected using an online questionnaire that included sociodemographic characteristics, health, lifestyle behaviors, the Sleep-Wake Experience List, sleep problems, sleep duration, and the Need for Recovery scale. Data analysis was performed using descriptive statistics, chi-square tests, *t*-tests, AN(C)OVA's and multiple linear regressions.

**Results:** In general, nurses working irregular shift experienced bad sleep quality. Nurses who worked irregular shifts, including night shifts, had even poorer sleep quality than those who did not work night shifts. Nurses who worked irregular shifts, including night shifts, demonstrated more difficulties in daily functioning than nurses who did not work night shifts. Sleep quality was significantly associated with the need for recovery and remained so after controlling for confounding variables ( $\beta = .554$ ,  $p = .001$ ).

**Conclusion:** First, the study findings show that nurses who work irregular shifts suffer from low sleep quality. Second, the study results show that nurses working night shifts had poorer sleep quality than those who work shifts but no night shifts. Third, this study is the first to find evidence that sleep quality is significantly associated with the need for recovery of nurses working irregular shifts. Given that a high need for recovery has been demonstrated to be a strong predictor of ill health, the findings suggest that enhancing sleep quality in nurses working irregular shifts may lead to a lower need for recovery, which may in turn lead to better health and less risk for burnout and sickness absence. Therefore, it is important to assess in future research whether sleep quality in nurses working irregular shifts can be improved by either optimizing irregular shifts schedules or by using certain sleep hygiene strategies.



# Strategies and lifestyle behaviors that nurses working irregular night shifts use to improve sleep quality: A qualitative interview study among good and bad sleepers

**Mr. Uthman Albakri<sup>1,2</sup>**, Mr. Nick Smeets<sup>3</sup>, Prof. Jmert Kant<sup>4</sup>, Associate Professor Ree Meertens<sup>1</sup>

<sup>1</sup>Department of Health Promotion, NUTRIM School of Nutrition and Translational Research in Metabolism, and Care and Public Health Research Institute (CAPHRI), Maastricht University, Maastricht, Netherlands,

<sup>2</sup>Department of Public Health, Faculty of Applied Medical Sciences, Albaha University, Albaha, Saudi Arabia,

<sup>3</sup>Maastricht University Medical Center (MUMC+), department Human Resources, Maastricht, Netherlands,

<sup>4</sup>Department of Epidemiology, Care and Public Health Research Institute (CAPHRI), Maastricht University, Maastricht, Netherlands

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** To assess the sleep strategies and lifestyle behaviors that nurses working irregular night shifts use to improve their sleep quality, and to compare the strategies of good and poor sleepers to determine whether the differences between the two groups could provide insights into possible good strategies.

**Methods:** A qualitative interview study was performed. Thirty-four nurses working irregular night shifts participated; 17 were classified as good sleepers and 17 as poor sleepers based on the Sleep-Wake Experience List. Data were collected through semi-structured, face-to-face interviews, using a guide of open questions regarding strategies/lifestyle behaviors around the night-shift set and for switching to a normal sleep rhythm after the night-shift set. The interviews were recorded, transcribed, translated, and analyzed by two researchers using thematic analysis and NVivo v. 12.

**Results:** Both groups described similar and different strategies that help them work and sleep well during and after night shifts. However, good sleepers mentioned a greater number of strategies and seemed to have thought about them more than poor sleepers. The most common strategies were having a clear structure, being organized—especially regarding sleeping time—maintaining a daily routine, and adjusting the sleep environment.

**Conclusion:** First, this is the first study that uses semi-structured interviews to explore sleep strategies among nurses working irregular night shifts who are good and poor sleepers. Second, the study findings indicate that good sleepers have a clear, consistent plan for the night shift period. Third, having a clear structure, being organized, maintaining a daily routine, and adjusting the sleep environment are often part of such a plan. To promote good quality sleep among nurses working irregular night shifts, they could be stimulated to develop such plans, therein considering their individual characteristics. Future interventions and research should help identify and encourage nurses to experiment with strategies/behaviors to find out what works best for them.

# Sex differences and family determinants in children's time use throughout the day

**Dr. Daniela Rodrigues**<sup>1,2</sup>, Prof. Aida Isabel Tavares<sup>3,4</sup>, Prof. Aristides Machado-Rodrigues<sup>1,5</sup>, Assistant Professor Augusta Gama<sup>1,6</sup>, Assistant Professor Helena Nogueira<sup>1,7</sup>, Assistant Professor Maria-Raquel Silva<sup>1,8</sup>, Associate Professor Cristina Padez<sup>1,2</sup>

<sup>1</sup>University of Coimbra, CIAS – Research Centre for Anthropology and Health, Coimbra, Portugal, <sup>2</sup>University of Coimbra, DCV – Department of Life Sciences, Coimbra, Portugal, <sup>3</sup>CEISUC - Centre for Health Studies and Research, University of Coimbra, Coimbra, Portugal, <sup>4</sup>ISEG, UL - Lisbon School of Economics and Management, University of Lisbon, Lisbon, Portugal, <sup>5</sup>High School of Education, Polytechnic Institute of Viseu, Viseu, Portugal, <sup>6</sup>Department of Animal Biology, Faculty of Sciences of the University of Lisbon, Lisbon, Portugal, <sup>7</sup>Faculty of Letters, University of Coimbra, Coimbra, Portugal, <sup>8</sup>Faculty of Health Sciences, University Fernando Pessoa, Porto, Portugal

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** More studies should adopt a combine approach to modifiable lifestyle behaviors because of their potential synergistic effects on health. This study will 1) determine differences in children's time allocation, considering sex and period of the week, and 2) identify family determinants associated with children's time use.

**Methods:** In 2016/2017, we pooled cross-sectional questionnaire data from 3-10-year-old Portuguese children (n=8472). Using a standardized questionnaire, parents reported children's time use in different behaviors - sleep, study, screen media, indoor and outdoor play, and commute to and from school - as well as children's participation in sports, and family socioeconomic characteristics (e.g., siblings, type of family, and degree of urbanization). Correlations between time use indicators were performed and pairwise correlations were calculated. Multiple linear regressions were performed. First, using screen time as dependent variable (independent variables: indoor play, outdoor play, school commute, study time, sleep duration; child characteristics were used as control variables). Second, using children's time use indicators as dependent variables (independent variables: family characteristics).

**Results:** Time-use correlation between activities was similar between boys and girls. Overall, boys accumulated more screen-time and spent more time in outdoor activities, but less in indoor plays in comparison with girls. Moreover, the time spent in different activities was correlated, particularly during the weekdays. However, the interaction between screen-time and outdoor play, indoor play, study-time and school commuting time was weak. Relevant effect on the time spent using screen media devices came from the sleep duration (more sleep=less screen). Also, children who practiced an organized sport, spent less time on screen, especially on weekends. Lastly, the time devoted for each task or activity was determined by a set of family sociodemographic factors such as urbanization and parental employment.

**Conclusions:** Identifying time spent in multiple activities that differ by sex (and associated determinants) is critical for the development of activity promotion strategies, and may help to inform evidence-based policies designed to increase physical activity and decrease sedentary behavior in young children.

# A cross-country ecological momentary assessment of joint association between outdoor and social contexts on movement behaviors

Dr. Chih-Hsiang Yang<sup>1</sup>, Dr. Shang-Ti Chen<sup>3</sup>, Mr. Abhishek Aggarwal<sup>1</sup>, **Dr. Christine Pellegrini**, Dr. Mengya Xia<sup>2</sup>

<sup>1</sup>University of South Carolina, Columbia, USA, <sup>2</sup>University of Alabama, Tuscaloosa, USA, <sup>3</sup>National Dong Hwa University, Hualien, Taiwan

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** The ecological momentary assessment (EMA) has been used to identify the impact of social and environmental contexts on movement behaviors in various populations. However, few EMA studies focused on the interface of multiple contexts in promoting physical activity (e.g., outdoor and not alone as a joint context). This study combined two EMA studies collected among college students in US and Taiwan (TW) to fill this research gap.

**Methods:** The two EMA studies were designed to understand the psychosocial and environmental determinants of daily movement behaviors in college students. Participants in each country responded to 6 EMA surveys for 7 (US) or 14 (TW) days during waking time using an app. For each survey, they reported if they were sitting, standing, or moving, staying outdoors or indoors, and alone or with someone else.

**Results:** A total of 6,072 EMA surveys from 279 participants (US=118; TW=161) were included in the analysis. Findings suggested that, compared to staying indoors and alone, participants were more likely to report movements with higher energy expenditure if they were outdoors and not alone ( $t= 24.75$ ,  $p<.001$ ), indoor and not alone ( $t= 4.31$ ,  $p<.01$ ), or outdoor and not alone ( $t= 28.74$ ,  $p<.001$ ). They were more likely to report moving than sitting if they were staying outdoors, regardless of being alone or not ( $ts= 21.86$  and  $27.04$ ,  $p<.001$ ). These results were consistent between the US and Taiwanese college students. However, US students were more likely to report movement behaviors with higher energy expenditure and moving than sitting at any EMA survey ( $ps<.001$ ). The models adjusted for participants' sex, age, and BMI.

**Conclusions:** This cross-country EMA study identified identical phenomena that outdoor context and the presence of other people are jointly associated with more movements at a given time. The outdoor context tends to be relatively more important than being alone or not in promoting physical activity. The current study dichotomizes both the outdoor and social contexts into four simple but independent momentary contexts. Future EMA studies are encouraged to apply various items to capture and study the diversity of our social and environmental contexts for promoting active lifestyles.

# Identity-based adolescent health interventions: A systematic review

**Miss Sarah Jenner<sup>1,2</sup>**, Dr. Jana Kreppner<sup>1</sup>, Dr. Kerry Fox<sup>3</sup>, Prof. Mary Barker<sup>1,2</sup>

<sup>1</sup>University of Southampton, Southampton, United Kingdom, <sup>2</sup>Medical Research Council Lifecourse Epidemiology Centre, Southampton, United Kingdom, <sup>3</sup>University of Brighton, Brighton, United Kingdom

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** J. Young Adults

**Purpose:** This review sought to evaluate health interventions aimed at adolescents that used theories of identity in the design of their behaviour change strategies. It aimed to investigate which theories have been used and how, as well as which intervention strategies have been most successful and why.

**Methods:** Six databases (PsycINFO, MEDLINE, Web of Science, EMBASE, CINAHL, and ERIC) were searched and results were screened by title, abstract and full text using defined inclusion and exclusion criteria. Data extraction and quality assessment were conducted by two reviewers for all studies and results were summarised in a narrative synthesis.

**Results:** A total of 26 studies from 20 papers were included in the review. Most interventions were based on self-affirmation theory (n = 15) and used a simple self-affirmation manipulation to strengthen aspects of a participant's identity that were highly valued by them before presenting them with health risk or health promotion materials. Other identity theories/concepts used included role identity, implicit drinking identity and deviance regulation theory. Studies addressed a range of different health behaviours including diet, physical activity, alcohol use and smoking. Most studies (n = 16) were unsuccessful in achieving statistically significant changes to health behaviours.

**Conclusions:** Using psychological theories that are pertinent to adolescent development, such as identity theories, as a basis for intervention design is a step in the right direction. However, the low success rates found by this review highlight the importance of taking adolescent values into consideration. Health is not a priority for adolescents, so interventions need to find other ways to support adolescents to make changes that fit into their lives and matter to them. For example, several studies included in this review aimed to reduce alcohol consumption in undergraduate students. Alcohol consumption is an accepted social norm within this group and is tied to important social events and relationships. The 'student drinker' identity is also highly prevalent. Therefore, reducing alcohol consumption is not something that is valued by most students. If interventions can strengthen healthy identities that are highly valued by adolescents they may have more success in supporting them to make healthier choices.

# Barriers and facilitators for implementing a 'lifestyle is medicine' model of care in hospitalized care: a qualitative study

**Ms. Marlinde L. van Dijk**<sup>1,2,3</sup>, Dr. Joyce Vrijssen<sup>4</sup>, Dr. Inge van den Akker-Scheek<sup>4</sup>, Prof. Martine de Bruijne<sup>1,3</sup>, Prof. Willem van Mechelen<sup>1,2</sup>, Dr. Judith Jelsma<sup>1,2,3</sup>

<sup>1</sup>Amsterdam UMC location Vrije Universiteit Amsterdam, Department of Public and Occupational Health, Amsterdam, Netherlands, <sup>2</sup>Amsterdam Public Health research institute, Health Behaviors & Chronic Diseases, Amsterdam, Netherlands, <sup>3</sup>Amsterdam Public Health research institute, Quality of Care, Amsterdam, Netherlands, <sup>4</sup>University of Groningen, University Medical Centre Groningen, Department of Orthopaedics, Groningen, Netherlands

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** In the Dutch healthcare system, advice on lifestyle-related behaviour in consultation with a healthcare professional is hindered by limited time, insufficient motivational skills and insufficient knowledge on referral options. We propose a new care pathway in which lifestyle medicine related care is organized through a separated lifestyle front office (LFO) in the hospital in collaboration with community-based lifestyle initiatives. The aim was to identify barriers and facilitators for implementing a LFO in a hospital, and identify matching implementation strategies.

**Methods:** Semi-structured interviews were held with healthcare professionals (i.e. physicians (assistant), dieticians, physiotherapist, (specialized) nurses) from different departments (n=33) and with patients (n=27) under treatment in the hospital who had either a BMI of  $25 \geq \text{kg/m}^2$  or who was a current smoker. Topics included experience with (i.e. providing or receiving) lifestyle-related care, and views, needs and preferences regarding design and implementation of an LFO in the hospital. An inductive thematic content analysis was conducted to identify barriers and facilitators. Barriers were matched to evidence-based implementation strategies with the CFIR-ERIC Implementation Strategy Matching Tool, resulting in an implementation plan that indicated strategies in three time-related phases: 1) preparation; 2) launch; 3) continuation.

**Results:** Barriers and facilitators were clustered according different organizational stages of the identified care pathway and patient journey: 1) Referral to the LFO (i.e. healthcare professional characteristics, health care professional motivation, patient motivation, resources); 2) Appointment at the LFO (i.e. fragmented care, lifestyle broker characteristics, time, case load, resources, perceived effectiveness); 3) Referral to community-based lifestyle initiatives (i.e. quality monitoring, patient motivation, patient behaviour, reimbursement structures, location); 4) Communication between patients and healthcare professionals (i.e. feedback, stakeholder characteristics, digital resources). Implementation strategies included identifying champions dedicated to supporting and marketing implementation of the LFO, recurrent training for professionals, and building a stakeholder network.

**Conclusion:** Insights from the current study are based on a relatively large and diverse stakeholder group and provide important insight for implementation of an LFO in the hospital. Future research should provide information on the effect of implementation strategies on actual implementation of an LFO in the hospital and if adaptations are necessary.



# Effects of Home-based Exergaming on Preschool Children's Cognition, Sedentary Behavior, and Physical Activity: A Randomized Crossover Trial

**Dr. Nan Zeng**, Dr. Jung Eun Lee, Dr. Zan Gao

<sup>1</sup>University of New Mexico Health Sciences Center, Albuquerque, USA

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Exergaming's potential to promote young children's cognition and health remains largely unknown. We conducted a randomized crossover trial to evaluate the preliminary effects of a home-based educational exergaming program (LeapTV™) versus usual practice on preschool children's executive function, sedentary behavior, and physical activity (PA).

**Methods:** A total of 34 preschool children (17 girls, Mage = 4.72±0.73 years; BMI-z = 0.39±1.08) were recruited. Participants were randomized to either exergaming condition (30 minutes/day, 5 days/week) or usual practice condition for 12 weeks, followed by a 1-week washout period (week 13) and a second 12-week crossover phase. Executive function was assessed by the Dimensional Change Card Sort (DCCS) test; sedentary behavior, light PA, and moderate-to-vigorous PA (MVPA) were assessed via ActiGraph GT3X+ accelerometers. All participants underwent identical assessments at baseline, week 13, and week 26.

**Results:** Compared with usual practice, exergaming intervention increased children's executive function by 1.9 DCCS unit (95% confidence interval [95% CI], -0.34 to 4.04; d = 0.22); decreased sedentary time by 22.1 minutes (95% CI, -25.22 to 18.98; d = 0.29); decreased light PA by 9.56 minutes (95% CI, -7.09 to -12.02; d = 0.22); and increased MVPA by 4.05 minutes (95% CI, 2.35 to 5.74; d = 0.20), respectively.

**Conclusion:** This study demonstrates the implementation of a home-based educational exergaming intervention would promote meaningful improvements in preschool children's executive function and PA behaviors. Despite the promising findings, such intervention merits larger trials to maximize and confirm the potentials of LeapTV™.

# Customer Discovery for Scale Up: Enhancing the Acceptability and Scalability of the Building Healthy Families Program

Dr. Gwenndolyn Porter<sup>1</sup>, Dr. Todd Bartee<sup>2</sup>, **Ms. Caitlin Golden**<sup>1</sup>, Prof. Paul Estabrooks<sup>3</sup>, Prof. Jennie Hill<sup>3</sup>, Dr. Kate Heelan<sup>2</sup>

<sup>1</sup>University Of Nebraska Medical Center, Omaha, USA, <sup>2</sup>University of Nebraska at Kearney, Kearney, USA,

<sup>3</sup>University of Utah, Salt Lake City, USA

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** Customer discovery, an entrepreneurial and iterative process to understand the context and needs of potential adoption agencies, may be an innovative strategy to improve broader dissemination of evidence-based interventions. This presentation will describe the customer discovery process for Building Healthy Families (BHF) an evidence-based, family healthy weight program designed to be delivered in rural areas by trained community implementation teams.

**Methods:** The customer discovery process was completed as part of a SPeeding Research-tested INTerventions (SPRINT) training supported by the U.S. Centers for Disease Control and Prevention. Customer discovery interviews (n=47) were conducted with people that could be potential resource users, economic buyers, and BHF adoption influencers to capture multiple contextual and needs-based factors related to adopting new evidence-based interventions. Qualitative analyses were completed in an iterative fashion as each interview was completed.

**Results:** While BHF was designed to be flexible in the type of implementation organization due to different resources being available in different rural communities, a focus on rural health departments provided the most consistently supportive context for intervention adoption. These health departments prioritize childhood obesity but lack resources to implement effective programming. Several intervention funding approaches were also identified that included (1) program grants from local and national foundations, (2) local value-based care hospital systems and (3) regional employer groups. Payment plans recommended included licensing fees and tiered payments based on level of implementation support (e.g., recruitment support, implementation consultation) at the organizational level and tiered fees at the participant level based on family ability to pay. Marketing a range of BHF outcomes (e.g., weight change, constructive family time, social & emotional support) and the use of a not-for-profit business model were also recommended during the customer discovery process to increase the likelihood of BHF scale up and sustainability.

**Conclusions:** Engaging in customer discovery was an important exercise to better understand the intended audience and the factors that could assist or hinder future scale up. These findings provide practical directions for BHF commercialization that will increase the likelihood of program adoption, implementation, and sustainment while also allowing the program to be low or no cost to eligible families.

# The Feasibility of a Remotely-Delivered Physical and Food Literacy Program for Youth with Intellectual Disabilities (ID)

**Dr. Carol Curtin**<sup>1</sup>, Dr. Heidi Stanish<sup>2</sup>, Dr. Aviva Must<sup>3</sup>, Mr. Patrick Cullen<sup>1</sup>, Ms. Katherine Rancaño<sup>2</sup>, Ms. Monica Forquer<sup>4</sup>, Ms. Kristin Schreck<sup>5</sup>, Dr. April Bowling<sup>6</sup>, Mr. Chris Irish<sup>5</sup>, Ms. Nicole Askenazy<sup>7</sup>, Ms. Xiaoya Wei<sup>7</sup>, Dr. Linda Bandini<sup>1,7</sup>

<sup>1</sup>E.K. Shriver Center, UMass Chan Medical School, Worcester, USA, <sup>2</sup>University of Massachusetts - Boston, Boston, USA, <sup>3</sup>Tufts University School of Medicine, Boston, USA, <sup>4</sup>Consultant, Washington, DC, USA, <sup>5</sup>Consultant, Boston, USA, <sup>6</sup>Merrimack College, North Andover, USA, <sup>7</sup>Boston University - Sargent College of Health & Rehabilitation Sciences, Boston, USA

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Youth with ID have low fitness and physical activity levels and poor diet quality. Physical literacy (PL) and food literacy (FL) are hypothesized to underlie the healthy physical activity and eating habits. PL comprises motivation, confidence, and physical competence for physical activity engagement. FL entails the capacity to learn about food and nutrition and make healthy choices. We developed and piloted a PL/FL program for youth with ID ages 12-16 yrs. Originally designed for in-person programming, the pandemic required significant redesign for remote delivery.

**Methods:** Six youth (4 male, 2 female) participated in remote sessions weekly (2 separate groups of 3 youth each) over 12 weeks. An ID-trained fitness instructor led 30-minute sports skills sessions focused on ball and locomotor skills using equipment sent to the home (balls, low hurdles, paddles). A registered dietitian and 2 nutrition students led 30-minute nutrition education sessions on food group identification, making healthy choices, snack preparation, and taste testing. Families received tablets to access Zoom™, food preparation equipment, food lists, and pre-paid credit cards for food purchases.

**Results:** Attendance was 88%; all participants completed the program. Protocol fidelity was 91%. Youth satisfaction data revealed that 5/6 liked the sport sessions “a lot”; 1 liked them “a little bit”. Two liked the nutrition sessions “a lot”, 3 liked them “a little”, and 1 did not like them. Five youth felt the sessions were “just right”; 1 indicated they were “too hard”. Parent satisfaction data indicated that 5/6 were satisfied overall. Four parents indicated their teen enjoyed the sport sessions; 5 indicated their teen enjoyed the nutrition sessions. Three felt the program increased their teen’s interest in physical activity/sports; 5 indicated the program motivated their teen to eat healthy foods. However, only 2 parents felt they had adequate space for the sport sessions.

**Conclusions:** This small pilot suggests that a PL/FL program for youth with ID is feasible and acceptable. Effective interventions that promote positive health behaviors in youth with ID are needed. PL/FL interventions for the ID population warrant further research, including evaluating in-person, remote, and hybrid formats.

# What types of brief vigorous intermittent physical activity could workplace interventions try as ‘exercise snacks’? A scoping review

**Dr. Josephine Chau<sup>1</sup>**, Dr. Juliana Oliveira<sup>2</sup>, Ms. Putu Novi Arfirsta Dharmayani<sup>1</sup>, Dr. Steve Gilbert<sup>2</sup>, Ms. Taryn Jones<sup>1</sup>, Prof. Emmanuel Stamatakis<sup>3,4</sup>, Prof. Andrew Philp<sup>3,4</sup>, Prof. Anne Tiedemann<sup>2</sup>, Prof. Janaki Amin<sup>1</sup>  
<sup>1</sup>Department of Health Sciences, Macquarie University, Sydney, Australia, <sup>2</sup>Institute for Musculoskeletal Health, University of Sydney and Sydney Local Health District, Sydney, Australia, <sup>3</sup>Sydney School of Health Sciences, Faculty of Medicine and Health, University of Sydney, Sydney, Australia, <sup>4</sup>Charles Perkins Centre University of Sydney, Sydney, Australia

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** To identify types of vigorous intermittent physical activity that are feasible to implement as ‘exercise snacks’ in workplace interventions.

**Methods:** We conducted a scoping review to examine the peer reviewed literature on interventions involving brief bouts of vigorous intermittent physical activity. We searched five databases for articles reporting on experimental and quasi-experimental studies that involved brief bouts of vigorous-intensity physical activity (e.g., high intensity interval training, HIIT) with physical and/or mental health outcomes in adults published up to March 2022. We extracted and synthesised data on characteristics of the intervention (types of activities, duration, frequency), participants, settings and outcomes.

**Results:** We identified 82 relevant articles (54% RCT, 24% cross-over, 12% randomised pre-post). Half the studies were conducted in a laboratory or clinical setting, 11% were school-based, 7% in mixed settings, 25% did not report the setting, and none were in workplaces. Studies involved participants who self-identified as sedentary/inactive (40%), were overweight/obese (29%), or had chronic conditions (30%). The most common type of activity performed in brief vigorous bouts was cycling, followed by running or sprinting, and walking. Nearly one fifth of studies involved interventions with mixed vigorous activities such as running plus football, game-based activities, and circuit training (e.g., squats, push ups, jumping jacks). Only 2 studies gave participants free choice of the activities they would like to do at high intensity in intermittent intervals. Intervention duration, composition and frequency varied from one session on a cycle ergometer (4X4-min exercise + 4X3-min rest) to 20-minute circuit training with drills and games twice per week for three months, to 16-minute HIIT sessions of self-selected activities twice per week for five years. Most studies measured outcomes related to cardiometabolic health, while few examined effects on mental health.

**Conclusion:** Translating evidence of the benefits of vigorous intermittent physical activity into workplaces requires more attention. Most studies in this scoping review were based in laboratory or clinical settings. The feasibility and acceptability of engaging in vigorous intermittent bursts of cycling and sprinting and other activities in workplace settings require further investigation with end-users in formative research before testing in larger trials.

# Neighborhood environment and physical activity in girls: findings from the LEGACY Girls Study

**Dr. Rebecca Kehm**<sup>1</sup>, Dr. Esther John<sup>2</sup>, Dr. Mary Daly<sup>3</sup>, Dr. Theresa Keegan<sup>4</sup>, Dr. Julia Knight<sup>5</sup>, Dr. Jasmine McDonald<sup>1</sup>, Dr. Caren Frost<sup>6</sup>, Dr. Danielle Hanna<sup>5</sup>, Dr. Angela Bradbury<sup>7</sup>, Dr. Sandra Buys<sup>6</sup>, Dr. Irene Andrulis<sup>5</sup>, Dr. Mary Beth Terry<sup>1</sup>

<sup>1</sup>Columbia University, New York, USA, <sup>2</sup>Stanford University, Stanford, USA, <sup>3</sup>Fox Chase Cancer Center, Philadelphia, USA, <sup>4</sup>University of California, Davis, Davis, USA, <sup>5</sup>Lunenfeld-Tanenbaum Research Institute, Toronto, Canada, <sup>6</sup>University of Utah, Salt Lake City, USA, <sup>7</sup>University of Pennsylvania, Philadelphia, USA

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** The built environment affects physical activity in adults; less is known about whether the neighborhood environment, as reported by parents, is associated with childhood physical activity.

**Methods:** We conducted a cross-sectional analysis using questionnaire data from the LEGACY Girls Study, a North American cohort of 1,068 girls, primarily aged 6-13 years at enrollment (2011-2013). Guardians (97% mothers) were asked by questionnaire if they 1="strongly disagreed" to 4="strongly agreed" that their neighborhood had: shops within walking distance, transit stops within walking distance, sidewalks on most streets, four-way intersections, high traffic, high crime, many recreational facilities, many physically active residents, and many interesting things to look at while walking (data available for 964 girls). Girls, aged ≥10 years, were asked these same questions (n=560). We used log-binomial regression models adjusted for age, race/ethnicity, study center, and maternal education to estimate relative risks (RRs) and 95% confidence intervals (CIs) for each neighborhood characteristic in association with being physically inactive (no report of free play, riding a bike, etc.) while at home in the past week. We used the weighted kappa statistic to evaluate mother-daughter inter-rater agreement .

**Results:** Forty-two percent of girls were physically inactive while at home in the past week. Girls in high crime and high traffic neighborhoods, as reported by guardians, had 26% (RR=1.26, 95% CI=1.07-1.48) and 37% (RR=1.37, 95% 1.13-1.65), respectively, higher risk of being physical inactive compared with girls in low crime/traffic neighborhoods. Girls, aged ≥10 years, who reported living in a neighborhood without many physically active residents had a 53% (RR=1.53, 95% CI=1.01-2.32) higher risk of being physically inactive compared with girls in neighborhoods with many physically active residents. Mother-daughter agreement on neighborhood characteristics was fair to moderate, with weighted kappa statistics ranging from 0.19 (many physically active residents) to 0.60 (sidewalks on most streets).

**Conclusions:** These findings support the need for policies and programs focused on the built environment for physical activity promotion in youth, especially given that we have previously found an association between childhood physical inactivity and early puberty in girls, a risk factor for breast cancer and other health outcomes.



# Cooking Self-Efficacy and Nutrition Knowledge Predict Diet Quality in College Students

**Ms. Emma Watras<sup>1</sup>**, Ms. Kayla Parsons<sup>1</sup>, Ms. Leigh Neptune<sup>1</sup>, Ms. Amelia Sullivan<sup>1</sup>, Ms. Caitlyn Winn<sup>1</sup>, Dr. Jade McNamara<sup>1</sup>

<sup>1</sup>University of Maine, Orono, USA

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** J. Young Adults

**Purpose:** College is a time when many young adults learn independence and self-management. College students often report eating processed foods which may be due to a lack of cooking knowledge (CK), nutrition knowledge (NK), and cooking self-efficacy (CSE), leading to poor overall diet quality (DQ). This study aimed to assess if greater CK, NK, and CSE, predicted DQ in college students.

**Methods:** A cross-sectional convenience sample of undergraduates completed an online survey assessing health behaviors. DQ was measured using the Short Healthy Eating Index (sHEI), assessing adherence to the 2015-2020 Dietary Guidelines for Americans. Scores range from 0-100, with higher scores indicating healthier DQ. CK, NK, and CSE were measured using the Food Preparation Knowledge and Confidence Survey, scores range from 1-5, with higher scores indicating better knowledge and self-efficacy. A Pearson correlation examined the directionality of relationships among variables. A linear regression determined whether CK, NK, and CSE predict DQ.

**Results:** Students (N=851) were on average 19.7 ( $\pm 1.6$ ) years old, primarily White (90.7%), female (63.8%), and underclassmen (58.6%). 38.3% of students perceived their NK as poor or fair and 26.9% perceived their CK as poor or fair. The mean CSE score was 3.9. The mean sHEI score was 47.9. CSE ( $r=.263$ ,  $p<.001$ ), NK ( $r=.345$ ,  $p<.001$ ), and CK ( $r=.261$ ,  $p<.001$ ) were positively correlated with DQ. The overall regression model was significant,  $R^2 = 0.14$ ,  $F(3, 757) = 39.3$ ,  $p<0.001$ . CSE ( $\beta=1.89$ ,  $p=.009$ ) and NK significantly predicted DQ ( $\beta=2.61$ ,  $p<.001$ ). CK did not predict DQ.

**Conclusions:** CSE and NK positively predicted DQ, highlighting the need to implement college-aimed initiatives incorporating nutrition and cooking education to improve overall DQ in college students. Providing students with comprehensive nutrition and cooking education can support positive behavior change, improve overall DQ, and reduce risk for developing chronic disease in adulthood.

# Study protocol for the Screen Free Time with Friends Feasibility Trial

**Miss Sarah Overgaard Sørensen**<sup>1</sup>, Dr. Anne Kær Gejl<sup>1</sup>, Miss Teresa Victoria Høy<sup>2</sup>, Dr. Peter Lund Kristensen<sup>1</sup>, Dr. Mette Toftager<sup>3</sup>, Mr. Arne Gårn<sup>4</sup>, Prof. Anders Grøntved<sup>1</sup>, Dr. Kristen Traberg Larsen<sup>1</sup>

<sup>1</sup>Research Unit for Exercise Epidemiology, Department of Sports Science and Clinical Biomechanics, University of Southern Denmark, Odense, Denmark, <sup>2</sup>National Institute of Public Health, University of Southern Denmark, Copenhagen, Denmark, <sup>3</sup>Research Unit for Active Living, Department of Sports Science and Clinical Biomechanics, University of Southern Denmark, Odense, Denmark, <sup>4</sup>Steno Diabetes Center Odense, Odense University Hospital, Odense, Denmark

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Children are spending an increasing amount of time alone with screens, which seems to affect both their physical and mental health. Furthermore, the field lacks feasible and effective interventions conducted in a natural setting. The Screen Free Time with Friends Feasibility Trial will be conducted to test the feasibility, including acceptability and compliance, to an intervention aiming to reduce screen media use and promote time physically with friends during leisure time in 10-11-year-old children.

**Methods:** A non-randomized single group feasibility trial will be conducted from February to October 2023 including approximately 200 children (aged 10-11 years) and 200 parents (at least one per child) from three different schools recruited from three different municipalities in Denmark (ClinicalTrials.gov ID: NCT05480085). The Screen Free Time with Friends intervention is a multicomponent intervention targeting families, afterschool clubs and local communities and has been developed based on a thorough development process following the Medical Research Council UK framework for developing and evaluating complex interventions. The implementation approach will allow the intervention to vary across different local communities yet maintaining the integrity of the core components of the intervention. Feasibility and acceptability of the intervention will be assessed during the intervention using process evaluation inspired by the RE-AIM framework including focus groups interviews with parents, afterschool club personnel and local stakeholders. Participation, recruitment, retention rate and compliance to the outcome measurements (objectively measured physical activity, screen time, screen media addiction, wellbeing, social relations, leisure time activities, sociodemographic background) will be investigated and presented.

**Conclusion:** The trial will investigate the feasibility including acceptability and compliance with regards to the intervention and the planned outcome measurements. This feasibility study will ensure the final essential refinements before the intervention program will be implemented in a large randomized controlled trial investigating the effect of the intervention.

# Comparing direct and indirect assessments of fidelity in a family healthy weight program

**Ms. Caitlin Golden**<sup>1</sup>, Prof. Jennie Hill<sup>2</sup>, Dr. Kate Heelan<sup>3</sup>, Dr. Gwenndolyn Porter<sup>1</sup>, Mrs. Emiliane Pereira<sup>1</sup>, Dr. Todd Bartee<sup>3</sup>, Mrs. Ali Malmkar<sup>3</sup>, Dr. Tzeyu Michaud<sup>1</sup>, Dr. Bryce Abbey<sup>3</sup>, Prof. Paul Estabrooks<sup>2</sup>

<sup>1</sup>University of Nebraska Medical Center, Omaha, USA, <sup>2</sup>University of Utah, Salt Lake City, USA, <sup>3</sup>University of Nebraska Kearney, Kearney, USA

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** Fidelity assessment is essential to dissemination and implementation science. Fidelity can be measured through direct, independent observer, assessment which is rigorous and expensive and/or indirect, implementer, assessment. Understanding the utility of indirect assessment is important to determine its potential to provide valid fidelity information in large trials or where implementation of interventions covers a broad geographic area. This study compared direct and indirect measures of fidelity from a 12-week family healthy weight program, Building Healthy Families (BHF), across 7 rural US communities.

**Methods:** Trained observers completed weekly direct assessments in each community while community implementation teams (CITs) provided weekly indirect assessments immediately following the completion of each session. Direct assessment measured key components on a 3-point scale (0=did not cover, 1=inconsistently covered, 2=completely covered), indirect assessment used a 10-point scale (1= did not achieve objective to 10= completely achieved objective). Correlations between direct and indirect assessments for each fidelity component (i.e., nutrition and physical activity (PA) content, self-regulation support, and family engagement) were completed within and across communities. Descriptive statistics were also completed.

**Results:** Direct and indirect fidelity assessments were significantly correlated for PA content ( $r=0.92$ ), nutrition content ( $r=0.37$ ), and family engagement ( $r=0.41$ ), but not for self-regulation ( $r=0.05$ ). The rank order of the fidelity assessments differed between direct (highest to lowest=nutrition, PA, self-regulation, family engagement) and indirect (highest to lowest=family engagement, PA, nutrition, and self-regulation). While not powered to examine significant differences in direct-indirect assessment correlations by community, there were variations in these relationships across communities.

**Conclusions:** Correlations between direct and indirect fidelity assessments may indicate that (1) the measures assessed different aspects of fidelity, (2) an existence of social desirability in indirect assessment, or (3) different perceptions between trained independent observers and implementers trained to deliver BHF rather than to assess fidelity--or some combination of these factors. Determining the relationship between direct/indirect assessments to participant outcomes will provide additional information on the utility of each method and determine which factors are most relevant to the development and implementation of fidelity assessments that are efficient and allow for rapid monitoring and feedback.

# Reliability of the digital physical fitness test digimot

**Dr. Anke Hanssen-Doose<sup>1</sup>**, Mr. Max Pauli<sup>1</sup>, Dr. Claudia Niessner<sup>2</sup>, Prof. Annette Worth<sup>1</sup>

<sup>1</sup>University of Education, Karlsruhe, Germany, <sup>2</sup>Karlsruhe Institute of Technology, Karlsruhe, Germany

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Monitoring of physical fitness (PF) in children and youth is important because PF is a summative indicator of health. There exist different ways of monitoring the PF levels in younger populations. The digital measurement of PF within a video meeting seems to be cost-effective and has the potential for wide-reach. However, there is almost no evidence how reliable this kind of measurement is. Therefore, the aim of this study was to assess the reliability of a new digital instrument.

**Methods:** We developed the *digimot* test on the basis of four tasks of the MoMo test profile (Worth, et al. 2015). The original test profile is validated, discussed with experts and frequently used within a population-based monitoring in Germany (MoMo study). Within the new *digimot* test, PF was assessed by means of these four tasks: 'Jumping-sideways', 'Sit-ups', 'Push-ups', 'Stand and reach'. The validation sample (n=47, aged 8-12 yrs, n<sub>♂</sub>=28, n<sub>♀</sub>=19) participated in two different test settings: 'digital' in a Zoom meeting at their homes and 'in presence' in test rooms. Both measurements - 'digital' and 'in presence' - were researcher-assessed by exactly the same trained researcher. Statistical significance was set at  $p < 0.05$ . Descriptive and inferential statistical analyses (t and sign tests, Spearman and Pearson correlations) were performed using SPSS. The reliabilities were estimated on the basis of mean comparisons in combination with the degrees of correlations.

**Results:** The results revealed a satisfactory reliability of 'Jumping-sideways' (no difference,  $r=0.66$ ,  $p < 0.001$ ), a very good reliability of 'Sit-ups' (no difference,  $r=0.70$ ,  $p < 0.001$ ), a not satisfactory reliability of 'Push-ups' (no difference,  $r=0.41$ ,  $p=0.005$ ) and a very good reliability of 'Stand and reach' (no difference,  $r=0.88$ ,  $p < 0.001$ ).

**Conclusions:** The study provides support that the *digimot* test is a reliable alternative to 'in presence' tests. Three of four tasks turned out to be sufficiently reliable. To enhance the reliability of 'Push-ups', motivational aspects should be proved. Additional research is needed which aims to the integration of a task for the endurance performance.

# Cluster randomised controlled trial to determine the impact of an activity enabling uniform on primary school student's fitness and physical activity

**Ms. Nicole McCarthy<sup>1,2,3</sup>**, Dr. Alix Hall<sup>1,2,3</sup>, Prof. Luke Wolfenden<sup>1,2,3</sup>, Dr. Emma Pollock<sup>2,3</sup>, Dr. Nicole Nathan<sup>1,2,3</sup>

<sup>1</sup>University of Newcastle, Newcastle, Australia, <sup>2</sup>Hunter New England Health, Newcastle, Australia, <sup>3</sup>Hunter Medical Research Institute, Newcastle, Australia

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** An emerging barrier to student physical activity at school, particularly among girls are traditional uniforms that may be impractical for participating in physical activity (e.g. dresses, skirts and black leather shoes). Modifying the school uniform to be sports uniform everyday may be a simple intervention to improve student's physical activity (PA). The aim of this study was to assess the impact of an activity enabling uniform on primary schools students' cardiovascular fitness and PA across the school day.

**Methods:** A cluster randomised controlled trial was undertaken in 13 primary schools in New South Wales, Australia with students in grade 4,5 or 6. Schools were randomised to either an activity friendly uniform intervention, whereby students wore their sports uniform every day of the school week, or to a usual practice control. Physical fitness was measured using the shuttle run test and PA was measured in steps and counts per minute using wrist worn accelerometers for 5 school days. Linear mixed models will be used to compare student fitness and PA (across the segmented school day) between the intervention and control groups at follow-up, controlling for baseline. All analyses will follow intention to treat principles, with missing data addressed using multiple imputation. To reduce bias and ensure adequate power no preliminary data will be analysed prior to final data collection, which is due for completion in December 2022.

**Results:** Results of the study will report overall difference in physical fitness levels and step count between intervention and control schools at follow-up. 13 schools have completed baseline data, there were 684 consenting students of which 602 had valid shuttle run data and 620 had valid accelerometer data.

**Conclusion:** Given the many challenges faced when implementing, at scale, school PA interventions this study is aiming to support a school uniform policy change as a simple means of improving student PA; one that does not require significant resource to build the capacity of schools and their staff to support implementation. It also has the ability to support other school PA programs by having students ready to engage in PA at any time of the week, especially for girls.



# Associations between cancer and cardiovascular disease diagnosis history and physical activity in Korean adults

**Dr. Ki-Yong An<sup>1</sup>**, Miss Fernanda Arthuso<sup>1</sup>, Mr. Spencer Allen<sup>1</sup>, Miss Stephanie Ntoukas<sup>1</sup>, Prof. Kerry Courneya<sup>1</sup>

<sup>1</sup>University of Alberta, Edmonton, Canada

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** C. Cancer prevention and management

**Purpose:** Cardiovascular disease (CVD) and cancer (CAN) are the leading causes of death in many countries worldwide. Although physical activity provides many health benefits, patients with CAN or CVD experience many barriers to physical activity. Understanding the physical activity levels in patients with CAN and CVD is important to improve their physical activity levels. The primary purpose of this study was to examine independent and combined associations of a CAN and/or CVD diagnosis with physical activity in Korean adults.

**Methods:** The current study is a cross-sectional design. A total of 32,655 adults, who completed the self-reported assessments of CAN and CVD diagnosis, and physical activity from the Korea National Health and Nutrition Examination Survey between 2015 and 2019, were included. Participants were asked to report their diagnosis of different types of CAN and CVD, and were divided into four groups depending on CAN and CVD diagnosis. Physical activities were measured using the Korean version of the Global Physical Activity Questionnaire. Chi-square analyses and analysis of variance were used to identify the differences in demographic, medical, and physical activity variables among the four diagnosis groups. Analysis of covariance and multinomial logistic regression were used to compare physical activity levels among the four diagnosis groups after adjusting for covariates. Factorial ANCOVA was used to examine the associations of time since diagnosis and time between diagnosis of CAN and/or CVD with physical activities.

**Results:** In adjusted model, participants diagnosed with CAN only participated in more leisure time physical activity compared to those diagnosed with neither disease ( $p=0.045$ ) and CVD only ( $p=0.024$ ), more walking compared to those diagnosed with neither disease ( $p=0.002$ ), CVD only ( $p<0.001$ ), and both ( $p=0.015$ ) diseases, and more strength exercise than those diagnosed with neither ( $p=0.009$ ) and both diseases ( $p=0.001$ ).

**Conclusions:** Although Physical activity levels in Korean adults are insufficient regardless of CAN and/or CVD diagnosis, people diagnosed with CAN only participated in more physical activity than those diagnosed with neither, both diseases, and CVD only. Different strategies may be required for each diagnosis group to improve their physical activity levels.

# Carbon footprint of diets among K-12 students in the USA

**Miss Andrea Barney**<sup>1</sup>, Associate Prof. Lori Spruance<sup>1</sup>, Dr. Amelia Willits-Smith<sup>2</sup>, Dr. Diego Rose<sup>2</sup>

<sup>1</sup>Brigham Young University, Provo, USA, <sup>2</sup>Tulane University, New Orleans, USA

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Greenhouse gas emissions (GHGE) from food production and diet choice contribute to climate change. Little is known about how the food choices of school-aged children and youth may contribute to this problem. The study's purpose was to calculate dietary GHGE, or "dietary carbon footprints," of US K-12 students, and examine its relationship with diet quality.

**Methods:** The study sample dietary recalls (N=2,400 students) came from the 2014-2015 US Department of Agriculture (USDA) School Nutrition and Meal Cost Study (SNMCS). The SNMCS collected demographic information, usual participation in the National School Lunch Program (NSLP) and School Breakfast Program (SBP), and a 24-hour dietary recall from a nationally representative sample of K-12 students. The USDA processed the 24-hour dietary recalls to produce nutrient intakes and Healthy Eating Index (HEI) scores for all respondents. Dietary GHGE were calculated by linking items from the SNMCS 24-hour dietary recalls to dataFRIENDS (database of Food Recall Impacts on the Environment for Nutrition and Dietary Studies), which includes the GHGE (kg CO<sub>2</sub>-equivalents) per 100g of each USDA food code. Dietary GHGE were ordered from low to high and categorized into quintiles. Dietary quality, measured by HEI scores, was compared between the students in the lowest-GHGE (Q1, n=549) and highest-GHGE (Q5, n=549) groups using t-tests. Analyses also compared Q1 and Q5 for usual school meal participation.

**Results:** The average dietary GHGE of the sample was 5.13 kg CO<sub>2</sub>-equivalents per person per day. Students in Q1 consumed higher amounts of dietary fiber, plant protein, and significantly lower ( $p < 0.05$ ) amounts of sodium and saturated fat. Students in Q1 had significantly higher HEI scores (mean = 62.40, SE=0.91) compared to students in Q5 (mean=29.19, SE=0.64) ( $p=0.004$ ). Q5 students were more likely to be usual participants of the NSLP ( $p=0.04$ ) and SBP ( $p=0.03$ ) compared to Q1 students.

**Conclusion:** Dietary carbon footprints of students were inversely correlated with overall diet quality, but the relationship of carbon footprint to individual nutrients was mixed. These results can inform dietary guidance seeking to modify food behaviors in order to reduce dietary GHGE. Opportunities exist to modify school meals to reduce GHGE among participants.

# Physical activity and inactivity during youth sport and dance: A systematic review and meta-analysis

**Prof. Gregory KOLT<sup>1</sup>**, Ms. Bethany Perkins<sup>1</sup>, Associate Prof. Emma George<sup>1</sup>, Dr. Justin Guagliano<sup>1</sup>

<sup>1</sup>Western Sydney University, Sydney, Australia

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** The aims of this study were to identify the percentage of time youth spend in moderate-to-vigorous physical activity (MVPA) and inactivity during organised sport or dance, and to identify the associated contextual factors that impact on time spent in these behaviours.

**Methods:** A systematic review and meta-analysis were conducted. Included studies sampled youth aged  $\leq 18$  years currently participating in organised youth sport or dance. Studies had a quantitative study design and baseline measure of time spent in MVPA or inactivity during a youth sport or dance session. Five electronic databases were searched: Scopus, SPORTDiscus, PubMed, Web of Science, and PsycINFO, with forward searching in Google Scholar to identify eligible articles that had cited the included studies. Meta-analysis was conducted to estimate the pooled mean percent time spent in MVPA/inactivity using random-effects models. Analyses were conducted using Stata Version 17.

**Results:** From an initial pool of 7,518 nonduplicate records, 31 articles from 30 studies met the inclusion criteria. Most studies were conducted in the US ( $n = 16$ ) and used accelerometry ( $n = 27$ ) as the primary physical activity measure. Only 7 studies targeted youth dance. Meta-analysis revealed that the mean (95% CI) time spent in MVPA during organised sport was 38.2% (33.8, 42.5) and mean time spent inactive was 29.7% (22.7, 36.7). Most studies explored contextual factors during practices only. There were several contextual factors that appeared to influence MVPA, including task contexts (e.g., warm-up, gameplay, free play), demand contexts (i.e., contexts that foster participation and inclusion), and coach contexts (e.g., coaches' MVPA during practice). Some task contexts (e.g., instruction, fitness) and demand contexts (i.e., contexts that foster exclusion like elimination games) also appeared to influence inactivity.

**Conclusions:** The findings indicate that in organised youth sport and dance there is potential to increase time in MVPA, particularly during practices. Sport and dance are likely one of the widest reaching out-of-school settings for physical activity. In many countries, most youth participate in at least one sport annually, so optimising the setting for MVPA could have substantial public health impact.

# Nutrition-related information on Instagram: A content analysis of posts by popular Australian accounts

**Ms. Emily Denniss<sup>1</sup>**, Dr. Rebecca Lindberg<sup>1</sup>, Prof. Sarah McNaughton<sup>1</sup>

<sup>1</sup>Institute for Physical Activity and Nutrition, School of Exercise and Nutrition Sciences, Deakin University, Melbourne, Australia

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Social media can influence individuals toward both healthy and unhealthy eating behaviours and has become a popular source of food and nutrition information. Nutrition is one of the most discussed health topics on Instagram, however, little is known about the content of nutrition-related posts by popular accounts. Therefore, the aim of this study was to examine the content of nutrition-related posts by popular Australian Instagram accounts using a machine learning approach.

**Methods:** Australian Instagram accounts that primarily posted about nutrition, with over 100,000 followers were identified. All posts from a 12-month period, excluding stories, were extracted and screened to identify posts containing information about nutrition. Text-based captions of included posts were uploaded to Leximancer, a content analysis software that uses machine learning to identify key concepts and themes in textual data. Instagram posts from each theme were read by the authors to develop an agreed upon interpretation and select illustrative quotes.

**Results:** A total of 10,964 Instagram posts from 61 Instagram accounts were included in the final sample. The mean engagement (number of likes plus number of comments) for included posts was 1,854 and mean number of followers was 279,505. Five overarching themes were identified. In decreasing order of magnitude, the themes were: 1) recipes; 2) eating practices; 3) body goals; 4) food literacy and 5) cooking and eating at home. Information about the benefits of healthy eating and how to prepare healthy meals occurred frequently throughout the Instagram posts. Additionally, the marketing of supplements and online programs for meal plans and weight loss occurred throughout posts under each theme.

**Conclusions:** The popularity of social media content about recipes and healthy eating indicate that social media may be a useful setting for wide-reaching nutrition promotion campaigns. Nutrition-related content about “body goals” and weight loss may contribute to restrained and disordered eating. There is a large amount of marketing claims about supplements and online nutrition programs present on Instagram. Future research should examine the accuracy of nutrition information on Instagram, and how consumers use social media to inform their eating behaviours.

# The Sleep and Activity Database for the Early Years (SADEY) project: International collaboration and data pooling to understand young children's 24-hour movement behaviours.

Associate Prof. Dylan Cliff<sup>1</sup>, **Dr. Devan Antczak<sup>1</sup>**, Dr. Byron Kemp<sup>1</sup>, Associate Professor Catherine Draper<sup>2</sup>, Prof. Timothy Olds<sup>3</sup>, Dr. Rute Santos<sup>4</sup>, Dr. Diego Augusto Santos Silva<sup>5</sup>, Prof. Mark Tremblay<sup>6</sup>, Dr. Esther Van Sluijs<sup>7</sup>, Dr. Ian Janssen<sup>8</sup>

<sup>1</sup>University of Wollongong, Wollongong, Australia, <sup>2</sup>University of the Witwatersrand, Johannesburg, South Africa, <sup>3</sup>University of South Australia, Adelaide, Australia, <sup>4</sup>University of Porto, Porto, Portugal, <sup>5</sup>Federal University of Santa Catarina, Florianópolis, Brazil, <sup>6</sup>Children's Hospital of Eastern Ontario Research Institute, Ontario, Canada, <sup>7</sup>University of Cambridge, Cambridge, United Kingdom, <sup>8</sup>Queen's University, Kingston, Canada

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** F. Early care and education

**Purpose:** Canada, Australia, the World Health Organization and other countries have released 24-hour movement guidelines for the early years which integrate physical activity, sedentary behaviour, and sleep, focusing more holistically on supporting children to achieve a healthy 24-hour day. The guideline development process, however, highlighted the dearth of quality evidence, particularly from large-scale studies. The Sleep and Activity Database for the Early Years (SADEY) project will assemble a large, pooled database of 24-hour movement behaviours, their determinants and health indicators in young children (birth to 5.99 years), to advance knowledge in these areas. This presentation will describe the SADEY methods and preliminary sample.

**Methods:** Researchers are being identified who have and are willing to share medium- to large-scale datasets (>100 children) of device-measured (waist-worn ActiGraph accelerometers) physical activity and sedentary behaviour, and parent-reported or device-measured sleep. Led by the co-ordinating centre at the University of Wollongong and supported by the International Children's Accelerometry Database (ICAD), SADEY is pooling these studies using R and Microsoft SQL Server to create a harmonised database of young children's 24-hour movement behaviours, health and developmental indicators, and determinants. Data contributors and external researchers can apply to access and analyse data via a virtual (off-premises) computer system.

**Results:** To date, 11 researchers from 7 countries have expressed interest in collaborating by contributing data from 12 studies. Ethics clearance and data sharing agreements have been secured for many of these studies and the SADEY 1.0 database will be assembled by early 2023. Data collection and harmonisation processes and descriptive findings will be presented.

**Conclusion:** SADEY will be used to address questions of global importance to public health policy and practice, for example - *How much does the mix of movement behaviours across the 24-hour day impact healthy development?*, *What is the optimal mix of these behaviours?*, and; *What factors can be targeted to support young children in achieving the optimal mix of 24-hour movement behaviours?* Additionally, SADEY seeks to develop and disseminate protocols, and develop capacity, on how to objectively assess movement behaviours, and seeks partnerships with stakeholders that promote knowledge translation on movement behaviours.



# Outdoor gym resistance training workouts delivered via mHealth: Process evaluation from the *ecofit* effectiveness trial

**Dr. Anna Jansson**<sup>1,2</sup>, Prof. David Lubans<sup>1,2</sup>, Prof. Mitch Duncan<sup>2,3</sup>, Mr. Jordan Smith<sup>1,2</sup>, Prof. Adrian Bauman<sup>4</sup>, Prof. John Attia<sup>3</sup>, Prof. Ronald Plotnikoff<sup>1,2</sup>

<sup>1</sup>Centre for Active Living and Learning, University of Newcastle, Newcastle, Australia, <sup>2</sup>Active Living Research Program, Hunter Medical Research Institute, Newcastle, Australia, <sup>3</sup>School of Medicine and Public Health, University of Newcastle, Newcastle, Australia, <sup>4</sup>School of Public Health, University of Sydney, Sydney, Australia

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** This study describes the process evaluation of (i) the *ecofit* workouts delivered via the smartphone app, (ii) the characteristics, use and perceptions of outdoor gyms, and (iii) factors influencing selection of outdoor gym locations, included in the *ecofit* effectiveness trial. The trial aimed to determine the effects of an innovative multicomponent physical activity intervention promoting resistance and aerobic-based physical activity using mHealth, outdoor gyms, and social support.

**Methods:** We evaluated the '*ecofit*' intervention using a two-arm cluster randomised controlled trial from September 2019 to March 2022 in two regional municipalities of New South Wales, Australia. We recruited a sample of 245 participants (72% female, mean age 53.4 years [SD=13.9]) who were randomised to the *ecofit* intervention ( $n=122$ ) or waitlist control ( $n=123$ ) group. The intervention group received access to a smartphone app, which included standardised workouts tailored to 12 outdoor gym locations. Process evaluation data were collected using surveys ( $n=69$ ), user data through the *ecofit* app and qualitative interviews at the 3-month time-point. Data were analysed using descriptive statistics and presented as means (standard deviations [SD]) or counts (percentages) as appropriate. Qualitative data were analysed using Nvivo 11 software.

**Results:** The outdoor gyms ( $N=12$ ) in this study varied in the number of pieces of installed equipment (min=3, max=19). Most locations (75%) included 'trail-based' equipment. Of the total number of logged workouts ( $n=1,447$ ), 53% were park-based (i.e., 47% were 'Home Challenges'). Participants logged workouts in an average of 3 (SD = 2.3) different outdoor gym locations. Proximity to outdoor gym facilities (mean=5.5, SD=1.1; 1='not at all', 6='completely') appeared to be the most important factor influencing the choice of facility to work-out. Almost all (90%) participants self-reported that the scenery was pleasant and 74% indicated that the quality of the outdoor gym equipment was good, at the location they used the most. Regarding the qualitative interviews, participants generally expressed positive views about the outdoor gyms and preferred those with more varied equipment.

**Conclusion:** This study demonstrated that locations with a variety of equipment and proximity of outdoor gym facilities were important factors to promote outdoor gym use.

# Associations between Health-Related Fitness Measures and General Health in Newly Diagnosed Breast Cancer Patients from the AMBER Cohort Study

**Mr. Spencer Allen<sup>1</sup>**, Dr. Ki-Yong An<sup>1</sup>, Miss Fernanda Arthuso<sup>1</sup>, Dr. Gorden Bell<sup>1</sup>, Dr. Andria Morielli<sup>2</sup>, Dr. Jessica McNeil<sup>3</sup>, Mr. Qinggang Wang<sup>2</sup>, Miss Stephanie Ntoukas<sup>1</sup>, Dr. Margaret McNeely<sup>1</sup>, Prof. Jeff Vallance<sup>4</sup>, Dr. Nicole Culos-Reed<sup>5</sup>, Dr. Karen Kopciuk<sup>2</sup>, Miss Myriam Fillion<sup>1</sup>, Dr. Lin Yang<sup>2,5</sup>, Dr. Charles Matthews<sup>6</sup>, Miss Leanne Dickau<sup>2</sup>, Dr. John Mackey<sup>1</sup>, Dr. Christine Friedenreich<sup>2,5</sup>, Prof. Kerry Courneya<sup>1</sup>

<sup>1</sup>University of Alberta, Edmonton, Canada, <sup>2</sup>Alberta Health Services, Calgary, Canada, <sup>3</sup>University of North Carolina at Greensboro, North Carolina, USA, <sup>4</sup>Athabasca University, Athabasca, Canada, <sup>5</sup>University of Calgary, Calgary, Canada, <sup>6</sup>US National Cancer Institute, Rockville, USA

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** C. Cancer prevention and management

**Purpose:** The diagnosis and treatment of breast cancer is associated with substantial stress and uncertainty that may threaten quality of life (QoL) in newly diagnosed breast cancer patients. Examining the correlates of QoL in newly diagnosed breast cancer patients may identify important intervention targets to improve QoL and better prepare patients for treatment. The present study aimed to examine the associations between a comprehensive set of high-quality health-related fitness (HRF) measures and the general health component of QoL in a large sample of newly diagnosed breast cancer patients.

**Methods:** Newly diagnosed breast cancer patients were recruited between 2012-2019 in Edmonton and Calgary, Canada as part of the Alberta Moving Beyond Breast Cancer (AMBER) Cohort Study. All participants (N=1,458) had early-stage disease and completed baseline HRF and QoL assessments within 90 days of diagnosis. HRF assessments included measures of cardiorespiratory fitness (VO<sub>2peak</sub> treadmill test), muscular fitness (upper and lower body strength and endurance tests), and body composition (dual x-ray absorptiometry). The general health component of the SF-36 was used to assess QoL among participants. Binary logistic regression was used to examine the associations between HRF and general health (dichotomized into poor/fair versus good/very good/excellent). Univariate and multivariate models were adjusted for key demographic, medical and behavioural covariates.

**Results:** Significant adjusted univariate associations were observed between general health and relative VO<sub>2peak</sub> (p=0.013), absolute VO<sub>2peak</sub> (p=0.021), relative upper body endurance (p=0.05), relative handgrip strength (p<0.001), body mass index (p=0.029), lean mass percentage (p=0.011), body fat percentage (p=0.05) and lean/fat ratio (p=0.009). However, in multivariate models, only relative handgrip strength emerged as significant. In particular, the least fit group was 3.7 times more likely to report poor/fair general health compared to the most fit group (OR=3.67, 95% CI=1.85-7.28).

**Conclusion:** Muscular strength, measured by relative handgrip strength, was the only component of HRF to emerge as independently associated with general health in newly diagnosed breast cancer survivors. Future studies aiming to mitigate the effects of a cancer diagnosis on QoL in breast cancer patients may benefit from the inclusion of an exercise intervention targeting muscular strength.

# Early childhood obesity prevention interventions – are we reaching the right populations to address this health equity problem?

**Dr. Anna Lene Seidler**<sup>1</sup>, Ms. Kylie Hunter<sup>1</sup>, Mr. Mason Aberoumand<sup>1</sup>, Dr. Jonathan Williams<sup>1</sup>, Prof. Rebecca Golley<sup>2</sup>, Dr. Sol Libesman<sup>1</sup>, Ms. Angie Barba<sup>1</sup>, Prof. Lousie Baur<sup>3</sup>, Dr. Talia Palacios<sup>1</sup>, Dr. Nipun Shrestha<sup>1</sup>, Dr. Alison Macchi<sup>4</sup>, Associate Professor Shonna Yin<sup>5</sup>, Dr. Brittany Johnson<sup>2</sup>

<sup>1</sup>University of Sydney, NHMRC Clinical Trials Centre, Sydney, Australia, <sup>2</sup>Caring Futures Institute, Flinders University, Adelaide, Australia, <sup>3</sup>Sydney Medical School, Sydney, Australia, <sup>4</sup>Department of Dietetics and Nutrition, Robert Stempel College of Public Health & Social Work, Florida International University, Florida, USA, <sup>5</sup>Departments of Pediatrics and Population Health, New York University Grossman School of Medicine, New York, USA

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

## **SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** Childhood obesity is a major health equity problem. Despite substantial efforts, rates of childhood obesity remain concerning, and inequalities are widening. Childhood obesity is more prevalent in underserved populations, necessitating targeted interventions. We aimed to analyse the landscape of current early childhood obesity prevention trials and to understand whether and how priority populations have been targeted and reached.

**Methods:** We completed systematic searches of five databases (e.g. Medline, EMBASE) and trial registries for all planned, ongoing and completed randomised controlled trials evaluating behavioural early childhood obesity prevention interventions. Eligible trialists were invited to join the TOPCHILD Collaboration and share their individual participant data and unpublished intervention materials. We analysed trial location, target populations, intervention reach and key intervention elements.

**Results:** 48 trials with >50,000 children have joined TOPCHILD. Interventions varied in content (i.e. addressing nutrition, physical activity and/or sleep), delivery features and effectiveness. We identified trials across all continents in 15 countries; the majority (n=44) were from high-income countries, albeit 5 trials were from middle-income countries (Belarus, Brazil, Guatemala, China). Most trials targeted universal populations (n=34), and results were frequently not stratified by priority population. Thirteen trials targeted specific priority populations, including lower socio-economic background populations (n=7) and specific cultural backgrounds (n=6). Trials reported challenges in reaching priority populations. For instance, some recruited in geographical low socio-economic areas but mainly reached the higher-socioeconomic position populations within these areas. Trials that were embedded in pre-existing services to target participants within a priority population group reported higher reach. One trial found that lower health literacy was associated with lower intervention effectiveness, highlighting the importance of health literacy considerations when designing interventions.

**Conclusion:** We mapped whether early obesity prevention interventions targeted and reached priority populations. We found low numbers of interventions specifically targeting priority populations or conducted in low- and middle-income countries. Based on our findings, we derived key recommendations for future interventions and policy to address the major health equity burden of childhood obesity, including more targeted interventions, stratifying reporting by priority population, appropriate health literacy considerations and selecting targeted behaviour change techniques (e.g. social support).

# Exercise adherence trajectory during chemotherapy treatment in patients with breast cancer- Results from the Phys-Can study

**Dr. Anna Henriksson**<sup>1</sup>, Associate Professor Andreas Stenling<sup>2, 6</sup>, Dr. Anne-sophie Mazzoni<sup>1</sup>, Dr. Katarina Sjövall<sup>3</sup>, Prof. Susanne Börjeson<sup>4</sup>, Dr. Laurien Buffart<sup>5</sup>, Dr. Christopher Bean<sup>1,7</sup>, Prof. Sveinung Berntsen<sup>1,6</sup>, Associate Prof. Ingrid Demmelmaier<sup>1</sup>, Prof. Karin Nordin<sup>1</sup>

<sup>1</sup>Uppsala university, Uppsala, Sweden, <sup>2</sup>Umeå university, Umeå, Sweden, <sup>3</sup>Kristianstad university, Kristianstad, Sweden, <sup>4</sup>Linköping university, Linköping, Sweden, <sup>5</sup>Radboud University Medical Center, Nijmegen, Netherlands, <sup>6</sup>University of Agder, Kristiansand, Norway, <sup>7</sup>University of Adelaide, Adelaide, Australia

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** C. Cancer prevention and management

**Purpose:** This study will provide a detailed description and explore potential predictors of exercise adherence (percentage of performed exercise volume/prescribed exercise volume) to a combined resistance and endurance training intervention during chemotherapy treatment for patients with breast cancer (BRCA).

**Methods:** The Phys-Can is a multicentre 6-month exercise trial conducted in Sweden (in Linköping, Lund and Uppsala). Participants were randomized to one of four conditions: high (HI) or low-moderate (LMI) intensity exercise groups, with or without behaviour change support. Randomized women receiving neo- or adjuvant chemotherapy in 21-day cycles for six cycles without treatment delays and with available resistance (n=143) and endurance (n=148) data will be included in the planned analyses. Adherence for endurance and resistance training will be analyzed in multilevel regression analyses due to the hierarchical nature of the data (i.e., observations at each time point were nested within participants). Predictors to be included in the analyses: chemotherapy treatment dose, randomized exercise intensity (HI vs LMI), baseline aerobic fitness, baseline physical activity, baseline BMI, and baseline co-morbidity.

**Results:** A preliminary descriptive analysis of participants without chemotherapy treatment delays shows the mean (SD) exercise volume for resistance (n=143) training across the entire chemotherapy treatment period was 68 % (18) for HI and 65 % (11) for LMI. The mean (SD) exercise volume for endurance training (n=148) was 54 % (16) for HI and 62% (11) for LMI. The mean volume per week varied throughout the cycles (i.e., lower levels in the weeks after the chemotherapy cycle) and decreased for each cycle. The total mean (SD) for the first and last cycle of resistance training 94% (9) and 55% (5) respectively, and for endurance training 72% (2) and 47% (15) respectively.

**Conclusions:** Preliminary descriptive analysis shows variation of exercise adherence throughout the chemotherapy treatment trajectory, but also a trend of lower levels at the end of the chemotherapy treatment period compared to the beginning of treatment. These patterns will be described further by plotting adherence for each chemotherapy week and predictors for adherence will be explored. This knowledge will contribute to optimising exercise programming for patients receiving chemotherapy against BRCA.

# Assessing the implementation of obesity prevention practices in Early Childhood Education and Care setting in New South Wales, Australia: a cross-sectional study.

**Ms. Ana Renda**<sup>1,2,3,4</sup>, Dr. Alice Grady<sup>1,2,4,5</sup>, Dr. Kathryn Reilly<sup>1,2,4,5</sup>, Associate Professor Serene Yoong<sup>4,5,6</sup>, Dr. Rebecca Hodder<sup>1,2,4,5</sup>

<sup>1</sup>University of Newcastle, Newcastle, Australia, <sup>2</sup>Hunter Medical Research Institute, Newcastle, Australia, <sup>3</sup>Sydney Local Health District, NSW Health, Sydney, Australia, <sup>4</sup>National Centre of Implementation Science, Newcastle, Australia, <sup>5</sup>Hunter New England Local Health District, Newcastle, Australia, <sup>6</sup>Global Obesity Centre, Institute for Health Transformation, Deakin University, Geelong, Australia

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** F. Early care and education

**Purpose:** The aim of this study was to assess the prevalence of implementation of obesity prevention policies, practices, and programmes in Early Childhood Education and Care (ECEC) services in New South Wales (NSW), Australia.

**Methods:** A cross-sectional study was conducted using a randomly selected sample of 1,026 centre-based ECECs in NSW. A 50-item survey measured the implementation of 7 evidence-based healthy eating (HE) and 8 evidence-based physical activity (PA) policies and practices. Service demographic characteristics were also assessed. Participating services were randomly allocated to receive items related to either HE (267 services) or PA (234 services). Surveys were conducted between October 2021 and June 2022, taking 30 minutes to complete. Descriptive statistics were used to report prevalence of implementation.

**Results:** Of 1026 ECEC services, a total of 501 (50% consent rate) completed the survey and were included in the analysis. Of the participating services, 81.4% were long daycares and 18.3% were preschools, 76.8% were in major cities and 61% were located in a low socio-economic area.

In services that prepare food, 91.89% of menu planners/cooks use nutrition guidelines to plan their menus. For all services, 29.59% reported that more than half of their educators participated in professional development or training which promotes HE for children. Outside mealtimes, almost half (48.32%) of services reported undertaking planned HE education lessons at least weekly.

On average, 3-6-year-olds are provided with 331.79 minutes (SD=173.70) of child-initiated free-play per day, and 109.57 minutes (SD=92.12) of structured, educator-led PA per day. Most (82.76%) services reported providing daily activities to intentionally teach and develop fundamental movement skills for children. Only 19.83% of services reported that more than half of their educators participated in training promoting PA for children, and only 13.79% offered PA education (workshops or meetings) to all parents/families.

**Conclusions:** Findings of this study indicate the prevalence of implementation of evidence-based HE and PA policies and practices to be variable across NSW, Australia. Several evidence-practice gap were identified, particularly HE and PA training for educators and the provision of PA education for all families per sector recommendations. Efforts to support implementation of these practices is required.



# Barriers and facilitators to dissemination of obesity prevention research: a mixed methods systematic review.

**Ms. Ana Renda**<sup>1,2,3,4</sup>, Dr. Heidi Turon<sup>1,2,4,5</sup>, Dr. Alice Grady<sup>1,2,4,5</sup>, Associate Professor Serene Yoong<sup>2,5,6</sup>, Dr. Kathryn Reilly<sup>1,2,4,5</sup>, Dr. Rebecca Hodder<sup>1,2,4,5</sup>

<sup>1</sup>School of Medicine and Public Health, University of Newcastle, Newcastle, Australia, <sup>2</sup>National Centre of Implementation Science, Hunter New England Population Health, Newcastle, Australia, <sup>3</sup>Sydney Local Health District, Population Health, Sydney, Australia, <sup>4</sup>Hunter Medical Research Institute, Newcastle, Australia, <sup>5</sup>Hunter New England Local Health District, Population Health, Newcastle, Australia, <sup>6</sup>Global Obesity Centre, Institute for Health Transformation, Deakin University, Geelong, Australia

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** To synthesise the barriers and facilitators to the dissemination of research related to the prevention of non-communicable diseases (NCD) to end-users of public health research.

**Methods:** A mixed methods systematic review, was conducted following the JBI convergent integrated approach. A search of 3 electronic databases was undertaken to identify studies published between Jan 2000 - May 2021 together with grey literature searches. We included quantitative, qualitative and mixed methods studies investigating factors influencing the dissemination of NCD research. Quantitative evidence was extracted, then converted into 'qualitized' data and categorised into themes based on the Framework for Knowledge Translation (FKT) which include: the user group, the issue, the research, the researcher-user relationship and dissemination strategies.

**Results:** The initial database search yielded 27,192 articles. After removal of duplicates, we screened 20,343 titles and abstracts, and retrieved 643 articles. Following full-text review, we included 11 qualitative, 1 quantitative and 4 mixed-methods studies, conducted in 9 different countries and on physical activity (n=6), nutrition (n=1), healthy body weight (n=1), and obesity prevention (n=1). Factors affecting dissemination were categorised across all 5 themes of the FKT. Barriers related to 'the user group' were inadequate timing and perceived low value of disseminated guidelines, and facilitators being end-users' interest and support in health and inclusion of stakeholders in dissemination process. Regarding 'the issue', perceived difficulties in linking research to policy hindered dissemination and an organisation (audience) prioritises that health facilitated dissemination. For 'the research', a reported barrier was lack of compatibility of content of guidelines and organisation goals (audience) and a facilitator was guidelines being evidence-based. Barriers regarding 'the researcher-user relationship' were the researcher and practitioners' different priorities and a facilitator was the mutual benefits for members of partnership. Regarding 'dissemination strategies', barriers were unclear target audiences and lack of communication skills, with facilitators being endorsement by recognised organisations or professionals and disseminating research findings through existing channels.

**Conclusion:** This review identified the key barriers and facilitators that can be targeted to improve the dissemination of research related to NCD and their risk factors including nutrition, physical activity and obesity prevention.

# The role of nature as a resource for student's health in the university setting

**Mrs. Pia Laemmert<sup>1</sup>**, Mr. Philipp Laemmert<sup>1</sup>, Prof. Susanne Tittlbach<sup>1</sup>

<sup>1</sup>University of Bayreuth, Bayreuth, Germany

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Around 26% of students are affected by a mental disorder during their study. Various demands in the university context like performance requirements contribute to this constitution. Based on salutogenetic approaches, resources must be identified to be able to cope with these demands. Different theoretical approaches show that nature can be one of those. The aim of the study is to examine (a) the role of nature as a resource for students, and (b) the pathways through which contact with nature relates to health involving physical activity, social cohesion and stress reduction. Regarding to the social-ecological model personal and environmental determinants will be included.

**Methods:** The study follows a mixed-methods design. First data collection is a quantitative standardized questionnaire, designed as full-scaled survey at the University of Bayreuth. 2.751 students (58% f, 42% ma, age range 18-66 years, response rate 22%) took part. Second data collection will take place as qualitative interviews, mid-2023 to go into more detail on the results of the quantitative survey. The focus will be on the perception of nature as a resource, i.e., which motives lead to the use of nature and which personal and environmental determinants influence the nature-health-relation.

**Results:** Students rate their mental health status (mean 3.15 on a five points Likertscale) worse than their physical (mean 2.56) and general health status (mean 2.38). Regarding to the student's behavior, they spend an average of 5.5 h/week, spread over 4 days a week, in natural environments. Nature is important to students for relaxation (mean 1.38 on a four points Likertscale), quality of life (mean 1.36) and as setting for physical activity (mean 1.65). First analyses of variance suggest that nature users (from 2 to 7 days/week) benefit significantly compared to non-nature users (never up to 1 day /week). Further statistical analyses to examine associations regarding to student's health (behavior) will follow.

**Conclusions:** First results show that the mental health of students is a serious issue. Nature can be a resource for coping with demands in the university setting. A special consideration on personal and environmental determinants which affect student's nature contact is necessary.

# Communicating Physical Activity to Adolescents: what works? A scoping review

**Miss Caera Grady**<sup>1</sup>, Dr. Enrique García Bengoechea<sup>1, 2</sup>, Dr. Kwok Ng<sup>1,3,4</sup>, Dr. Elaine Murtagh<sup>1</sup>, Prof. Catherine Woods<sup>1</sup>

<sup>1</sup>Physical Activity for Health Research Centre, Physical Education and Sport Science, Health Research Institute, University of Limerick, Limerick, Ireland, <sup>2</sup>Sport Ireland, Dublin, Ireland, <sup>3</sup>University of Eastern Finland, Joensuu, Finland, <sup>4</sup>University of Turku, Rauma, Finland

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** J. Young Adults

**Purpose:** Adolescents are among the most inactive population group worldwide. Researchers have called for an effective communication strategy for physical activity (PA) but to date this has been largely unexplored among adolescents. This scoping review aims to explore the content, context and mode of delivery for communicating PA messages with adolescents.

**Methods:** The protocol for this review was published in HRB Open research. It followed a systematic scoping review methodology guided by the Levac et al scoping review framework and PRISMA-ScR guidelines. Five databases were searched using the following key search terms 'physical activity', 'adolescents' and 'communication'. Sources included databases and citations of extracted articles were checked from the year 1995 onwards. A proportion (10%) of articles were double screened at both screening stages until a high level of agreement was achieved (i.e.  $\geq 75\%$ ), the remaining articles were screened by CG. This review is currently in the data extraction phase which is expected to be complete in January 2023. Results will be synthesised narratively and descriptively and reported as recurring themes.

**Results:** The search revealed 16,943 articles, of which 4,480 were duplicates. A further 12,008 were removed after title and abstract screening. A total of 459 full texts were assessed for eligibility of which 98 studies were included in the review. Initial analysis has identified the following themes: mechanisms for effective communication, ideal PA communicators, ideal setting for PA communication, additional considerations for adolescents needs.

**Conclusion:** A previous review of the PA messaging literature in the general population highlighted that messaging requirements differ across the lifespan e.g. adolescents are not concerned by the health related benefits of PA. However, this paper provides a more comprehensive overview of adolescents needs and wants for PA messaging. These findings have potential to facilitate the development of an effective communication strategy that outlines best practices for communicating PA messages to adolescents, which would be applicable for practice and policy.

# Pupils' experiences of physical activity and wearable technologies within primary school

**Ms. Georgina Wort**<sup>1</sup>, Dr. Gareth Wiltshire<sup>2</sup>, Dr. Oliver Peacock<sup>1</sup>, Dr. Simon Sebire<sup>3</sup>, Prof. Dylan Thompson<sup>1</sup>

<sup>1</sup>University of Bath, Bath, United Kingdom, <sup>2</sup>Loughborough University, Loughborough University, United Kingdom, <sup>3</sup>University of Bristol, Bristol, United Kingdom

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Children are insufficiently active, with vast inequalities which disadvantage girls and those from lower socio-economic backgrounds. It is acknowledged that researchers should move towards bottom-up approaches, understanding the perspectives and knowledge of individuals at the centre of research. Children's voices are often excluded from issues which directly impact them, with perceptions that they lack the capability for meaningful discussions. However, children are likely to provide valuable insights and their perspectives should contribute to intervention development. To understand primary school pupils' views and experiences of physical activity and wearable technologies within schools.

**Methods:** Semi-structured focus groups (N= 9) were conducted with 41 Year 5 and 6 pupils (19 girls, 22 boys) from across 6 primary schools based in the South-West of England. Information sheets and consent forms were sent home to pupils' parents/carers, and those who received consent participated in focus groups. Focus groups were recorded, transcribed, and the data was analysed using a reflective thematic approach.

**Results:** Pupils highlighted that academic learning was often a barrier to physical activity, as well as acknowledging the influence of the playground space and equipment. Social factors, particularly friendships and the influence of teachers, was recognised as contributing to their engagement, or lack of, in certain activities. Conversations took place regarding physical activity gender differences and included girls stating they had experienced exclusion, particularly in football, as well as gender stereotyping which was a barrier to their engagement. Individuals' competence and confidence, which included feelings of embarrassment, could prevent children from engaging, particularly the least active. Finally, autonomy was important for children, who valued choice and variety. When discussing wearable technologies children reported that they liked monitoring their steps. However, they highlighted that less sporty children were not as likely to own a device. Pupils acknowledged that technologies could often lead to competition, which may be less enjoyable for less active children.

**Conclusion:** Pupils contributed valuable knowledge and experiences. The findings from this study can contribute to a more detailed understanding of pupils' perspectives on physical activity and wearable technologies in primary schools, which can be used to inform intervention design.

# Changes in self-reported physical activity engagement across retirement transition among retirees from different occupational backgrounds

**Mr. Miika Tuominen**<sup>1,2</sup>, Associate Professor Tuija Leskinen<sup>1,2</sup>, Prof. Sari Stenholm<sup>1,2</sup>

<sup>1</sup>Department of Public Health, University of Turku and Turku University Hospital, Turku, Finland, <sup>2</sup>Centre for Population Health Research, University of Turku and Turku University Hospital, Turku, Finland

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** Retirement is a common life transition associated with changes in physical activity engagement. The impact of retirement on physical activity appears to vary across socioeconomic positions which may serve to increase socioeconomic disparities in physical activity, and consequently health, in older age. However, further longitudinal studies focused specifically on retirement transition period are needed. The purpose of the current study was to examine changes in self-reported physical activity engagement across retirement transition among retirees from different occupational backgrounds.

**Methods:** Public sector workers (n=3541) from the Finnish Retirement and Aging cohort study were followed annually approximately 6 months before and after retirement transition. Occupational background was categorized based on the International Standard Classification of Occupations: High (classes 1-2), Middle (classes 3-4), Low (classes 5-9). The amount and intensity of weekly leisure-time or commuting related physical activity was assessed annually with a four-item questionnaire and expressed as METh/week. Binary variables were created for physical inactivity (<14METh/week) and participation in vigorous physical activity (yes/no). Differences in changes across retirement transition by occupational backgrounds were estimated using linear and logistic regressions with generalized estimating equations while adjusting for gender, age and self-reported health.

**Results:** Physical activity increased during retirement transition, although the increases were smallest among participants with low occupational background (High: 2.87 METh/week, 95% CI 1.78–3.97; Middle: 2.67, 1.58–3.77; Low: 1.12, 0.04–2.19; time\*occupation, p=0.049). The participants with high (OR 0.72, 95% CI 0.62–0.82) and middle (OR 0.81, 0.70–0.93) occupational background were less likely to be physically inactive after retirement transition when compared to before retirement, while no changes were observed among participants with low occupational background (OR 0.94, 0.82–1.07; time\*occupation p=0.022). In addition, participants with low occupational background were less likely to participate in vigorous physical activity after retirement transition (OR 0.85, 0.75–0.96), whereas no changes were observed among participants with high (OR 1.05, 0.93–1.18) or middle occupational background (OR 1.04, 0.92–1.19, time\*occupation p=0.026).

**Conclusion:** Retirement transition increases disparities in physical activity engagement across occupational backgrounds with the least favorable changes observed among participants with low occupational background.



# Does Exercise Modality Matter Affectively? Contrasting Type and Sequence of Moderate-Intensity Continuous Training versus High-Intensity Interval Training in a Randomized Within-Subject Study

**Mrs. Katja Dierkes**<sup>1</sup>, Ms. Inka Rösel<sup>1</sup>, Prof. Katrin E. Giel<sup>1</sup>, Prof. Ansgar Thiel<sup>1</sup>, Prof. Gorden Sudeck<sup>1</sup>

<sup>1</sup>University of Tübingen, Tübingen, Germany

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Affective determinants of exercise behavior are receiving increasing attention in research on health promotion and prevention. To date, however, little is known about changes in affective exercise determinants during multi-week training programs in insufficiently active individuals. This applies in particular to the currently discussed advantages and disadvantages of moderate-intensity continuous training (MICT) compared with high-intensity interval training (HIIT) with regard to the affective experience of these two training types, which is important for exercise adherence. Therefore, referring to the Affect and Health Behavior Framework (AHBF), this within-subject study investigated changes in affective exercise determinants as a function of training type and sequence consisting of MICT and HIIT.

**Methods:** Forty insufficiently active healthy adults ( $M_{age} = 27 \pm 6$  years; 72% women) underwent two 6-week training periods in a randomized sequence (MICT–HIIT vs. HIIT–MICT) within 15 weeks. Pre-post questionnaires and in-situ measurements, during and after a standardized vigorous-intensity continuous exercise session (VICE), were used to assess affective attitude, intrinsic motivation, in-task affective valence, and post-exercise enjoyment. These four affect-related constructs were collected before, between, and after the two training periods. For each of the four affect-related constructs, we separately fitted a mixed model for repeated measures including the fixed effects training type (MICT vs. HIIT), training period (period 1 vs. 2), and sequence (MICT–HIIT vs. HIIT–MICT) according to a 2x2 cross-over design. We set the significance level of  $\alpha = .0125$  to adjust for multiple testing using the Bonferroni correction.

**Results:** Mixed models revealed a significant effect for training sequence ( $p = .011$ ) – but not for training type ( $p = .045$ ) – on changes in in-task affective valence in favor of the MICT–HIIT sequence. Moreover, no significant training type or sequence effects were found for the constructs of reflective processing examined following the AFBH framework: exercise enjoyment, affective attitude, and intrinsic motivation.

**Conclusions:** Based on our results, individual-based training recommendations should consider the effects of variety and training sequence to develop tailored interventions that lead to more positive affective experiences – in particular during exercise – and thus to the maintenance of exercise behavior in previously inactive individuals.

# Factors that Predict Interest in Participation in Nutrition Interventions among Audiences with Low Incomes during COVID-19

Dr. Elena Serrano, **Ms. Rachel Liebe**, Dr. Sarah Misyak  
<sup>1</sup>Virginia Family Nutrition Program, Virginia Tech, Blacksburg, USA

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** To explore factors that predict interest in participating in nutrition interventions for individuals with low incomes in the United States (US).

**Study Design, Setting, and Participants:** A cross-sectional online survey using Qualtrics panels was conducted in March and April of 2020 with adults 18 years and older who lived in Virginia, US, and were eligible for the US federal nutrition assistance program, Supplemental Nutrition Assistance Program (SNAP). SNAP provides monetary benefits to eligible individuals to supplement their food budget with the goal of eliminating food insecurity.

**Methods:** Survey questions included the following: socio-demographic information, including SNAP participation; food resource management skills and physical activity levels adapted from the Expanded Food and Nutrition Education Program (EFNEP) validated questionnaire for adults; number of days of poor mental health from the Centers for Disease Control and Prevention Health-Related Quality of Life questionnaire; and interest in nutrition interventions (designed by the survey development team). Frequencies and means were computed for each measure. Pearson chi-square analyses were utilized to predict different socio-demographic factors (age, gender, education, income, race, ethnicity, and SNAP participation) and food resource management skills and interest in nutrition interventions. All analyses were conducted using IBM SPSS Statistics for Windows (Released 2021, Version 28.0. Armonk, NY: IBM Corp.).

**Results:** A total of 1,309 (93.0%) participants completed all of the questions of interest for this specific study. Age, race, and participation in SNAP within the past 12 months were the only demographic variables found to be significantly associated with interest in nutrition interventions ( $p < .05$ ). A higher proportion of respondents who expressed interest in nutrition interventions indicated overall higher mean frequencies of planning meals before shopping, shopping with a grocery list, and poor mental health days ( $p < .05$ ).

**Conclusions:** The findings help characterize individuals with interest in nutrition interventions designed for audiences with low-incomes and can be used to help inform and tailor recruitment strategies, as well as potential intervention content.

# Smartphone- & Wearable-based Activity Trackers–Determinants of Engagement: Study Design and Instrument Development

**Ms. Chen-Chia Pan<sup>1,2,3</sup>**, Prof. Benjamin Schüz<sup>1,3</sup>, Dr. Kathrin Günther<sup>2</sup>, Prof. Wolfgang Ahrens<sup>1,2,4</sup>

<sup>1</sup>Leibniz ScienceCampus Digital Public Health Bremen, Bremen, Germany, <sup>2</sup>Leibniz Institute for Prevention Research and Epidemiology - BIPS, Bremen, Germany, <sup>3</sup>Institute for Public Health and Nursing Research, University of Bremen, Bremen, Germany, <sup>4</sup>Institute of Statistics, Faculty of Mathematics and Computer Science, University of Bremen, Bremen, Germany

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Smartphones and wearable devices with activity-tracking functions offer great opportunities to support health behavior change. They can deliver evidence-based behavior change techniques and provide just-in-time adaptive interventions for physical activity. However, there is a dearth of epidemiological research on consumer usage patterns in the real world and the determinants of long-term engagement. We aim to investigate the distribution, patterns, and determinants of engagement with activity trackers in Germany.

**Methods:** A web-based survey assessing the experience of and attitudes toward activity trackers was developed for a sub-study embedded in the German National Cohort (NAKO), called "Smartphone- & Wearable-based Activity Trackers–Determinants of Engagement" (SWEAT-DE). The questionnaire addresses ownership, types of devices, usage patterns of activity trackers, and determinants of usage based on the Capability, Opportunity, Motivation, Behavior (COM-B) model. Face validity and content validity of the questionnaire were assessed qualitatively by an expert group. The test-retest reliability is planned with a one-week interval in between among university students. The correlation coefficient of continuous variables and Cohen's kappa for categorical variables will be calculated between the test and retest. Each study center will sequentially distribute the questionnaire via email to at least 2000 participants per study center.

**Results:** The project is ongoing in the data collection process of test-retest, and the official questionnaire distribution to NAKO participants is planned for the beginning of 2023. This study will present: 1) the prevalence of owning and using consumer activity trackers and their distribution in the German National Cohort study; 2) the degree of engagement and usage patterns and their population characteristics; 3) the individual-level behavioral constructs of activity tracker users vs. non-users and long-term engaged users vs. discontinued users.

**Conclusions:** The study results will provide insights into the user characteristics, usage patterns, and determinants of uptake and engagement with activity trackers. Moreover, they have significant implications for understanding how to increase long-term engagement with activity trackers using modifiable factors like capability, opportunity, and motivation. These findings will be of interest to developers and researchers in designing digital behavior change interventions for physical activity using a smartphone- or wearable-based activity tracker.

# Design and baseline results of the SoFiT study: a randomized controlled intervention to study the effect of a personalized lifestyle program on cancer-related fatigue in colorectal cancer survivors

Mrs. Judith de Vries-ten Have<sup>1</sup>, Mr. Koen Manusama<sup>1</sup>, Miss Auke Verkaar<sup>1</sup>, Prof. Ellen Kampman<sup>1</sup>, Dr. Laura Winkens<sup>2</sup>, **Associate Professor Renate Winkels<sup>1</sup>**

<sup>1</sup>Division of Human Nutrition and Health, Nutrition and Disease Chair Group, Wageningen University and Research, Wageningen, Netherlands, <sup>2</sup>Consumption and Healthy Lifestyles Chair Group, Wageningen University and Research, Wageningen, Netherlands

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** C. Cancer prevention and management

**Purpose:** Many colorectal cancer survivors (CRC) experience long-term side effects of treatment, with cancer-related fatigue (CRF) listed as the most reported and severe problem. Observational studies among CRC survivors suggest an association between a healthy lifestyle and decreased risk of CRF; intervention studies are sparse. Importantly, there are no interventions that recruited only CRC survivors experiencing fatigue. We designed the SoFiT-study to assess the effect of a personalized 6-month lifestyle intervention compared with usual care on CRF.

**Methods:** The SoFiT-study is an ongoing parallel randomized controlled trial aiming to recruit 184 participants. Eligible are persons who experience CRF and who completed treatment for stage I-III CRC between six months and five years ago. Participants randomized to the intervention group receive personalized coaching from a lifestyle coach for 6 months to increase adherence to the lifestyle recommendations of the World Cancer Research Fund regarding adopting healthy dietary behaviours, maintaining a healthy weight, and increasing physical activity. The intervention is personalized to the current level of adherence to WCRF recommendations of the participant, and to the preference of the participant; additionally, it is personalized by applying behavioural change techniques tailored to the specific behavioural determinants of the participant. Participants randomized to the usual care group receive two lifestyle coaching sessions after completion of the 6 months measurements. The primary endpoint is the difference in change in CRF between intervention and usual care group from baseline to 6 months assessed by the Functional Assessment of Chronic Illness Therapy (FACIT)-Fatigue Scale. Secondary, differential changes in skeletal muscle echo-intensity, gut microbiota composition, health-related quality of life, physical performance, and sleep quality and duration are assessed. Primary outcome data are expected the last quarter of 2023.

**Results:** Recruitment is ongoing, n=92 participants were recruited so far (Dec 2022). Baseline data on the level of CRF, on adherence to the WCRF lifestyle recommendations and on behavioral determinants will be presented, together with further details on the design of the intervention.

**Conclusions:** The SoFiT trial will show whether adopting a healthier lifestyle can reduce CRF. Adopting healthy lifestyle behaviours may also contribute to better health-related quality of life.

# A systematic scoping review of accelerometer-measured physical activity datasets that include markers of cardiometabolic health: The Global Physical Activity Dataset (GPAD) catalogue

Mr. Jonah Thomas<sup>1</sup>, Prof. Amanda Daley<sup>1</sup>, Dr. Dale Esliger<sup>1</sup>, Dr. Victoria Kettle<sup>1</sup>, Mrs. April Coombes<sup>2</sup>, Prof. Emmanuel Stamatakis<sup>3</sup>, **Dr. James Sanders<sup>1</sup>**

<sup>1</sup>Loughborough University, Loughborough, United Kingdom, <sup>2</sup>University of Birmingham, Birmingham, United Kingdom, <sup>3</sup>University of Sydney, Sydney, Australia

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Many research study datasets have been collected to answer questions about the relationship between accelerometer-measured physical activity and cardiometabolic health. This scoping review aimed to map the available datasets across the world which have collected accelerometer-measured physical activity and markers of cardiometabolic health. This data was then used to develop of a publicly available resource, named the Global Physical Activity Dataset catalogue (GPAD) to house the identified datasets, to facilitate future research studies on questions related to physical activity and cardiometabolic health.

**Methods:** Databases, trial registries and grey literature (inception until 09/2022) were systematically searched to identify studies that have collected data on physical activity and cardiometabolic health outcomes. Inclusion criteria were; datasets must have included accelerometer-measured physical activity in adults aged  $\geq 18$  years, a sample size  $>400$  participants (unless recruited participants in a lower middle-income country where a sample size threshold was 100), utilised an observational, longitudinal or trial based study design and collected at least one cardiometabolic health marker (unless only body mass was measured). Two reviewers independently screened the search results to identify eligible studies and the characteristics of each dataset were extracted.

**Results:** A total of 16,720 study reports were identified and after screening, 319 were eligible, with 124 unique datasets in these study reports meeting the review inclusion criteria. Datasets were found in 49 countries, with the most developed in Europe ( $n=54$ ) and the least in Africa and Oceania ( $n=4$  and  $n=3$  respectively). The most common accelerometer was the waist-worn ActiGraph. Body mass was the most frequently measured cardiometabolic health marker in datasets (121/124 datasets), followed by blood pressure (83/124 datasets). The number of participants in the included datasets ranged from 120 to 103,712. Once the review processes had been completed the GPAD catalogue was developed(<https://lboro-climb.shinyapps.io/gpad/>).

**Conclusion:** This review identified datasets from around the world that have collected potentially harmonisable accelerometer-measured physical activity and cardiometabolic health markers. The GPAD catalogue is an online open-source resource which will enable easier identification of potentially harmonisable datasets, to answer important health research questions



# Measuring Resilience and Mental Health as Moderated by Daily Habits of Senior Military College Students.

**Ms. Tara Grogan<sup>1</sup>**, Ms. Jacie Harlow<sup>1</sup>, Dr. Rachele Pojednic, corresponding<sup>1</sup>, Dr. Kylie Blodgett<sup>1</sup>

<sup>1</sup>Norwich University, Northfield, USA

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** J. Young Adults

**Purpose:** To examine associations between resilience and positive or negative mental health in undergraduate students at a senior military college, and to further explore how sleep, diet, and physical activity moderates that relationship.

**Methods:** This cross-sectional study administered the National College Health Assessment version 3 (NCHA III) survey at the beginning of the fall semester to first year undergraduate students. Three distinct lifestyles were assessed, Reserve Officer Training Corps (ROTC), Corp of Cadets (CORPS) and Civilian (CIV). The NCHA III included Connor Davidson Resiliency (CDRISC 2), Diener Flourishing Score (DIENER), Kessler 6 Non-Specific Psychological Distress Score (K6), UCLA Loneliness Scale (UCLA), Suicide Behavior Questionnaire – Revised (SBQR), a sleep score (SLEEP), PRIME screen (DIET), and International Physical Activity Questionnaire (IPAQ). Data were analyzed by SPSS software version 28 using Pearson correlation and multiple linear regression.

**Results:** Seventy-seven (n=77) students responded (age: 18.50±1.20 years; gender: n=47 male, n=27 female, and n=3 non-binary). LIFESTYLE reported: ROTC (n=25), CORPS (n=18), and CIV (n=34). When LIFESTYLE was combined, the means and standard deviations of each scale included CD-RISC 25.64 ±1.84, DIENER 41.54± 10.22, K6 9.16± 6.42, UCLA 5.80± 1.80 and SBQR 5.54± 3.48. There was a positive correlation between CD-RISC2 and DIENER (r=0.414, p<0.001). There were negative correlations between CD-RISC2 and K6 (r=-0.454, p<0.001), UCLA (r=-0.394, p<0.001), and SBQR (r=-0.233, p=0.046). When separated by LIFESTYLE, there was a negative correlation between K6 and Total Moderate activity within ROTC (r=0.419, p=0.041) and CORPS (r=0.541, p=0.025). Multiple linear regression models examined the effect of CDRISC2, DIET, IPAQ, SLEEP, and LIFESTYLE on DIENER (r<sup>2</sup>=0.128, p=0.123), K6 (r<sup>2</sup>=0.204, p=.013), UCLA (r<sup>2</sup>=0.186 p=0.023), and SBQR (r<sup>2</sup>=0.097, p=0.253). DIET, IPAQ, SLEEP and LIFESTYLE were not significant in any model.

**Conclusions:** Based on the results of this study, there was a positive correlation between resilience and flourishing in first year undergraduate students, regardless of lifestyle, and an inverse relationship between resilience and loneliness, emotional distress, and suicide behavior. There was no effect of sleep, diet, or physical activity on these relationships cross-sectionally, although longitudinal assessment is necessary to better understand how health behaviors relate to resilience and mental health.

# Is the adherence to the food practices recommended by the 2014 Brazilian Food Guide associated with a healthier diet?

**Ms. Kamila Gabe**<sup>2,3</sup>, Dr. Caroline dos Santos Costa<sup>1,2</sup>, Dr. Francine Silva dos Santos<sup>1,2</sup>, Ms. Thays Nascimento Souza<sup>2,3</sup>, Prof. Patricia Constante Jaime<sup>1,2</sup>

<sup>1</sup>Department of Nutrition, School of Public Health, University of São Paulo, São Paulo, Brazil, <sup>2</sup>Center for Epidemiological Research in Nutrition and Health, Department of Nutrition, School of Public Health, University of São Paulo, São Paulo, Brazil, <sup>3</sup>Postgraduate Program in Nutrition in Public Health, School of Public Health, University of São Paulo, São Paulo, Brazil

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** The 2014 Brazilian Food Guide (BFG)'s messages are mostly qualitative and based on food practices and behaviors, such as meal planning, cooking, and eating modes. This study investigates if the adherence to these food practices is aligned with a healthier diet according to the BFG's recommendations for food intake based on the level of food processing.

**Methods:** A cross-sectional analysis was conducted using a quota-based subsample of adults from the NutriNet-Brasil Cohort. The participants completed the Food Practices Brasil Scale (FPBr), a validated 24-items scale which accesses four dimensions of healthy food practices encompassed by the BFG: planning, domestic organization, eating modes, and food choices. Each item has four possible frequency-based answers; the sum of them generates a score ranging from 0 to 72. Web-based 24h-recalls (up to three per person) were used for calculating the usual percentage of energy intake (%energy) of ten food groups, divided into three categories: 'eating more' (plant-based fresh/minimally processed foods, fruits, vegetables, whole grains, legumes, and nuts); 'limit' (processed foods, red meat, and table sugar); and 'avoiding' (ultra-processed foods). The association between quartiles of the FPBr-score and food groups' %energy was analysed through crude and adjusted linear regression models; the results were expressed in terms of geometric means.

**Results:** The participants (n=2052) were 39.8 (sd=13.5) years old on average. Most of them were women (52.6%), had completed up to high school (69.1%), and self-declared as white (56.7%). Adjusted means for the %energy of plant-based fresh/minimally processed foods were 27.4% (95%CI 26.7-28.2) and 37.9% (95%CI 36.9-38.6) among those classified in the first and fourth quartiles of the FPBr-score, respectively. Conversely, these percentages were 16.4% (95%CI 15.8-17.0) against 14.8% (95%CI 14.1-15.4) for processed foods and 26.3% (95%CI 25.6-27.0) against 17.1% (95%CI 16.3-17.8) for ultra-processed foods. Except for red meat, all the other food groups were also associated with the FPBr-score in the expected direction.

**Conclusions:** In general, healthier food practices were aligned with a healthier diet. These results support the use of messages based on practices and behaviors in Food-Based Dietary Guidelines and reinforce the importance of policies that enable people to adopt them.

# Accessibility, Quality, and Selection of Nutritious Foods Differ by Food Security Status in Virginia

Dr. Elena Serrano, Dr. Sarah Misyak, **Ms. Rachel Liebe**

<sup>1</sup>Virginia Family Nutrition Program, Virginia Tech, Blacksburg, USA

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** Individuals experiencing food insecurity are at an elevated risk for several adverse physical and mental health outcomes. Contributors to food insecurity are multi-factorial and include individual and community-level factors, including access to nutritious foods. This study aimed to explore differences in the accessibility, quality, and selection of fresh produce and low-fat foods in a person's neighborhood by food security status.

**Methods:** A cross-sectional survey was administered to English-speaking adults living in the state of Virginia from February to July 2022. The survey included demographic information and previously validated measures of household food security status (USDA Economic Research Service) and healthful food access (NEMS). Food security status was categorized as high (HFS), marginal (MFS), low (LFS), or very low (VLFS). Results were analyzed using descriptive statistics and chi-squared tests were used to explore differences in access by food security status. Cohen's  $w$  effect sizes were also calculated. The threshold for significance was set *a priori* at 0.05 and a Bonferroni correction was applied ( $p < 0.007$ ).

**Results:** Of the 2,018 respondents, 25.2% experienced HFS, 14.9% MFS, 20.0% LFS, and 39.9% VLFS. There were medium effects of food security status on produce accessibility, quality, and selection ( $w = 0.32, 0.30, 0.33$ , respectively;  $p < 0.001$ ). Nearly half (49.0%) of HFS respondents strongly agreed that produce was easy to access in their neighborhood compared to 17.7% of people experiencing VLFS. More VLFS respondents strongly disagreed that produce was easy to access (13.0%), high quality (8.8%), and abundant (11.5%) in their neighborhood compared to HFS respondents (5.1%, 3.5%, and 4.7%, respectively). There were medium effects of food security status on low-fat food accessibility and quality ( $w = 0.31, 0.32$  respectively;  $p < 0.001$ ). Respondents experiencing VLFS disagreed or strongly disagreed that low-fat foods were accessible and high quality (27.7% and 25.6% respectively). There was a small effect of food security status on low-fat food selection ( $w = 0.29$ ;  $p < 0.001$ ).

**Conclusions:** Respondents experiencing food insecurity reported lower perceived access to produce and low-fat foods in their neighborhoods than respondents experiencing food security. Strategies to improve neighborhood access to healthful foods for people experiencing food insecurity are needed to help mitigate existing disparities in health outcomes.

# Swiss pre-school children' s type and level of physical activity during open gym programs

**Miss Bianca Schmidli<sup>1</sup>**, Prof. Claudio Renato Nigg<sup>1</sup>, Dr. Simon Endes<sup>2</sup>, Mrs. Sonja D. Stoffel Kerr<sup>3</sup>

<sup>1</sup>Department of Health Science, Institute of Sport Science, University of Bern, Bern, Switzerland, <sup>2</sup>Ecoplan AG, Bern, Switzerland, <sup>3</sup>Gesundheitsförderung Schweiz, Bern, Switzerland

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** F. Early care and education

**Purpose:** Physical activity (PA) access is an issue especially during winter and for people with lower socioeconomic status. In Switzerland, open gym programs with opportunities for PA activities (movement landscapes) are offered for preschoolers and their parents for free or for nominal price during winter time. The aim of the study was to evaluate whether children are physically active during these open gym programs and which types of movement they perform.

**Methods:** Preschoolers (2-5 years old) from 8 sites of two Swiss activity programs (MiniMove & Ä Halle wo's fägt) were randomly selected to participate as part of a larger program evaluation. All children were observed using the System for Observing Play and Leisure Activity in Youth (SOPLAY). Additionally, 5-8 children per gym were observed with the System for Observing Children's Activity and Relationships during Play (SOCARP) over 12 minutes per child. Simultaneously to SOCARP, the children wore an ActiGraph accelerometer on their right hip.

**Results:** According to SOPLAY, 56% (SD=0.2) of children (N=1633) attending the open gym program engaged in moderate to vigorous (MV)PA. According to SOCARP (N=45), children engaged in MVPA 61% of the observed 12 (SD=0.16) minutes. Accelerometry data (N=45) confirmed that 56% (SD=0.16) of the recorded time was spent in MVPA. Movement types observed were: climbing (21%), on a swing (14%), climbing and jumping on the gymnastic box (12%), and on the slide (12%). The intensity of PA in those areas varied from 62% MVPA (slide), 60% MVPA (climbing), 55% MVPA (gymnastic box), to 31% MVPA (swing).

**Conclusions:** The overall intensity of PA in the Swiss Winter open gym programs is relatively high (>50% MVPA) as indicated both by observation and accelerometry. A large variety of movement types are promoted including endurance and strength activities; however, intensity does vary within the different activities. The lowest intensity is observed at the swing, which may be due to children sitting, being pushed from their parents. This notwithstanding, open gym programs can contribute to a higher level of MVPA and help potentially underserved populations to meet the PA recommendations of WHO (2020).

# Using mixed-methods social network research to grow and sustain complex community-based health programmes in low- and middle-income countries: Benefits, limitations, and potential solutions.

**Ms. Nina Abrahams<sup>1,2</sup>**, Prof. Charlie Foster<sup>1</sup>, Prof. Estelle Victoria Lambert<sup>2</sup>, Dr. Zoi Toumpakari<sup>1</sup>, Associate Professor Frederick Marais<sup>3</sup>

<sup>1</sup>Centre for Exercise, Nutrition and Health Sciences, School for Policy Studies, Faculty of Social Sciences and Law, University of Bristol, Bristol, United Kingdom, <sup>2</sup>Health through Physical Activity Lifestyle and Sport Research Centre, Division of Physiological Sciences, Department of Human Biology, Faculty of Health Sciences, University of Cape Town, Cape Town, South Africa, <sup>3</sup>Healthy Lifestyle Services, Public Health, Somerset County Council, United Kingdom

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** The impact of community-based programmes to prevent and manage non-communicable diseases may be limited unless they can be scaled up and sustained. Social network analysis – the measurement of the structural relationships between individuals or organisations – may serve as an important tool to better understand the potential role of social networks in scaling up and sustaining complex community-based physical activity and nutrition programmes.

**Methods:** This was a mixed-methods study using a complex, South African healthy lifestyles initiative as a case study (Western Cape on Wellness, WoW!). This programme is made up of a core team, over 60 partner organisations, and over 700 community champions. The first phase was a network survey. Sixty-seven network partners were asked about their relationships along five themes: centralisation, quality of relationships, cliques, leaders, and shared goals. Network relationships and visualisations were determined using UCINET and NetDraw software. Semi-structured interviews were then conducted with fourteen purposively sampled network stakeholders, representing the WoW! team, partners, and champions. Interview transcripts were analysed with the help of NVivo using Framework Approach.

**Results:** Results revealed a centralised network around the WoW! team, other possible network leaders, overall unclear role differentiation, and low rural representation. Despite testing the survey process, there was still a fairly low response rate (39%) which brings into question the practicality of collecting social network survey data from these complex settings. Interviewees supported the survey findings and provided contextual understanding of the network, such as how centralisation affected them. However, participants indicated that while some aspects of the research are useful, such as the visual outputs, most of the analyses did not provide enough information for them to take action in the network. Participants suggested the use of a “live mapping” tool that can provide the visual benefits of social network analysis while taking into account the data collection capabilities and information needed to measure, monitor, and act in complex community networks.

**Conclusions:** This research contributes to the development of practical network analysis tools in improving the scale-up and sustainability of complex community programmes, particularly in low-income settings where it may be needed most.



# Perceived environmental factors affecting recreational walking behavior among socioeconomically disadvantaged adults

**Mrs. Suzannah D'hooghe**<sup>1,2,3</sup>, Ms. Yasemin Inac<sup>1,2,3</sup>, Prof. Benedicte Deforche<sup>3</sup>, Prof. Delfien Van Dyck<sup>3</sup>, Dr. Stefanie Vandevijvere<sup>1</sup>, Dr. Karin De Ridder<sup>1</sup>, Prof. Nico van de Weghe<sup>3</sup>, Prof. Sarah Dury<sup>2</sup>

<sup>1</sup>Sciensano, Brussels, Belgium, <sup>2</sup>Vrije Universiteit Brussel, Brussels, Belgium, <sup>3</sup>Ghent University, Ghent, Belgium

Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** Socioeconomically disadvantaged (SED) adults are found to be less active during leisure time in comparison with higher socioeconomic groups. Recreational walking (RW) is an important type of leisure time physical activity which is considered budget-free and without specific skills or equipment. Local environmental factors affecting RW behavior are particularly important for SED adults who are more dependent on their direct environment. Limited papers studied the role of the perceived local environment in peri-urban areas on RW, especially among SED adults. The following research questions will be answered: (1) Which perceived environmental factors play a role in RW among SED adults? (2) Which actions can be identified by SED adults to promote RW?

**Methods:** Purposeful convenience sampling was used to recruit 38 SED adults (25-65 y/o) in two peri-urban municipalities in Belgium. Walk-along interviews (n=38) have been performed in the participants' neighborhood to identify local environmental factors affecting RW. 20 participants joined a focus group (n=4) afterwards to categorize the identified environmental factors in the different environmental types (physical, sociocultural, political and economic) of the ANGELO framework, and to identify local actions to promote RW. The interviews and focus groups were transcribed ad verbatim. MaxQDA was used for thematic content analysis.

**Results:** The participants added the information environment (dissemination, retrieving and understanding of information) to the ANGELO framework, as they felt it was lacking. Furthermore, the availability of well-maintained walking surfaces, toilets, street lighting and seating options (physical environment), but also social support, dog-ownership, stigmatization, social isolation (sociocultural environment) and affordability (direct and indirect links – economic environment) are identified important environmental factors in RW among SED adults. The identified political and economic factors are intertwined with the other environmental factors. Improving communication and knowledge transfer, stimulation of physical, sociocultural, and economic accessibility, and promotion of physical and social safety are identified most important action points for the local government to facilitate RW.

**Conclusion:** Different environmental types interact and are embedded in each other. A broad comprehension of the various dimensions of the local environment are necessary to understand the mechanisms affecting RW among SED adults.

# The Feasibility and Acceptability of an Online CPD Programme to Enhance PE Teachers' Knowledge of Muscular Fitness Activity

**Mr. Ash Cox**<sup>1</sup>, Dr. Robert Noonan<sup>2</sup>, Prof. Stuart Fairclough<sup>1</sup>

<sup>1</sup>Edge Hill University, Ormskirk, United Kingdom, <sup>2</sup>University of Bolton, Bolton, United Kingdom

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** Muscular fitness (MF) activity provides a range of health benefits, including improvements in metabolic function, bone health, and mental health. MF activity seldom features within Physical Education (PE) curricula due to perceived barriers among some PE teachers. These barriers typically centre around confidence, time and a perceived lack of facilities. The aims of this study were to (1) assess if an online continued professional development (CPD) course can increase PE teacher knowledge of MF activity (2) assess the feasibility of an online CPD course to enhance PE teacher knowledge and competence of MF activity, and (3) assess the acceptability of the content and design of an online CPD course.

**Methods:** A user-centred approach to the development of an online CPD platform was undertaken with five secondary school PE teachers across three meetings to inform CPD content and design. Once the CPD course was developed, UK secondary school PE teachers were invited to enrol, and 119 teachers expressed an interest in taking part. A pre-course quantitative quiz was included to assess knowledge and understanding of the concepts covered. The quizzes were completed by 44 enrolled teachers and a wait-list control group (n=21). Upon CPD completion, teachers provided feedback which was analysed qualitatively.

**Results:** Pre-and-post CPD knowledge quiz data were available from 65 participants (55.4% male). The median knowledge quiz change score was significantly higher in the CPD group than in the wait-list control group ( $U=37, z=-5.96, p<0.01$ ). Qualitative data analysis provided three primary themes reflecting factors associated with the acceptability and feasibility of the course: (1) practical application, (2) support and resources, and (3) knowledge and confidence. A further 19 secondary themes provided further context and were conceptualised using pen profiles.

**Conclusions:** Improvements in PE teachers' MF activity knowledge and practice were observed following completion of a user-centred CPD programme. The online platform was beneficial to overcoming the limitations of face-to-face CPD, such as time and financial constraints. Further, the CPD content was beneficial and appropriate to their teachers' practice. Future work is required to establish links between teachers' learning following CPD, the translation into PE practice and student MF outcomes.

# Implementation of the TEACH e-Learning course on physical activity and sedentary behaviour for pre- and in-service early childhood educators: A pilot study

**Dr. Trish Tucker**<sup>1</sup>, Dr. Brianne Bruijns<sup>1</sup>, Dr. Leigh Vanderloo<sup>1</sup>, Dr. Andrew Johnson<sup>1</sup>, Dr. Kristi Adamo<sup>2</sup>, Dr. Shauna Burke, Dr. Valerie Carson<sup>3</sup>, Dr. Rachel Heydon<sup>1</sup>, Dr. Jennifer Irwin<sup>1</sup>, Dr. Patti Jean Naylor<sup>4</sup>, Dr. Brian Timmons<sup>5</sup>

<sup>1</sup>University of Western Ontario, London, Canada, <sup>2</sup>University of Ottawa, Ottawa, Canada, <sup>3</sup>University of Alberta, Edmonton, Canada, <sup>4</sup>University of Victoria, Victoria, Canada, <sup>5</sup>McMaster University, Hamilton, Canada

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** F. Early care and education

**Purpose:** Childcare interventions targeting physical activity and sedentary behaviour often employ in-person training to supplement early childhood educators' (ECEs) knowledge and self-efficacy to provide physically active programming to children in care. However, this approach is resource-intensive, and limits reach to ECEs. The purpose of the Training pre-service EARly CHildhood educators in physical activity (TEACH) pilot study was to examine the implementation (e.g., fidelity, feasibility, acceptability) of an e-Learning course targeting physical activity and sedentary behaviours among a sample of pre-service (i.e., post-secondary students) and in-service (i.e., practicing) ECEs in Canada.

**Methods:** A pre-/post-pilot study design was used, and implementation outcomes were assessed cross-sectionally at post-intervention. Pre-service ECEs were purposefully recruited from Canadian colleges ( $n = 3$ ) and in-service ECEs were recruited via social media. Following the e-Learning course, a process evaluation survey ( $n = 32$  pre-service and 121 in-service ECEs) and interviews ( $n = 3$  pre-service and 8 in-service ECEs) were conducted to explore ECEs' perspectives on the e-Learning course. Intervention fidelity was assessed using e-Learning course metrics pulled from the web platform. Descriptive statistics were calculated for quantitative data, while thematic analysis was conducted for qualitative data.

**Results:** Moderate-to-high fidelity to the TEACH study e-Learning course was displayed by pre-service (68%) and in-service (63%) ECEs. The course was reported to be highly acceptable, compatible, effective, feasible, and appropriate in complexity; however, some ECEs noted technical difficulties with the e-Learning platform and a longer than anticipated course duration as challenges. ECEs reported especially enjoying content on outdoor play (87.5% and 91.7%) and risky play (84.4% and 88.4%) among pre- and in-service ECEs, respectively.

**Conclusions:** The TEACH e-Learning course was feasible to implement and well received among both pre-service and in-service ECEs. Findings demonstrate the value of e-Learning for professional development interventions for ECEs. Modifications to the TEACH e-Learning course, based on participants' feedback, will be used to make improvements to improve scalability of this training.

# Neighbourhood greenness moderates the association between physical activity and geriatric relevant health outcomes: An analysis of the CLSA

**Mx. Andrew Putman<sup>1</sup>**, Ms. Irmina Klicnik<sup>1</sup>, Prof. Shilpa Dogra (Corresponding Author)<sup>1</sup>

<sup>1</sup>University of Ontario Institute of Technology, Oshawa, Canada

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** The purpose of this analysis was to evaluate the relationship between physical activity levels of older adults and geriatric relevant health outcomes, and to determine whether neighbourhood characteristics alter this association.

**Methods:** Data from the Canadian Longitudinal Study on Aging (CLSA) were used to assess geriatric relevant outcomes of physical impairment, medication use, severity of daily pain, and depressive symptoms. Data from the Canadian Active Living Environments (Can-ALE) and the Normalized Difference Vegetative Index (NDVI) were used to determine neighbourhood walkability and greenness, respectively. The analytic sample included adults who were 65 years or older at baseline (n=16,735, age=73±5.6, 50% female).

**Results:** Adjusted odds ratios and 95% confidence intervals for the base relationships were calculated using proportional odds logistic regression (physical impairment, pain, medication use), and linear regression (depressive symptoms). Moderation effects of environmental factors were assessed using greenness and walkability. The base relationships showed protective associations between each additional hour per week of total physical activity and physical impairment (OR=0.95, p<.001), daily pain severity (OR=0.98, p<.001), medication use (OR=0.98, p<.001), and depressive symptoms (OR=0.95, p<.001). Additive effects were seen when greenness was added to physical impairment (p=.04), daily pain severity (p<.01), and depressive symptoms (p=.01) but no moderation was seen with walkability. Sex differences were observed in that greenness moderation was found in severity of daily pain in males but not in females.

**Conclusions:** Neighbourhood greenness shows a moderation effect on the protective associations between physical activity and geriatric relevant health outcomes in a sample of over 15,000 Canadian seniors. Future research investigating geriatric relevant health outcomes and physical activity should consider neighbourhood greenness as a potential moderator.

# Prevalent Dietary Patterns in U.S. Food-Insecure Cancer Survivors are Associated with Mortality: NHANES 1999-2018

**Mr. Christian Maino Vieytes<sup>1</sup>**, Dr. Ruoqing Zhu<sup>2,3</sup>, Dr. Francesca Gany<sup>4</sup>, Ms. Brenda Koester<sup>5</sup>, Dr. Anna Arthur<sup>6</sup>

<sup>1</sup>Division of Nutritional Sciences, the University of Illinois at Urbana-Champaign, Champaign, USA,

<sup>2</sup>Department of Statistics, the University of Illinois at Urbana-Champaign, Champaign, USA, <sup>3</sup>Carl R. Woese Institute for Genomic Biology, the University of Illinois at Urbana-Champaign, Champaign, USA, <sup>4</sup>Memorial Sloan Kettering Cancer Center, New York, USA, <sup>5</sup>Family Resiliency Center, Department of Human Development and Family Studies, Champaign, USA, <sup>6</sup>Department of Dietetics and Nutrition, the University of Kansas Medical Center, Kansas City, USA

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** Food insecurity (FI) is a public health issue of concern and a sociodemographic factor that drives health inequities and affected approximately 13.5% of U.S. households in 2020. Using penalized logistic regression as a novel methodology, we previously characterized the major prevalent dietary patterns in the U.S. food-insecure cancer survivor population [1]. The goal of the present analysis was to evaluate how those characterized patterns related to mortality, a critical prognostic outcome in cancer survivors.

**Methods:** This analysis employed data from the National Health and Nutrition Examination Survey (NHANES, 1999-2018) and public-use linked mortality files from the National Center for Health Statistics (NCHS). We used penalized logistic regression (logit), with binary outcomes for FI and FI risk factors, and principal components analysis (PCA) to extract dietary patterns as previously described [1]. We computed index scores and fit covariate-adjusted Cox-Proportional Hazards models to evaluate the relationship between adherence to these diet indices and the risks of all-cause and cancer-specific mortality within 2,495 eligible cancer survivors.

**Results:** We extracted four patterns using penalized logit and named them according to the outcome variable used in each model (FI, Age, SNAP, Household Size). Two patterns were extracted with PCA and were named the Modified Western and Prudent patterns due to their interpretations. In the survival analysis, we found significant positive associations between adherence to the FI pattern (HR: 1.23, 95% CI: 1.05-1.44), the SNAP pattern (HR: 2.20, 95% CI: 1.45-3.36), and the risk of all-cause mortality. There was an inverse association between the Modified Western pattern (HR: 0.54, 95% CI: 0.35-0.83) and all-cause mortality.

**Conclusions:** Major dietary patterns prevalent in the food-insecure cancer survivor population deleteriously impacted survival in the U.S. cancer survivor population. Given the extant health disparities food insecure cancer survivors face, these results highlight a potential area for targeted interventions and policies to mitigate those disparities.

## References

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# Assessing Physical Literacy Knowledge, Attitudes and Behaviours in Early Childhood Educators: Face and Content Validity Study

**Dr. Lynne Lafave**<sup>1,2</sup>, Dr. Nadine Van Wyk<sup>1</sup>, **Dr. Mark Lafave**<sup>1</sup>

<sup>1</sup>Mount Royal University, Calgary, Canada, <sup>2</sup>University of Calgary, Calgary, Canada

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** F. Early care and education

**Purpose:** Physical literacy is a complex construct that encompasses “the motivation, confidence, physical competence, and knowledge and understanding to value and engage in physical activity for life.” Early childhood educators (ECEs) play a critical role in shaping young children’s relationship with movement and physical activity that influence their physical literacy journey. There is a paucity of measurement tools that assess the motivation, knowledge, and confidence aspects of physical literacy. The purpose of this study was to develop and assess the face and content validity of an online survey tool to assess physical literacy constructs for ECEs in both a professional teaching context and their own personal context.

**Methods:** An environmental scan of the literature guided the physical literacy knowledge, attitudes and behaviours (PL-KABQ) item creation. Face validity and content validity were evaluated by two physical literacy experts and one early childhood educator expert. Content validity was quantified by the content validity index. Readability was measured with the Flesch-Kincaid Reading Level with a grade 8 reading level target. Feasibility was assessed by completion time measured in minutes. A cross-sectional design was used to test internal consistency of the PL-KABQ items by calculating Cronbach's alpha.

**Results:** A 25-item survey (7 knowledge items) was created to collectively represent a holistic metric of knowledge, attitudes, and behaviours related to physical literacy. The readability score was initially grade 15, but after five revisions the final readability score was grade 8.8. Cronbach’s alpha was determined to be 0.87 indicative a strong unifying and underlying construct. The median survey completion time was 8 minutes.

**Conclusion:** A novel physical literacy assessment tool for knowledge, attitude, and behaviour domains was developed for a special population of early childhood educators. The current study is the first step in the process to validate this tool. The results indicate a strong Cronbach’s alpha level, which paves the way to continue the development with intra-rater reliability. Future research will begin to use this tool as a baseline measure for PL knowledge, attitudes and behaviours of ECEs so that we can measure the impact of continuing competence education for working practitioners.

# Factors that influence firefighters' food choices at the fire station

**Mr. Thomas Sire<sup>1</sup>**, Prof. Louis Laurencelle<sup>1</sup>, Prof. Noémie Carbonneau<sup>1</sup>, Prof. Julie Houle<sup>1</sup>, Prof. François Trudeau<sup>1</sup>, Prof. Philippe Gendron<sup>1</sup>

<sup>1</sup>Université du Québec à Trois-Rivières, Trois-Rivières, Canada

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** A low-quality diet increases the risk of cardiovascular diseases and, consequently, the risk of on-duty cardiac events among firefighters. Qualitative studies have provided a picture of the barriers to healthy eating at the fire station. However, to our knowledge, factors that may influence firefighters' food choices while on duty have never been quantitatively investigated. Therefore, the purpose of this study was to identify factors that may influence firefighters' food choices at the fire station.

**Methods:** An online questionnaire (Qualtrics, Provo, UT, USA) was sent to full-time and part-time firefighters in Québec. The survey consisted of two main sections: the assessment of diet (ratio of servings of good and poor foods for cardiovascular health) and the examination of social (Social Support for Healthy Eating Questionnaire), environmental (Perceived Food Environment Questionnaire in a French-Canadian population), occupational and individual (Regulation of Eating Behavior Scale) factors that may influence firefighters' diet at work. Correlational analyses via Kendall's tau-b coefficient were used to test the relationships between these variables.

**Results:** Ninety-three (93) firefighters (91 males and 2 females, age:  $37.6 \pm 11.5$  years, years of experience as firefighter:  $14.0 \pm 9.8$  years) responded to the questionnaire. Co-workers' social support for healthy eating showed a positive correlation with food quality ( $t = 0.171$ ,  $p = 0.01$ ). Conversely, the number of co-workers at the fire station was negatively correlated with food quality ( $t = -0.149$ ,  $p = 0.04$ ) and positively correlated with frequency of fast food meals ( $t = 0.153$ ,  $p = 0.04$ ). Frequency of the latter is also positively associated with the perceived fast food availability around the fire station ( $t = 0.171$ ,  $p = 0.03$ ). Nutritional literacy varies inversely with fast food frequency ( $t = -0.162$ ,  $p = 0.05$ ). Finally, frequency of meals cut by emergency calls was positively associated with diet quality ( $t = 0.224$ ,  $p = 0.01$ ).

**Conclusions:** Social support, number of teammates, perceived food environment and nutritional literacy seem to influence the quality of food at the fire station. This exploratory study will support further intervention studies aimed at improving firefighters' food choices.

# Pre-pandemic Sleep and Activity Behaviors and Associated Change in Depressive Symptoms during the COVID-19 Pandemic

**Ms. Mikael Anne Greenwood-Hickman<sup>1</sup>**, Dr. Laura Harrington<sup>1</sup>, Dr. Lily Shapiro<sup>1</sup>, Dr. Andrea LaCroix<sup>3</sup>, Dr. Susan M. McCurry<sup>2</sup>, Dr. Pamela Shaw<sup>1</sup>, Dr. Dori Rosenberg<sup>1</sup>

<sup>1</sup>Kaiser Permanente Washington Health Research Institute, Seattle, USA, <sup>2</sup>University of Washington, Seattle, USA, <sup>3</sup>University of California, San Diego, La Jolla, USA

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** Changes in sleep and physical activity and worsened depressive symptoms were observed in older adult populations during early stages of the COVID-19 pandemic. Quantifying these changes as the pandemic progressed and understanding behavioral predictors of increases in depressive symptoms following major stressor events like the pandemic onset could inform future intervention and public health responses.

**Methods:** We used data from older adults in the Adult Changes in Thought study collected at pre-pandemic study visits (2016-February 2020) and a one-time survey approximately 1 year into the pandemic period (April-July 2021) to characterize activity and sleep behaviors (daily total sitting; TV and computer time; days/week briskly walking; sleep disturbance) and depressive symptoms (N=896). We subtracted pre-pandemic Center for Epidemiological Studies-Depression (CES-D) 10-item scale scores from pandemic scores to calculate CES-D change. We used paired t-tests to compare levels of pre- and during-pandemic behaviors and used multivariable linear regression to explore potential pre-pandemic predictors of CES-D change score, adjusted for demographics, time between measurements, body mass index, retirement status, difficulty with activities of daily living and pre-pandemic CES-D, social support, and fatigue scores.

**Results:** Mean age pre-pandemic was 77.2 (SD=6.6), with 3.0 years between measurements on average. Participants (89% White, 58% female, 83% retired, mean 17 years education) reported significantly more TV (3.0 vs. 2.6 hours) and computer (2.3 vs. 1.9 hours) time, fewer days briskly walking (0.7 vs. 1.6 days/week), more sleep disturbance (53.4 vs. 46.7 PROMIS t-score), and higher depressive symptoms (5.2 vs. 3.7 CES-D; 20.8% vs. 9.7% CES-D score  $\geq 10$ ) in pandemic vs. pre-pandemic comparisons ( $p < 0.0001$ ). Higher pre-pandemic sleep disturbance and computer time were associated with larger increases in CES-D ( $B = 0.07$  [0.03, 0.11] and  $B = 0.20$  [0.01, 0.38], respectively) and higher fatigue was associated with larger decreases in CES-D ( $B = -0.08$  [-0.10, -0.06]). No associations with pre-pandemic total sitting, TV, or brisk walking time were observed.

**Conclusions:** Findings suggest prior better sleep quality and less sedentary computer time may be associated with less worsening in depressive symptoms from stressor events, like pandemics, but that physical activity and TV time may not. Future research on these relationships with objective measures is warranted.

# Examining Exercise Motivation and Physical Activity Patterns Among Users and Non-Users of Wrist-Worn Wearable Activity Trackers

**Ms. Rebecca Coulter<sup>1</sup>**, Dr. Sam Liu<sup>1</sup>, Dr. Kayla Nuss<sup>2</sup>

<sup>1</sup>University of Victoria, Victoria, Canada, <sup>2</sup>Klein Buendel Institute, Denver, USA

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Physical activity (PA) is crucial for good health, however, meeting the Canadian PA guidelines (>150 minutes of weekly moderate-to-vigorous PA) remains a challenge. Wrist-worn wearable activity trackers (WATs) have quickly grown in popularity and these devices are often marketed as a potential tool to improve PA. However, it is unclear whether owning a WAT increases adherence to PA guidelines and if differences in exercise motivation and WAT use are associated with MVPA. The objectives of this study were to 1) identify the proportion of individuals meeting PA guidelines among WAT users compared to non-users, and 2) examine whether exercise motivation, WAT use and demographic characteristics predict MVPA.

**Methods:** Canadian adults aged 18+ years were recruited (February – November 2022) to participate in this cross-sectional study. Participants completed an online questionnaire that measured exercise motivation (BREQ-3), WAT use (i.e., current user vs non-user) and demographic information (i.e., age, sex, employment status). Chi-squared test was used to determine differences in the proportion of WAT users and non-users meeting PA guidelines. Multiple linear regression was used to examine associations of exercise motivation, participant demographic characteristics and WAT status on MVPA.

**Results:** 551 participants were included in the study (WAT users, n = 388; Non-users, n = 163; 66% Female). A higher proportion of WAT-users met MVPA guidelines (79.4%) compared to non-users (62.6%;  $\chi^2 = 17.02$ ,  $p < .001$ ). Our regression showed that both intrinsic motivation ( $\beta = 61.2 \pm 23.6$ ,  $p < .01$ ) and integrated regulation ( $\beta = 92.8 \pm 21.8$ ,  $p < .001$ ) were significantly associated with greater minutes of weekly MVPA after controlling for age, sex, and employment status. Using a WAT was associated with a 34-minute increase in weekly MVPA, however the association was not significant ( $p = .21$ ).

**Conclusions:** Results from this study contribute to our understanding of associations between WATs with PA. While a greater proportion of WAT users adhere to guidelines, integrated regulation and intrinsic motivation for exercise remain the strongest predictors of MVPA regardless of WAT status. More research should employ longitudinal designs to further understand the impact of WATs on motivation for exercise over time.

# Understanding Food Insecurity at Residential Liberal Arts Colleges: Roles of Campus Dining Options and Cooking Habits

**Dr. Emily Heying<sup>1</sup>**, Dr. Jonathan Nash<sup>1</sup>

<sup>1</sup>College of Saint Benedict/Saint John's University, Saint Joseph, USA

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** J. Young Adults

**Purpose:** Food insecurity exists among college students, but the reasons why students lack access to food can vary greatly. Many students at residential liberal arts colleges rely on campus dining options for meals. More research investigating how food insecurity manifests at these institutions is needed to design effective campus-wide interventions that students are willing to utilize. The goal of this research was to determine if there were relationships between campus dining participation and collaboration, cooking habits, dietary habits, perceived stress, and food security status.

**Methods:** Participants (n = 532) were undergraduate students at two residential liberal-arts institutions in rural environments. Participants completed an online survey at the beginning and end of the semester. The surveys contained questions about demographics, cooking habits, campus dining participation, meal plans, the perceived stress scale (PSS), and food security status (six-item US Household Food Security Survey Module). Chi-square analyses were used to determine relationships between food security status and other variables.

**Results:** 41% (n = 322) of participants experienced food insecurity within the previous 30 days of survey completion. Perceived stress and number of meals cooked in a residence per week was significantly higher in food insecure participants ( $p < 0.001$ ,  $p = 0.05$ , respectively). Enrollment in the "continuous" meal plan, which provided unlimited access to campus cafeterias, was associated with higher food security than participants on meal plans with a set number of meals per semester or having no meal plan ( $p < 0.001$ ). Students willing to donate a meal punch or campus dining dollars to another student were more likely to be food secure ( $p < 0.001$ ). Daily servings of fruit and vegetable intake did not vary by food security status.

**Conclusions:** Perceived stress, cooking more frequently, and enrollment in smaller meal plans or no meal plan was associated with food insecurity. All three of these factors may be interrelated -- for example, students on smaller meal plans may need to cook more frequently. Better understanding of the association between food insecurity and barriers to accessing campus dining environments or cooking while in college is crucial for creating sustainable interventions.



# Implementation Models and Frameworks Used to Guide Community-Based Physical Activity Programs for Children: A Scoping Review

**Mrs. Emma Ostermeier**<sup>1</sup>, Associate Prof. Shauna Burke<sup>1,2</sup>, Dr. Jason Gilliland<sup>1,2,3</sup>, Dr. Trish Tucker<sup>1,2,3</sup>

<sup>1</sup>Western University, London, Canada, <sup>2</sup>Children's Health Research Institute, London, Canada, <sup>3</sup>Lawson Health Research Institute, London, Canada

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** This scoping review explores the implementation models and frameworks used to develop, explore, and/or evaluate community-based physical activity programs for children. The foundational components of the implementation models and frameworks and practical application in real-world settings are also described. The findings provide context into the strategies used previously by researchers and program developers to support the implementation of physical activity programs at a community level.

**Methods:** The methodological framework developed by Arksey and O'Malley (2005) and the updated recommendations from Levac, Colquhoun and O'Brien (2010) were used to search, identify, and summarize applicable studies. This review also met the requirements in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Scoping Reviews Checklist (PRISMA-ScR). A detailed search of six databases and three academic journals was conducted. The search string included a variety of terms related to physical activity, children, implementation science, and community-based programs. To be eligible for inclusion, the articles had to be peer-reviewed and had to use an implementation model or framework to guide the development, exploration, and/or evaluation of a community-based physical activity intervention for children ages 5 to 12 years. Information about the article, the program, and the implementation model/framework were extracted and summarized.

**Results:** The search retrieved 42,202 articles, of which 27 met the inclusion criteria. Of the identified models and frameworks, eleven guided program development, one explored the barriers and facilitators for program implementation, and two evaluated implementation and physical activity outcomes. Tailoring, situational analysis, and element identification were common components among the identified models and frameworks.

**Conclusions:** As program implementation can affect the success of physical activity initiatives, researchers and program developers should consider using implementation models and frameworks to guide their community-based programs. The included articles were all published in the last ten years, demonstrating the use of implementation models and frameworks in community-based physical activity initiatives is still in its infancy and requires further exploration. Further research examining the application of new and existing implementation models and frameworks in developing, exploring and evaluating community-level programs is warranted.

# Social Engagement during a Sedentary Time Reduction Intervention in Assisted Living

**Ms. Irmína Klicnik**, Dr. Jennifer Copeland, Dr. Shilpa Dogra

<sup>1</sup>Ontario Tech University, Oshawa, Canada

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** To determine whether a sedentary time reduction intervention conducted with older adults residing in an assisted living setting would lead to changes in social engagement.

**Methods:** A pre-post intervention, mixed-methods design was used. Data were collected at the beginning and end of a 12-week intervention aimed at increasing standing breaks and reducing sedentary time in three assisted living facilities across Canada (Alberta, Ontario, New Brunswick). Environmental cues such as posters, table cards, and floor stickers were implemented to encourage standing breaks. Participants (n=43, 80.6% female) were given the Keele Assessment of Participation Questionnaire (KAP) before and after the 12-week intervention to assess their social participation across 7 domains. Participants were also invited to focus group discussions after the conclusion of the intervention to gather more insight into the effects of the intervention. Focus groups were transcribed verbatim, and thematic analysis was performed.

**Results:** Analysis of the KAP indicated no statistical changes in participation across any domain from pre-intervention to post-intervention. Several key themes emerged from thematic content analysis of focus group discussions, including sense of belonging, enjoyment, and staff interaction. Across all three provinces, participants endorsed the importance of social interaction and participation, but were clear that their personal choice to participate was of utmost importance. In one facility, residents initially stated that intervention did not increase their social participation, but later acknowledged the sense of belonging they gained from participating in the program. Some residents also suggested that despite the presence of the environmental cues, there are some institutional barriers within the residence which preclude social participation.

**Conclusion:** In conclusion, a sedentary time reduction intervention may not significantly affect social engagement across all older adults. The lack of significance may be due to the highly social nature of congregate living in assisted living facilities where older adults eat their meals together in a dining room, and are able to participate in several recreation activities planned by staff. Enjoyment related to the sedentary time reduction intervention indicates that social engagement may be critical for reducing sitting time among older residents in assisted living.

# Associations of Neighbourhood Greenness and Walkability with Social Participation among Older Canadians: An Analysis of the CLSA

**Ms. Irmna Klicnik**, Mx. Andrew Putman, Dr. Shilpa Dogra

<sup>1</sup>Ontario Tech University, Oshawa, Canada

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** To explore associations of neighborhood characteristics (greenness and walkability), physical activity, and social participation at two time periods.

**Methods:** This is a population-based prospective cohort study of cross-sectional baseline data from the Canadian Longitudinal Study on Aging (CLSA), with a follow-up period at 3 years. The CLSA is a nationally representative, stratified random sample of Canadian men and women, aged 45-85 years at baseline (2011-2015, n=51388). Data on different aspects of social participation (e.g., positive social interaction, and desire to participate in more activity) *at follow-up* were used as outcomes. The CLSA baseline database was linked with the Canadian Active Living Environments, a measure of walkability, and Normalized Difference Vegetation Index, a measure of greenness. Physical activity was measured using the Physical Activity Scale for Elderly. Walkability, greenness, and total physical activity from baseline were used as exposure variables.

**Results:** The primary associations of interest and assessment of interactions will be analyzed using linear and ordinal logistic regression modeling with the models being adjusted for age, sex, education, and household income. The analytic sample consists of 50.0% females (n=16,735, age 72.9±5.6 years). At follow-up, 33.4% (n=5,637) participants reported desiring more social interactions and 34.7% (n=5,811) participants scored the maximum possible value (100) on the Medical Outcomes Study measure of positive social interactions. We will examine the relationships between older Canadians' neighbourhood environment, total physical activity, and social participation to gain a better understanding of how these factors influence one another and provide insight into the design of age-friendly environments.

**Conclusion:** The goal of this study is to inform future work on how external factors such as the natural and built environments can facilitate or hinder social participation among older adults.

# Preliminary effects of a carbohydrate-restricted, high-fat diet in head and neck cancer patients undergoing radiotherapy: A pilot randomized controlled trial

**Ms. Hania Taha (corresponding author)**<sup>1,2</sup>, Assistant Professor Hannah Holscher<sup>1</sup>, Dr. Fadi Atrash<sup>2</sup>, Dr. Alexander Slade<sup>3</sup>, Associate Professor Yuan-Xiang Pan<sup>1</sup>, Dr. Salem Billan<sup>2</sup>, Assistant Professor Anna Arthur (corresponding author)<sup>1,4</sup>

<sup>1</sup>University of Illinois at Urbana-Champaign, Champaign, USA, <sup>2</sup>Augusta Victoria Hospital, East Jerusalem, Palestine, State of, <sup>3</sup>Stony Brook University School of Medicine, Stony Brook, USA, <sup>4</sup>University of Kansas Medical Center, Kansas City, USA

**Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM**

**SIG - Primary Choice:** C. Cancer prevention and management

**Purpose:** Our previous observational studies showed that a self-reported diet of < 50% carbohydrates and ≥ 23% unsaturated fats is associated with positive outcomes in head and neck cancer (HNC) patients. The purpose of this single-blinded randomized controlled trial (RCT) is to test the preliminary effects of implementing a carbohydrate-restricted, high-fat (CRHF) diet in HNC patients undergoing definitive radiotherapy (RT).

**Methods:** From January 2020 to August 2021, thirteen newly-diagnosed HNC patients that planned to receive RT at Augusta Victoria Hospital in Palestine, were enrolled and randomized to one of two arms—a CRHF arm (N=6) who received ~30% carbohydrates, ~45% fats, and ~25% proteins or a standard diet (SD) arm (N=7). Three meals per day were provided to all participants for 2-weeks before RT and 6-7 weeks during RT, with adequate calories estimated for weight maintenance. The per-protocol analysis included (N=4) participants in the CRHF arm and (N=5) participants in the SD arm. Outcomes were nutritional status (assessed by patient-generated subjective global assessment (PG-SGA)), body composition (assessed by fat-mass (FM) and lean body mass (LBM)), nutrition impact symptoms (NIS), and tumor progression, and were assessed at baseline, 2-weeks (before RT), and 1.5-2 months post-RT.

**Results:** Both arms showed improvements in PG-SGA score at 2-weeks. Post RT, a non-significant, but greater percent weight loss was observed in the CRHF arm compared to the SD arm. Conversely, the CRHF arm maintained more LBM and lost more FM than the SD arm. The most common NIS were taste deterioration and pain for the CRHF arm, and dry mouth, early satiety, fatigue, pain, and loss of appetite for the SD arm. There was one recurrence in the CRHF arm and one mortality in the SD arm.

**Conclusion:** This pilot RCT shows that dietary intervention may improve the PG-SGA score before RT. There were fewer NIS observed in the CRHF arm. The CRHF had greater FM loss but better LBM maintenance than the SD arm. These preliminary results can be used to develop a larger sample size, with more statistical power to test the efficacy of implementing a CRHF diet on HNC outcomes.

# Exploring factors associated with sedentary behaviour pre, during, and post covid-related restrictions in UK university students: A pooled cross-sectional analysis

**Mr. Matthew Savage**<sup>1</sup>, Dr. Ruth James<sup>1</sup>, Dr. Philip Hennis<sup>1</sup>, Dr. Daniele Magistro<sup>1</sup>, Dr. Kirsty Hunter<sup>1</sup>, Dr. James Donaldson<sup>1</sup>, Dr. Laura Healy<sup>1</sup>

<sup>1</sup>Nottingham Trent University, Nottingham, United Kingdom

Chaired Poster Session, June 14, 2023, 5:30 PM - 6:45 PM

**SIG - Primary Choice:** J. Young Adults

**Purpose:** University students undertake prolonged periods of habitual sedentary behaviour which can adversely affect future health. This issue was exacerbated further by the onset of restrictions to freedom of movement due to the COVID-19 pandemic in March 2020. However, in July 2021 the UK government reopened all sectors of the economy and limits on social contact were largely abolished, leading to a contextual shift towards pre-pandemic societal norms. Despite this, little is known about how sedentary behaviour in university students has been influenced since the removal of covid-related restrictions. The aim of this study is therefore to explore correlates of sedentary behaviour across four academic years from October 2019 (pre-pandemic) to October 2022 (15-months following the removal of covid-related restrictions) in UK university students.

**Methods:** This study used an online self-report survey to obtain sociodemographic information and to quantify levels of mental wellbeing (MWB), perceived stress (PS), moderate to vigorous physical activity (MVPA), body mass index (BMI), and sedentary behaviour (SB) in four cohorts of university students from prior to the pandemic (October 2019) to 15-months following the removal of COVID-related restrictions (October 2022) in UK university students ( $n=7,100$ ). A pooled cross-sectional analysis was used to explore the relationships between sedentary behaviour and other lifestyle factors over time.

**Results:** The regression model was statistically significant ( $R^2 = .27$ ,  $F(1, 7) = 382.21$ ,  $P < .001$ ). MWB and MVPA were positively related to SB ( $P < .001$  &  $P = 0.01$ ) whereas PS and BMI were negatively related to SB ( $P < .001$ ). Compared to 2019, SB was higher in 2020 and 2022 ( $P < .001$ ) but was not different in 2021 ( $P = 0.03$ ).

**Conclusion:** These findings demonstrate that behavioural and psychological correlates of sedentary behaviour remain constant across four years despite substantial changes in sedentary behaviour due to the COVID-19 pandemic. Importantly, the implementation of COVID related restrictions led to an increase in sedentary behaviour beyond pre-pandemic levels that still remains despite a contextual shift towards pre-pandemic society. As such, universities and policy makers should make a concerted effort to explore methods of reducing sedentary behaviour to develop an environment in which students' health can thrive.



# ORAL PRESENTATIONS

## Examining associations between mothers' and fathers' food skills and children's diet quality: A Structural Equation Modelling approach

**Mr. Amar Laila**<sup>1</sup>, Dr. Maude Perreault<sup>2</sup>, Mr. Adam Sadowski<sup>1</sup>, Dr. Scott Maitland<sup>1</sup>, Dr. David Ma<sup>1</sup>, Dr. Jess Haines<sup>1</sup>

<sup>1</sup>University of Guelph, Guelph, Canada, <sup>2</sup>Université de Montréal, Montréal, Canada

**O.1.01 - How parents and carers behaviors are linked to children behaviors and health, UKK - Main Hall (Level 6), June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Parents have substantial influence on young children's dietary intake. Parental food skills may be associated with the healthfulness of food provided in the home, which could influence children's diet quality. However, a paucity of research has examined the association between parental food skills and children's diet quality or compared how this association may differ between mothers and fathers.

**Methods:** A Structural Equation Modelling (SEM) approach was used to build a measurement model representing food skills of mothers ( $n = 202$ ) and fathers ( $n = 116$ ) participating in the Guelph Family Health Study, a randomized trial of an obesity-prevention intervention among Canadian families ( $n = 169$ ) with children aged 1.5-5 years. Measurement invariance followed by latent mean analysis was conducted between mothers and fathers, separately. Structural regression analysis was then conducted to assess the association between parental food skills and child diet quality (assessed via the parent-reported Healthy Eating Index) and whether this association was mediated by parent-reported healthfulness of dinner.

**Results:** Results indicated partial scalar invariance between mothers and fathers. Latent mean analyses showed that fathers' ability to plan meals and adjust recipes was significantly lower than mothers ( $M = -0.16$ ,  $p = 0.04$ ). Structural regression showed that the ability to plan meals and adjust recipes among fathers was associated with healthfulness of dinner ( $\beta = 0.59$ ,  $p = 0.009$ ). However, neither mothers' nor fathers' food skills were associated with parent-reported children's Healthy Eating Index.

**Conclusions:** These results highlight the utility of an SEM approach and the importance of including fathers to understand how parental food skills are associated with food provision.

# Carer perspectives on overweight, obesity and dental caries in early childhood to inform a feeding behaviour intervention: findings from a systematic qualitative review

**Ms. Heilok Cheng**<sup>1,3</sup>, Prof. Louise Baur<sup>1,3</sup>, Associate Professor Amit Arora<sup>2</sup>, Prof. Elizabeth Denney-Wilson<sup>1,3</sup>  
<sup>1</sup>The University of Sydney, Sydney, Australia, <sup>2</sup>Western Sydney University, Sydney, Australia, <sup>3</sup>The Centre of Research Excellence in Translating Early Prevention of Obesity in Childhood, Sydney, Australia

**O.1.01 - How parents and carers behaviors are linked to children behaviors and health, UKK - Main Hall (Level 6), June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Overweight, obesity and early childhood caries (ECC) share overlapping etiologies through bottle and formula feeding. Feeding behaviours, which include feeding to settle crying; overfeeding, via feeding until bottle emptying and exceeding infant satiety; and the addition of cariogenic carbohydrate foods to bottles, can cause overnutrition and continual exposure of teeth to sugar. Carer beliefs may be barriers to uptake of best-practice feeding messages. Creating targeted messages on best-practice formula and bottle feeding, and bottle transition to cups, may be more effective and engaging. This systematic qualitative review aimed to identify carer perspectives on overweight, obesity and ECC in infants and young children.

**Methods:** Databases CINAHL, Medline and EMBASE, were searched in August 2021, for original qualitative research, involving caregivers of infants and children aged 0-6 years, diagnosed with, or at increased risk of, child overweight, obesity or ECC. Studies were coded in NVivo, informed by the COM-B framework. Themes were generated inductively using thematic analysis. Critical appraisal was undertaken using the CASP Qualitative Checklist.

**Results:** 92 studies were identified: 49 on overweight/obesity, 43 on ECC. All studies, except one with Photovoice, used focus groups and interviews. Themes focused on how caregivers: perceived children's wellness; identified unhealthy weight or teeth; and felt resourced for supporting children's healthy weight and teeth. Beliefs that may be barriers to behaviour change include: large body size, good feeding and activity as better indicators of weight and health, instead of growth charts; baby teeth being unimportant, compared to adult teeth; obesogenic and cariogenic foods as supporting dietary diversity; and the role of food in discipline and responding to perceived hunger and satiety signals. CASP appraisal indicated, in general, high quality research conduct; however, 67 studies did not report on researcher reflexivity and/or potential researcher bias in research conduct.

**Conclusion:** Findings indicate caregivers prioritise wellness and value health promotion, but may only respond reactively once adverse symptoms of overweight/obesity or ECC occur. Understanding how caregivers value weight, dental health and feeding can help tailor intervention strategies. Using behaviour change theory, this can address priorities for child health and support uptake of obesity and ECC prevention messages.

# Latent profiles of eating behaviours in childhood and their association with temperament, parenting and food insecurity

**Dr. Abigail Pickard<sup>1</sup>**, Dr. Helen Croker<sup>5</sup>, Prof. Claire Farrow<sup>1</sup>, Dr. Moritz Herle<sup>4</sup>, Prof. Emma Haycraft<sup>3</sup>, Dr. Alice Kinninmonth<sup>2</sup>, Associate Professor Clare Llewellyn<sup>2</sup>, Prof. Jacqueline Blissett<sup>1</sup>  
<sup>1</sup>Aston University, Birmingham, United Kingdom, <sup>2</sup>University College London, London, United Kingdom, <sup>3</sup>Loughborough University, Loughborough, United Kingdom, <sup>4</sup>King's College London, London, United Kingdom, <sup>5</sup>World Cancer Research Fund International, London, United Kingdom

**O.1.01 - How parents and carers behaviors are linked to children behaviors and health, UKK - Main Hall (Level 6), June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Previous research has evidenced that from infancy onward, genetic influences on weight are partly mediated by appetite avidity, expressed as food approach behaviours. The primary aim of this research was to identify a comprehensive eating behaviour profile reflecting high food approach (avid eating) in children between 3-5 years. The secondary aim was to understand how factors such as child temperament, the experience of food insecurity, or parental feeding practices, may vary in that profile.

**Methods:** An online survey was conducted with 995 parents/carers living in England and Wales. Participants reported on their child's eating behaviour using the Child Eating Behaviour Questionnaire (CEBQ), as well as completing measures of child temperament (VSF-CBQ), household food security (HFSS) and parental feeding practices (CFPQ). Latent Profile Analysis (LPA) was carried out to identify distinct eating profiles amongst the children (36-72 months, mean age = 48.8 months, 52% female).

**Results:** Four eating profiles emerged from the sample of children: (a) *avid eating*, (b) *fussy eating*, (c) *happy eating*, and (d) *typical eating*. *Avid eating* (21.9% of children) was characterised by higher levels of food responsiveness, enjoyment of food, and emotional over-eating in combination with lower satiety responsiveness, slowness in eating, and food fussiness. Children in the *avid eating* profile were recipients of parental feeding practices linked with increased risk of adiposity in later childhood, namely food use for emotional regulation and food restriction for weight control. Children with an *avid eating* profile were reported to be more surgent and experienced greater food insecurity than all other eating profiles.

**Conclusions:** This work provides novel evidence that avid eating is a distinct, multi-dimensional and emotionally charged eating profile observable in children as young as 3 years old and which is systematically related to more surgent child temperament and more non-nutritive parental feeding practices such as restriction and the use of food for emotion regulation. The results demonstrate the importance of tailoring preventative and intervention methods to both the child's environment and temperament to promote healthier eating habits.

# Parental feeding practices and appetite in toddlerhood and early childhood: a discordant twin analysis of the Gemini cohort

**Dr. Alice Kininmonth<sup>1</sup>**, Dr. Moritz Herle<sup>2</sup>, Miss Kristiane Tommerup<sup>1</sup>, Prof. Emma Haycraft<sup>3</sup>, Dr. Claire Farrow<sup>4</sup>, Dr. Helen Croker<sup>5</sup>, Dr. Abigail Pickard<sup>4</sup>, Dr. Katie Edwards<sup>4</sup>, Prof. Jacqueline Blissett<sup>4</sup>, Dr. Clare Llewellyn<sup>1</sup>

<sup>1</sup>University College London, London, United Kingdom, <sup>2</sup>Kings College London, London, United Kingdom,

<sup>3</sup>Loughborough University, Loughborough, United Kingdom, <sup>4</sup>Aston University, Birmingham, United Kingdom,

<sup>5</sup>World Cancer Research Fund, London, United Kingdom

**O.1.01 - How parents and carers behaviors are linked to children behaviors and health, UKK - Main Hall (Level 6), June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** To test the hypothesis that parents develop their feeding practices partly in response to their child's individual appetite, using a discordant twin design. We hypothesised that parents would use more nonresponsive feeding practices such as restriction, emotional feeding and instrumental feeding with their twin who expresses a more avid appetite (e.g., more food responsive and less satiety responsive) and parents will use more pressuring feeding practices with their twin who expresses a less avid appetite (e.g., less food responsive, more satiety responsive, fussier eating).

**Methods:** Participants were from the Gemini study, a longitudinal cohort of twins born in England and Wales in 2007. Psychometric measures of parental feeding practices (PFPs) and child appetite were completed by parents when their twins were 15-months and 5-years. We identified twins who were discordant for PFPs (n=14-357) and used Paired Samples T-tests to explore the direction and magnitude of differences in appetite between twin pairs.

**Results:** As hypothesised, parents used more pressure with twins expressing less food responsiveness, lower enjoyment of food, lower emotional overeating, higher satiety responsiveness, slower eating speed, and greater fussiness at 15-months and 5-years (p-values<0.001; d=0.28-0.95). Parents used more instrumental feeding with twins expressing lower food enjoyment, higher satiety responsiveness, slower eating speed, and greater fussiness at 15-months and 5-years (p-values<0.05; d=0.25-0.65). Parents exerted greater restriction on twins who expressed a more avid appetite, characterised by greater food responsiveness, higher food enjoyment, lower satiety responsiveness, quicker eating speed, less fussiness – at 15-months and 5-years (all p-values<0.05; d=0.29-0.89). Parents also used more emotional feeding and exerted more control over meals/snacks with their twin who expressed a more avid appetite, but findings were not consistent across timepoints. No differences in appetite were observed for twins who were encouraged to eat healthy foods to differing extents.

**Conclusion:** Parents who fed their twins differently appear to be, in part, responding to differences in appetite expressed by their children. These findings could be used to guide the development of an intervention to provide support for parents around appropriate ways to feed their children to support the development of healthy eating behaviours.

# The Relationship between Neighborhood Environment and Children's Physical Activity and the Mediating Role of Parental Perception of Child Friendliness

**Ms. Xiaoli Gong#1<sup>1</sup>**, Assistant Professor Pauline E.W. van den Berg#2<sup>1</sup>, Prof. Theo A. Arentze#3<sup>1</sup>

<sup>1</sup>Eindhoven University of Technology (TU/e), Eindhoven, Netherlands

**O.1.01 - How parents and carers behaviors are linked to children behaviors and health, UKK - Main Hall (Level 6), June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** During the last decades, the level of children's physical activity is in decline. To develop effective interventions for children, insight in the correlates of physical activity and the possible mediating factors is necessary. Besides, parents are important gatekeepers and decision references for their children's physical activity. Some studies have considered parental perceived safety, while parental perceptions of child friendliness on neighborhoods as a whole have been ignored. Furthermore, we consider children's physical activity in more detail by differentiating into three types: active travel, organized sports and outdoor play. Therefore, this study aimed to examine the potential mediating effect of parental perception of child friendliness on the associations between household, physical and social environment characteristics and children's three types of physical activities: active travel, organized sports and outdoor play.

**Methods:** In order to study these relationships, survey data were collected using a large national sample of parents with children (7–12 years old) in the Netherlands. Geographic Information System (GIS) was used to objectively measure the physical environment variables of the neighborhood of each participant, and enriched with data from Dutch Central Bureau of Statistics (CBS). A TwoStep cluster analysis was conducted to identify the natural groupings of respondents' living neighborhood environment based on physical environment variables. Structural equation modelling (SEM) was used to test the mediating role of parental perception of child friendliness on the relationships between household, physical and social environment characteristics and children's three types of physical activities.

**Results:** The paper will present the results of the TwoStep cluster analysis and structural equation modelling (SEM). The results will show different groups of physical environments based on the TwoStep cluster analysis, what characteristics influence parental perception of child friendliness and children's three types of physical activities, and whether parental perception of child friendliness has a mediating role between household, environment characteristics and children's physical activity.

**Conclusion:** These insights can be used by policy makers from different sectors to create more child-friendly neighborhoods, which in turn will improve children's physical activity, health and wellbeing.



# Prospective associations of parent feeding behaviors with early childhood appetitive traits

**Dr. Tonja Nansel<sup>1</sup>**, Dr. Leah Lipsky<sup>1</sup>, Dr. Kyle Burger<sup>2</sup>, Dr. Jenna Cummings<sup>1</sup>, Dr. Myles Faith<sup>3</sup>

<sup>1</sup>National Institute of Child Health and Human Development, Bethesda, USA, <sup>2</sup>University of North Carolina Chapel Hill, Chapel Hill, USA, <sup>3</sup>University at Buffalo - SUNY, Buffalo, USA

**O.1.01 - How parents and carers behaviors are linked to children behaviors and health, UKK - Main Hall (Level 6), June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Child appetitive traits, eating styles that reflect responsiveness to external influences and internal hunger and satiety signals, are associated with eating behaviors and susceptibility to excess weight gain. However, little is known about early life influences on child appetitive traits. This study investigated relations of early life maternal feeding behaviors with child appetitive traits at age 3.5 years.

**Methods:** Participants of the Pregnancy Eating Attributes Study (PEAS) and follow-up Sprouts study were enrolled in early pregnancy and followed prospectively. This analysis includes data collected from baseline through child age 3.5-years (n=160). Child appetitive traits at age 3.5 years were measured using the Child Eating Behavior Questionnaire. Maternal feeding to soothe was assessed with the Food to Soothe Questionnaire at child age 3, 6, and 12 months. Maternal permissive feeding was assessed with the Infant Feeding Style Questionnaire at child age 2 years. Multiple linear regressions estimated relations of maternal feeding behaviors with child appetitive traits (food responsiveness, satiety responsiveness, enjoyment of food, emotional overeating, emotional undereating, desire to drink, slowness in eating, food fussiness) at age 3.5 years, controlling for maternal age, education, family income-poverty ratio, and breastfeeding duration.

**Results:** Maternal feeding to soothe at 6 and 12 months was positively associated with permissive feeding at 2 years ( $r=0.39$  and  $0.37$ , respectively,  $p<0.001$ ). Greater maternal feeding to soothe at 12 months was associated with greater child emotional overeating ( $\beta=0.21\pm0.06$ ,  $p=0.002$ ), emotional undereating ( $\beta=0.49\pm0.10$ ,  $p<0.001$ ), and desire to drink ( $\beta=0.25\pm0.11$ ,  $p=0.03$ ); more permissive feeding at 2 years was associated with greater child emotional undereating ( $\beta=0.35\pm0.14$ ,  $p=0.02$ ) and desire to drink ( $\beta=0.36\pm0.15$ ,  $p=0.03$ ) at 3.5 years. Maternal feeding behaviors were not significantly associated with other appetitive traits.

**Conclusions:** Associations of emotional eating with parent feeding behaviors is consistent with previous literature suggesting a stronger environmental influence on emotional eating, while the absence of associations with food responsiveness and satiety responsiveness are consistent with a relatively stronger genetic influence on these traits.

# Associations between area deprivation and changes in the digital food environment during the COVID-19 pandemic: longitudinal analysis of three online food delivery platforms

**Ms. Alexandra Kalbus**<sup>1</sup>, Prof. Andrea Ballatore<sup>2</sup>, Dr. Laura Cornelsen<sup>1</sup>, Mr. Robert Greener<sup>1</sup>, Prof. Steven Cummins<sup>1</sup>

<sup>1</sup>London School of Hygiene & Tropical Medicine, London, United Kingdom, <sup>2</sup>King's College London, London, United Kingdom

**O.1.02 - Evidence-based approaches for the promotion of healthy foods, UKK - Level 6 Foyer, June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Foods prepared away from home are typically energy-dense and nutrient-poor and contribute to health inequalities relating to overweight and obesity. The COVID-19 pandemic has changed the way people interact with the out-of-home food environment, accelerating the transition to use of online food delivery services. It is unknown if these changes affect households equally or exacerbate social and spatial inequalities in exposure to unhealthy food environments. In this study we explore whether neighbourhood deprivation is associated with (1) greater exposure to online food delivery services, and (2) changes in access to these services during the COVID-19 pandemic.

**Methods:** Data on food outlets delivering to 661 postcode districts in Greater London and the North of England were obtained for April 2020 and May 2021 from three online delivery platforms. Using machine learning, food outlet data were merged and cross-platform and duplicates were removed. Relationships between area deprivation and change in the total number of delivering outlets over time were assessed using a multilevel regression model. Linear regression was used to model absolute and relative change in the count of outlets during the pandemic. Models were adjusted for area and demographic characteristics.

**Results:** The median number of food outlets delivering to postcode districts increased by 132% between 2020 and 2021. The association between area deprivation and the overall exposure to online food delivery services was moderated by region, with evidence of a positive relationship between number of outlets and deprivation in the North of England, but a negative relationship in London. There was no association between area deprivation and growth of online food delivery services.

**Conclusions:** While inequalities in the exposure to online food delivery services exist, these have not been exacerbated during the COVID-19 pandemic. Findings suggest that the direction and magnitude of associations between neighbourhood deprivation and exposure to the digital food environment vary geographically. Hence, policies targeting the digital food environment may need to consider this heterogeneity and tailor to the local context.

# Revising a home food inventory scale to increase utility and assess sodium and ultraprocessed foods

**Dr. Leslie Lytle<sup>1</sup>**, Dr. Melissa Laska<sup>1</sup>, Ms. Sarah Friend<sup>1</sup>, Dr. Mary Hearst<sup>1</sup>, Mr. Nicholas Marka<sup>1</sup>, Dr. Jayne Fulkerson<sup>1</sup>

<sup>1</sup>University of Minnesota, Minneapolis, USA

**O.1.02 - Evidence-based approaches for the promotion of healthy foods, UKK - Level 6 Foyer, June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** The Home Food Inventory (HFI) is a validated tool assessing the obesogenicity and healthfulness of foods available in the home (Fulkerson et al, 2008). To expand the tool's utility, methodological research is underway to shorten the tool, evaluate its ability to rank home food environments by the presence of high sodium and ultraprocessed foods, and assess construct validity with comparisons to dietary intake.

**Methods:** A scale reduction approach recommended by Stanton et al (2002) was employed using a secondary data set that included dietary recall data from children (ages 7-12 years), food frequency data from parents, and data on home food availability using the HFI (n=342). Elimination of specific foods within an HFI food category (such as a dairy or protein category) was determined by evaluating the frequency of each item identified across homes and by comparing the association of each food item with nutrient intake. The creation of scores to rank homes on the presence of high sodium and ultraprocessed foods (using the Nova system) occurred by aggregating HFI food items based on sodium content or identification as an ultraprocessed food; those scores were then evaluated for associations with dietary sodium and energy intake to assess construct validity.

**Results:** Using Stanton's approach, the number of food items in the revised HFI was reduced by 23%. A total of 63 high sodium food items (sodium above 5% of daily values) were aggregated to form an HFI high sodium score; the Spearman correlation between the HFI sodium score and sodium intake based on dietary intake data from children and parents was 0.176 and 0.187 ( $p < 0.001$ ), respectively. A total of 86 food items were aggregated to form an ultraprocessed score; the Spearman correlation between the score and child and parent energy intake was 0.15 and 0.16 ( $p < 0.001$ ), respectively.

**Conclusions:** Creating valid tools to assess environmental contributions to disease risk is important from an epidemiologic as well as an intervention evaluation perspective. Enhanced utility of such tools will be demonstrated by reducing the time required to complete the tools and by increasing the tool's ability to assess multiple chronic-disease related risk factors.

# Examining differences in children and adolescents' exposure to food and beverage marketing in Canada by sociodemographic characteristics: findings from the International Food Policy Study Youth survey, 2020

Dr. Rachel Acton<sup>1,2</sup>, Ms. Mariangela Bagnato<sup>3</sup>, Ms. Lauren Remedios<sup>3</sup>, Dr. Monique Potvin Kent<sup>3</sup>, **Dr. Lana Vanderlee**<sup>4</sup>, Mrs. Christine M White<sup>1</sup>, Dr. David Hammond<sup>1</sup>

<sup>1</sup>University of Waterloo, Waterloo, Canada, <sup>2</sup>Health Canada, Ottawa, Canada, <sup>3</sup>University of Ottawa, Ottawa, Canada, <sup>4</sup>Université Laval, Québec, Canada

**O.1.02 - Evidence-based approaches for the promotion of healthy foods, UKK - Level 6 Foyer, June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Marketing is a known determinant of dietary intake among youth, and many countries, including Canada, are considering regulations to restrict food and beverage marketing to children. However, little evidence is available outside of the US on how marketing exposure differs across sociodemographic subgroups. This study aimed to investigate potential associations between sociodemographic characteristics and exposure to food and beverage marketing in Canada among children and adolescents.

**Methods:** Data were from the 2020 International Food Policy Study Youth survey. Participants (n=3,780) in Canada aged 10-17 years self-reported exposure to food and beverage marketing across different food categories, settings, and marketing techniques. Logistic regression models tested relationships between sociodemographic characteristics (age, sex, ethnicity, income adequacy) and measures of marketing exposure.

**Results:** The results identified meaningful differences in marketing exposure among youth of different age, sex, ethnicity and income adequacy groups in Canada. Among other differences identified, 13-17 year-olds were more likely than 10-12 year-olds to report seeing unhealthy food marketing online in the last 30 days (41% vs 31%, OR 1.61, p<0.001). Girls were more likely than boys to see such marketing online (40% vs 35%, OR 1.21, p=0.009) and in retail settings (33% vs 26%, OR 1.40, p<0.001), while boys were more likely to see unhealthy food and beverage marketing in video games (15% vs 10%, OR 1.59, p<0.001). Minority ethnicities, including Indigenous youth, tended to report higher exposure to unhealthy food and beverage marketing than White respondents, with the exception of East/Southeast Asian respondents, who tended to report lower exposure than White youth. Similarly, respondents with lower income adequacy generally reported higher exposure than those with higher income adequacy.

**Conclusions:** This study highlights important differences in marketing exposure among youth of different sociodemographic groups in Canada, including greater exposure to marketing among those most disadvantaged. In particular, this is the first study to examine food and beverage marketing among Indigenous children and adolescents in Canada, who reported significantly greater exposure to unhealthy food and beverage marketing than White youth. The results emphasize the essential need to consider food marketing across equity groups when developing restrictions on marketing to kids.

# Assessing the prevalence and nutritional quality of Canadian packaged food and beverage products that would be required to display a FOP symbol using Food Label Information and Price (FLIP) 2020 data

**Ms. Jennifer Lee<sup>1</sup>**, Dr. Christine Mulligan<sup>1</sup>, Ms. Nadia Flexner<sup>1</sup>, Ms. Hayun Jeong<sup>1</sup>, Dr. Mavra Ahmed<sup>1</sup>, Dr. Guanlan Hu<sup>1</sup>, Dr. Mary L'Abbe<sup>1</sup>

<sup>1</sup>University of Toronto, Toronto, Canada

**O.1.02 - Evidence-based approaches for the promotion of healthy foods, UKK - Level 6 Foyer, June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** In July 2022, Canada finalized its front-of-pack (FOP) labelling regulations that mandate pre-packaged foods meeting and/or exceeding thresholds for nutrients-of-concern (i.e., saturated fat, sugars, sodium) display a 'high-in' FOP nutrition symbol. However, limited research on its potential impact on the food supply system is available. Therefore, the objective was to examine the prevalence and nutritional quality of Canadian packaged food and beverage products that would be required to display a FOP symbol.

**Methods:** Using a nationally representative, branded food composition database, Food Label Information and Price (FLIP) 2020, packaged food and beverage products (n=20,458 products with unique universal product code) were assessed and categorized according to FOP labelling regulations. The prevalence of foods that would display a FOP symbol, and their nutritional quality, determined by the Food Standards Australia New Zealand (FSANZ) nutrient profiling model was evaluated overall and by food category.

**Results:** According to Canadian FOP labelling regulations, approximately 55% of products (n=11,406) would display a FOP symbol, with the majority of products displaying a FOP symbol for 1 nutrient (n=7,623; 67%). The categories with the highest proportion of foods that would display a FOP symbol were Soups (94%), Dessert Toppings (91%), and Desserts (86%). Overall, products that would display a FOP symbol had higher FSANZ scores (i.e., were 'less healthy') than products that would not display a FOP symbol (means±SD: 10.0±8.9 vs. 4.1±11.5). Although most food categories showed a similar trend, Dairy products & alternatives (6.2±8.7 vs. 13.5±14.1) and Oils and fats (22.2±8.6 vs. 17.9±4.4) showed an opposite trend, where products that would display a FOP symbol showed lower FSANZ scores (i.e., were 'more healthy') than those that would not display a FOP symbol.

**Conclusions:** With a high prevalence of foods that would display a FOP symbol according to Canada's FOP labelling regulations, the regulations have the potential to help consumers identify "less healthy" products and for manufacturers to reformulate products to avoid displaying a FOP symbol. Thus, a comprehensive monitoring and evaluation plan is needed to examine pre-post implementation of the regulations in 2026; and these data can serve as a baseline for such an analysis.



# Food reformulation before the implementation of the front-of-package nutrition labeling in Brazil

**Dr. Ana Clara Duran**<sup>1,2</sup>, Ms. Mariana Fagundes Grilo<sup>3</sup>, Mr. Thiago A Pastorelli Rodrigues<sup>4</sup>, Associate Professor Paula Carvalho Pereda<sup>2,4</sup>

<sup>1</sup>Center for Food Studies and Research, University of Campinas, Campinas, Brazil, <sup>2</sup>Center for Epidemiological Studies in Nutrition and Health, University of Sao Paulo, São Paulo, Brazil, <sup>3</sup>Milken Institute School of Public Health, George Washington University, Washington, DC, USA, <sup>4</sup>Department of Economics, School of Business, Accounting and Economics, University of Sao Paulo, São Paulo, Brazil

**O.1.02 - Evidence-based approaches for the promotion of healthy foods, UKK - Level 6 Foyer, June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** To assess changes in the content of total sugars, sodium, saturated fat, non-sugar sweeteners (NSS) and food additives of 'cosmetic use' (CFA) in foods and beverages sold in Brazil over a 11-year period prior to the implementation of front-of-package nutrition labeling (FOPNL).

**Methods:** We used data from the "Global New Products Database (Mintel-GNPD)". We created a panel with all processed and ultra-processed foods according to NOVA launched in the Brazilian food supply between 2010 and 2021 with at least one reported change in food composition (nutrients and/or ingredient list) by pairing unique barcodes and product inclusion and reformulation dates (126,441 observations and 6,021 unique products). Outcome variables included energy, saturated fat, sodium, and the presence of total sugars, NSS, and CFA. The latter were identified using detailed description of CFA found in ultra-processed foods. We searched products' ingredients list for the presence of sugars, NSS, and CFA. We ran year- and product-fixed effect log-linear models. For additives 'of cosmetic use' we ran Poisson models with similar specifications. We then explored heterogeneity across food categories.

**Results:** Findings from our fitted models show significant increases in energy and sodium contents in 2021 as compared with 2010, but not in saturated fat. While we found smaller changes in the prevalence of foods and beverages with total sugars (ranging from 77% to 80%), the presence of NSS grew from 12% to 28%. The number of CFA/products had a 15% upward increase from 2015 to 2021. The energy content of candies and salty snacks had the largest increases, while dairy beverages the sharpest decrease. The number of CFA/product soared in dairy and non-dairy sweetened beverages, ready-to-eat meals, and snacks. Finally, CFA changes were followed by greater increases in the energy content of foods in 2019-21 as compared with earlier periods.

**Conclusions:** Foods and beverages have undergone significant reformulation in the 10 years prior to the implementation of FOPNL, with important heterogeneity across nutrients, total sugars, NSS and other food additives of 'cosmetic use', and food categories. Monitoring food reformulation will be key to address an unintended worsening of the healthfulness of the food supply.

# Characterizing the Dollar Store Food Environment to Inform New Legislation in Baltimore City

**Ms. Samantha Sundermeir<sup>1</sup>**, Dr. Joel Gittelsohn<sup>1</sup>, Ms. Lisa Poirier<sup>1</sup>, Ms. Emma Lewis<sup>1</sup>, Ms. Sydney Santos<sup>1</sup>  
<sup>1</sup>Johns Hopkins Bloomberg School of Public Health, Baltimore, USA

**O.1.02 - Evidence-based approaches for the promotion of healthy foods, UKK - Level 6 Foyer, June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Over the past decade, Dollar Stores (DS) have become ubiquitous retailers in low-income urban settings. There are over 34,000 DS in the U.S., with proliferation largely occurring in under-resourced majority Black urban neighborhoods where low food access is prevalent. The City of Baltimore has focused recent efforts on understanding and mitigating the impact of DS on health and local retailers and therefore enlisted our research team to characterize the DS food environment and develop informed recommendations for new policies to be considered by City Council.

**Methods:** Direct observations will be used to collect data on the in-store food environment at all 55 DS located in Baltimore City using a modified version of the Nutrition Environment Measures Survey in Stores (NEMS-S). Healthy food availability index (HFAI) scores will be calculated according to NEMS-S scoring protocol.

**Results:** Results from in-store observations will help to characterize the DS food environment including food availability, pricing, and quality. Findings will also include data on acceptance of food assistance program benefits, the presence of in-store shopping promotions, and general store characteristics (cleanliness, staffing, layout). Based on initial store visits, ultra-processed foods (e.g., frozen pizza, hot dogs, ice cream, snacks, and soda) are ubiquitous, while fruit and vegetable options are scarce. Most stores accept Supplemental Nutrition Assistance Program benefits, but not Special Supplemental Nutrition Program for Women, Infants and Children benefits. We anticipate having policy recommendations to share by June 2023, including the City Council's receptiveness to them.

**Conclusion:** This ongoing work is timely as Baltimore City is currently interested in developing and implementing new DS legislation. Findings may support future scale-up of similar work in other food retail settings, particularly among vulnerable communities where healthy food access is a challenge and local retailers face business threats from larger national brand stores.

# A mediation analysis on the relationship between adolescents' migrant background and their body mass index

Miss María Beneito-Durá<sup>1</sup>, **Mr. Jesús Martínez-Gómez<sup>1</sup>**, Ms. Amaya de Cos-Gandoy<sup>1,2</sup>, Ms. Patricia Fundación Privada SHE<sup>1,2</sup>, Miss Mercedes de Miguel<sup>1,2</sup>, Dr. Emily Laveriano-Santos<sup>3,4</sup>, Miss Camila Arancibia-Riveros<sup>3</sup>, Dr. Emilio Sacanella<sup>5</sup>, Dr. Anna Tresserra<sup>3,4</sup>, Dr. Ramón Estruch<sup>4,5</sup>, Prof. Rosa M Lamuela-Raventós<sup>3,4</sup>, Dr. Gloria Santos-Beneit<sup>1,2,6</sup>, Dr. Rodrigo Fernández-Jiménez<sup>1,7,8</sup>, Dr. Juan Miguel Fernández Alvira<sup>1</sup>

<sup>1</sup>Centro Nacional de Investigaciones Cardiovasculares (CNIC), 28029, Madrid, Spain, <sup>2</sup>Foundation for Science, Health and Education (SHE), 08008, Barcelona, Spain, <sup>3</sup>Departament de Nutrició, Ciències de l'Alimentació i Gastronomia, Xarxa d'Innovació Alimentària (XIA), Facultat de Farmàcia i Ciències de l'Alimentació, Institut de Nutrició i Seguretat Alimentària (INSA-UB), Universitat de Barcelona (UB), 08921, Santa Coloma de Gramenet, Spain, <sup>4</sup>Consorcio CIBER, M.P. Fisiopatología de la Obesidad y Nutrición (CIBEROBN), Instituto de Salud Carlos III (ISCIII), 28029, Madrid, Spain, <sup>5</sup>Department of Internal Medicine, Hospital Clínic, Institut d'Investigacions Biomèdiques August Pi i Sunyer (IDIBAPS), University of Barcelona, 08036, Barcelona, Spain, <sup>6</sup>The Zena and Michael A. Wiener Cardiovascular Institute, Icahn School of Medicine at Mount Sinai, 10029, New York, USA, <sup>7</sup>Centro de Investigación Biomédica En Red en enfermedades Cardiovasculares (CIBERCV), 28029, Madrid, Spain, <sup>8</sup>Hospital Universitario Clínico San Carlos, 28040, Madrid, Spain

**O.1.03 - Latest findings on socio-economic inequalities, UKK - Hall B (Level 3), June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** Obesity and its risk factors often show a socioeconomic gradient. However, it is essential to understand which health behaviours and correlates explain such disparities. In particular, there is little information about which mediators explain the higher weight often found in adolescents with a migrant background. The objective of this study was to assess the potential mediating role of several adolescents' and parental health behaviours and factors in the association between the origin of the parents and adolescents' body mass index (BMI).

**Methods:** Data were obtained from 24 secondary schools enrolled in the SI! Program for Secondary Schools trial in Spain. Participants were measured at approximately 12 (n=925; ~50% girls), and followed up at 14 (n=781), and 16 (n=876) years of age. Parental data on diet, smoking, physical activity and BMI and adolescent's dietary data were obtained via questionnaires. Adolescents' physical activity, sedentary and sleep parameters were measured by 7-day accelerometer. Age- and sex-adjusted z-scores were calculated using validated cut-off points for BMI at each assessment. A migrant background was assumed if at least one parent/caregiver was born outside Spain. Potential mediators were explored via MacKinnon's product-of-coefficients test in single mediation models and a final multiple mediation model, including all previous significant mediators.

**Results:** Significant mediators in the multiple mediation models explained 48.5%, 7.7% and 45.8% of the association between migrant background and adolescents' BMI z-scores at 12, 14, and 16 years of age, respectively. The most relevant single mediator at all time-points was maternal BMI (44.7%, 39.0% and 32.9%, respectively), followed by the number of meals at 12 and 16 years of age (16.2% and 19.9%), and sleep duration at 12 years of age (9.2%). Significant suppression effects were found for the consumption of sugar-rich foods at all time-points, reducing the total percentage explained in the models.

**Conclusions:** A higher maternal BMI was consistently found to be the most important mediator explaining the higher weight in adolescents with a migrant background. Obesity prevention strategies should address not only adolescents but also their family unit, with special attention to vulnerable groups.

# Facilitating Children's Club-Organized Sports Participation: Person–Environment Misfits Experienced by Parents from Low-Income Families

**Dr. Lonneke Van Leeuwen**, Dr. Anne Annink, Dr. Kirsten Visser, Dr. Marielle Jambroes

<sup>1</sup>Public Health Department, Julius Center For Health Sciences And Primary Care, University Medical Center Utrecht, Utrecht, Netherlands, <sup>2</sup>Utrecht University School of GovernanceUtrecht School of Governance, Utrecht University, Utrecht, Netherlands, <sup>3</sup>Department of Human Geography and Spatial Planning, Faculty of Geosciences, Utrecht University, Utrecht, Netherlands, <sup>4</sup>Public Health Department, Julius Center For Health Sciences And Primary Care, University Medical Center Utrecht, Utrecht, Netherlands

**O.1.03 - Latest findings on socio-economic inequalities, UKK - Hall B (Level 3), June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** Despite the many benefits of club-organized sports participation for children, studies have shown that sports participation is lower among children from low-income families than among children from middle- or high-income families. Adopting a socioecological perspective, the aim of our study was to identify and describe experiences of person–environment (PE) misfits in relation to parental facilitation of children's sports participation.

**Methods:** We conducted 24 interviews with parents from low-income families. The interviews were structured around three sets of questions, probing for: 1) positive and negative thoughts or beliefs about sports for children and organizing children's sports participation, 2) experienced or expected constraining and facilitating factors while/for facilitating children's sports participation, and 3) suggestions for parent-targeted solutions to help increase sports participation among children from low-income families. The analysis of the interview transcripts was aimed at discovering experiences of misfits and parental strategies to reduce misfits or deal with misfits. Then, individual and environmental attributes involved in each misfit were coded.

**Results:** PE misfits were found in multiple behaviors related to the facilitation of children's sports participation: financing sports participation; planning and investing time; transporting children; acquiring, processing, and providing information; and arranging support. Across these PE misfits, influential attributes were found on the individual level (e.g., skills) as well as within the social, policy, physical, and information environment. In response to PE misfits experienced, parents deployed multiple strategies to reduce these PE misfits, aimed at enhancing either themselves (e.g., increasing financial capacities) or their environments (e.g., arranging social support). These results provide an insight into experienced PE misfits that took the form of multiple specific behaviors which parents found difficult while facilitating their children's sports participation. Furthermore, the results provide insight into the environmental and individual attributes that were involved in these PE misfits, and into how parents modified themselves or their environments in order to make their environments more supportive.

**Conclusions:** The study contributes to future research on individual and environmental influences on parental facilitation of their children's sports participation, as well as on the development of multilevel interventions aimed at increasing sports participation among children from low-income families.

# Understanding young people's participation in a health-promotion intervention in schools located in socially advantaged and disadvantaged areas in Sweden

**Dr. Lisette Farias Vera**<sup>1</sup>, Dr. Gisela Nyberg<sup>1,2</sup>, Dr. Björg Helgadóttir<sup>1,2</sup>, Dr. Susanne Andermo<sup>1,2</sup>

<sup>1</sup>Karolinska Institutet, Stockholm, Sweden, <sup>2</sup>The Swedish School of Sport and Health Sciences, Stockholm, Sweden

**O.1.03 - Latest findings on socio-economic inequalities, UKK - Hall B (Level 3), June 15, 2023, 2:15 PM - 3:45 PM**

## **SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** Adolescents face many challenges, including increasing academic expectations and physical, cognitive, and emotional changes. These are influenced by socioeconomic determinants, leading to health inequalities. This study explores how young people in grade eight (14-15 years old) experience their participation in a health-promotion in socially advantaged and disadvantaged areas in Sweden.

**Methods:** The intervention (n=193) was conducted in six schools (four control and two intervention) and lasted one-school year. The intervention was teacher-led and consisted of three 60-minute sessions per week: varied physical activities, homework support, and walks while listening to audiobooks. A qualitative design with ethnographic fieldwork, participant observations, and focus groups in two intervention schools was used to evaluate how participants experienced the intervention. A total of 27 students (18 boys and 9 girls) were purposely recruited to focus groups and 23 participant observations were conducted over 8 months. A content analysis was conducted.

**Conclusions:** "Having fun with others" illustrates how having teachers leading activities allowed participants to have fun, look forward to the activities, and share experiences with others. "Being too busy with other organized activities" describes how both groups enjoyed the physical activities and walks, but some experienced having too much to do after school, which coincided with those attending the school located in the advantaged area. Most participants from the disadvantaged area described having little to do at home and preferred to participate in the activities instead of sitting at home with their mobile phones. "Catching up with studies" exemplifies how both groups were motivated by homework support and walks listening to audiobooks but used this time differently depending on how busy they were after school; most of those attending the school in the advantaged area used that time to do their homework and listen to books, while most participants in the disadvantaged area preferred to study at home.

**Conclusions:** Access and use of time dedicated to physical activity, walks with audiobooks, and homework support were influenced by socioeconomic factors. This study showed that it is crucial to support young people's participation by focusing on availability and support, especially in schools located in disadvantaged areas.



# The obesogenic system in deprived urban neighbourhoods in the Netherlands: an expert-based system map through Group Model Building.

**Ms. Fleur ter Ellen<sup>1</sup>**, Dr. Joost Oude Groeniger<sup>1</sup>, Dr. Karen Oude Hengel<sup>1,2</sup>, Dr. Luc Hagedaars<sup>2</sup>, Prof. Karien Stronks<sup>2</sup>, Prof. Frank van Lenthe<sup>1</sup>

<sup>1</sup>Department of Public Health, Erasmus MC University Medical Center, Rotterdam, Netherlands, <sup>2</sup>Department of Public Health, Academic Medical Center, University of Amsterdam, Amsterdam, Netherlands, <sup>3</sup>Department of Work Health Technology, Netherlands Organisation for Applied Scientific Research TNO, Leiden, Netherlands

**O.1.03 - Latest findings on socio-economic inequalities, UKK - Hall B (Level 3), June 15, 2023, 2:15 PM - 3:45 PM**

## **SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** Over the past decades, the prevalence of obesity among adults has increased tremendously, especially in deprived urban neighbourhoods. Obesity prevention policies often address a single cause, resulting in individual-level actions. However, it is the complex dynamics between individuals and their living environment that must be understood to inform obesity prevention strategies. Drawing on insights and methodologies from system science, our study investigates obesity as an undesirable consequence of the dynamics of the underlying system. Therefore, we developed a system map to understand how the dynamics in the obesogenic system in deprived urban neighbourhoods have led to the rise of obesity over the past 30 years in the Netherlands.

**Methods:** We conducted a participatory workshop process called Group Model Building (GMB). During three GMB sessions, thirteen researchers with expertise in obesity and/or health inequalities qualitatively modelled the obesogenic system by developing a 'Causal Loop Diagram' (CLD). A CLD is a system dynamics tool visualising the connectedness of variables and the feedback and dynamics present in the system. Using system-based analyses, the core modelling team interpreted the overarching system paradigm and subsystems goals.

**Results:** Four subsystems were generated in the GMB sessions: the system of the food environment, the system of the built environment, the socio-cultural system, and the socioeconomic system. The overarching CLD provides a visual representation of the interacting subsystems, consisting of interconnected variables and multiple feedback loops. The CLD shows us that in the deprived urban neighbourhoods, changes in the living environment and societal development over the past 30 years (e.g., increased availability of unhealthy foods, digitization of social security, increased screen time, changes in social norms) amplified obesity risk factors at the individual level (e.g., unhealthy dietary intake, chronic stress, sleeping problems and sedentary behaviour).

**Conclusions:** This study developed a CLD that visualises the dynamics in deprived urban neighbourhoods in the Netherlands that result in an increased prevalence of obesity. These insights allow for a better understanding of the dynamics driving obesity at the population level and can be used to identify leverage points for effective obesity prevention strategies that disrupt the obesogenic system.

# Predicting vegetable and fruit consumption in distinct socioeconomic groups using machine learning models

**Ms. Mélina Côté<sup>1,2</sup>**, Ms. Catherine Laramée<sup>1,2</sup>, Ms. Annie Lapointe<sup>1,2</sup>, Prof. Simone Lemieux<sup>1,2</sup>, Dr. Sophie Desroches<sup>1,2</sup>, Mrs. Ariane Bélanger-Gravel<sup>1,3</sup>, Prof. Benoît Lamarche<sup>1,2</sup>

<sup>1</sup>Centre Nutrition, Santé et Société (NUTRISS), Institut sur la nutrition et les aliments fonctionnels (INAF), Université Laval, Québec, Canada, <sup>2</sup>École de nutrition, Faculté des sciences de l'agriculture et de l'alimentation, Université Laval, Québec, Canada, <sup>3</sup>Département d'information et de communication, Faculté des lettres et des sciences humaines, Université Laval, Québec, Canada

**O.1.03 - Latest findings on socio-economic inequalities, UKK - Hall B (Level 3), June 15, 2023, 2:15 PM - 3:45 PM**

## **SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** Recruiting vulnerable populations represents a considerable challenge in public health research. Developing and validating predictive models of nutrition-related outcomes using data from broader population samples for use in hard-to-reach low socioeconomic groups would be valuable. This study aimed to assess the applicability in different socioeconomic subgroups of a machine learning (ML) model developed to predict adequate vegetable and fruit consumption (VFC) in a general population.

**Methods:** Data from a large array of variables (96) potentially associated with dietary habits in a sample of 2836 adults (86% women) from the NutriQuébec project were used. Adequate VFC ( $\geq 5$  servings/d) was measured by averaging data from two to three web-based 24-h dietary recalls and used as the outcome to predict. The sample was randomly divided into training (60%), testing (20%) and validation (20%) sets. The training set (general population) was used to develop a Random Forest (RF) classification algorithm to predict adequate VFC. The prediction performance of the model was evaluated in the testing set (general population) using the accuracy score (proportion of correct predictions). The validation set was divided into low (household income  $< 50\,000$  \$CAN/y,  $n=130$ ), middle ( $50\,000$  \$CAN to  $< 100\,000$  \$CAN/y,  $n=204$ ) and high ( $\geq 100\,000$  \$CAN/y,  $n=230$ ) income groups. The accuracy of the model was then evaluated in each income subgroup. The analysis was repeated by dividing the validation set into low (high school or less), middle (pre-university or certificate), and high (bachelor or higher) education groups.

**Results:** The model developed in the training set predicted adequate VFC with an accuracy of 0.60 (95%CI:0.56-0.64) in the testing set. The model predicted adequate VFC in low, middle and high income subgroups with accuracies of 0.65 (95%CI:0.60-0.70), 0.65 (95%CI:0.62-0.68) and 0.55 (95%CI:0.52-0.58), respectively. Relatively similar results were obtained in the education subgroups.

**Conclusion:** The RF model predicted adequate VFC in the low income subgroup with similar accuracy as in the total population, in which the model was developed and tested. These results suggest that ML models predicting a nutrition-related outcome in a general population can be used to predict a similar outcome in harder-to-reach socioeconomic groups.

# Intersectional, cross-level correlates of physical activity guidelines among 131,717 Korean adults: Korean Community Health Survey 2021

**Mr. Heejun Lim<sup>1</sup>**, Dr. Eun-Young Lee<sup>1</sup>

<sup>1</sup>Queen's University, Kingston, Canada

O.1.03 - Latest findings on socio-economic inequalities, UKK - Hall B (Level 3), June 15, 2023, 2:15 PM - 3:45 PM

## **SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** To examine intersectional, cross-level correlates (i.e., intersections of individual-[gender, education, employment, monthly income, physical limitations] and community-[community satisfaction]level variables) of adhering to the World Health Organization (WHO)'s physical activity (PA) guidelines (guidelines thereafter) among Korean adults aged 24-64 years.

**Methods:** Self-reported, nation-wide, cross-sectional data from Korean Community Health Survey 2021 (N=229,242) was used. Participants were categorized into adhering/not adhering to the guidelines (either  $\geq 150$ -300 minutes moderate-intensity aerobic PA or  $\geq 75$ -150 minutes vigorous-intensity aerobic). Multilevel logistic regressions with interactions were performed.

**Results:** Of 131,717 (*Mean*=44.89yrs, women=50.7%), overall adherence to the guidelines was 32.8% (women=26.7% vs men=38.7%,  $p < 0.001$ ). All social identities that reflect privilege at the individual level (being male, educated, employed, high income, no physical limitations) and community trust, social network, and public transportation at the community level (being satisfied) were statistically significant with adhering to the guidelines compared to their respective counterparts (being female, less educated, not employed, low income, physical limitations, and dissatisfied with community trust, social network, and public transportation). Two statistically significant intersectional, cross-level, 3-way interactions were analyzed for further stratification (SexXEducationXSocial network; SexXEmploymentXSocial network). Compared to groups that reflect disadvantages (i.e., being women, less educated [or not employed], and dissatisfied with social network), both women and men were more likely to adhere to the guidelines regardless of their education (or employment) and satisfaction with social network. Among women, when women were satisfied with social network, being less educated (OR=1.25, 95%CI=1.16-1.34) or employed (OR=1.67, 95%CI=1.50-1.85) is more conducive to adhering to the guidelines compared to being more educated (OR=1.22, 95%CI=1.11-1.34) or not employed (OR=1.25, 95%CI=1.16-1.34). Among men, when education or employment is equal, being satisfied with social network (Male+<University+Satisfied: OR=1.41, 95%CI=1.27-1.85; Male+ $\geq$ University+Satisfied: OR=1.70, 95%CI=1.50-1.92; Male+Not employed+Satisfied: OR=1.41, 95%CI=1.27-1.58; Male+Employed+Satisfied: OR=2.38, 95%CI=2.12-2.68) is more supportive of adherence to the guidelines compared to being dissatisfied with social network (Male+<University+Dissatisfied: OR=1.39, 95%CI=1.26-1.53; Male+ $\geq$ University+Dissatisfied: OR=1.65, 95%CI=1.47-1.85; Male+Not employed+Dissatisfied: OR=1.39, 95%CI=1.26-1.53; Male+Employed+Dissatisfied: OR=1.95, 95%CI=1.73-2.19).

**Conclusions:** Individual-level variables compounded with community-level variables were associated with adhering to the guidelines. Identifying marginalized groups with intersectionality theoretical framework is important for promoting equitable PA interventions among Korean adults.

# Validity of raw accelerometry data from consumer wearable devices to predict activity intensity in children.

**Dr. R Glenn Weaver<sup>1</sup>**, Mr. James White<sup>1</sup>, Ms. Olivia Finnegan<sup>1</sup>, Miss Xuanxuan Zhu<sup>1</sup>, Dr. Sarah Burkart<sup>1</sup>, Dr. Michael Beets<sup>1</sup>, Dr. David Brown III<sup>1</sup>, Dr. Russell Pate<sup>1</sup>, Dr. Massimiliano de Zambotti<sup>2</sup>, Dr. Gregory Welk<sup>3</sup>, Dr. Srihari Nelakuditi<sup>1</sup>, Dr. Rahul Ghosal<sup>1</sup>, Dr. Yuan Wang<sup>1</sup>, Dr. Bridget Armstrong<sup>1</sup>, Dr. Elizabeth Adams<sup>1</sup>, Dr. Layton Reesor-Oyer<sup>1</sup>, Dr. Christopher Pfladderer<sup>1</sup>, Mr. Roddrick Dugger<sup>1</sup>, Ms. Meghan Bastyr<sup>1</sup>, Ms. Lauren Von Klingraeff<sup>1</sup>, Ms. Hannah Parker<sup>1</sup>

<sup>1</sup>University of South Carolina, Columbia, USA, <sup>2</sup>SRI International, Menlo Park, USA, <sup>3</sup>Iowa State, Ames, USA

**O.1.04 - Improving measurement of movement behaviour in children, UKK - Hall C (Level 3), June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical

**Purpose:** Consumer wearables often include accelerometers, an important marker of activity intensity. Given the widespread adoption of consumer wearables, accessing their accelerometry data may provide an accurate, reproducible, open-access, and device-agnostic method for classifying activity intensity. This study examined the validity of physical activity intensity estimates based on the raw accelerometry data from consumer wearables compared to indirect calorimetry in children.

**Methods:** Seventy-five 5–12-year-old apparently healthy children (58% male, 63% White) participated in a simulated, free-living, 60-minute protocol (12 activities for 5 minutes each) with activity intensities from sedentary to vigorous (e.g., seated watching a video, standing writing on a board, walking, playing tag). Children wore two wrist-placed consumer wearables (Apple Watch Series 7 and Garmin Vivoactive 4), a wrist-placed research-grade accelerometer (Actigraph GT9X), and a portable indirect calorimeter (Cosmed K5), concurrently. Criterion activity intensity from the K5 was calculated based on metabolic equivalent (MET) thresholds (i.e.,  $V_{O2}$  per kg per minute divided by resting  $V_{O2}$  per kg per minute) of <1.49 METs=sedentary, 1.50-2.99 METs=light, 3.00-5.99 METs=moderate, 6.00-max=vigorous. Activity intensities for the consumer wearables and Actigraph raw accelerometer data were based on Euclidian Norm Minus One thresholds of 0.0-35.5mg=sedentary, 35.6-201.3mg=light, 201.4-706.9mg=moderate, and >707.0mg=vigorous. Epoch-by-epoch agreement and mean absolute error (MAE) between accelerometry-derived (i.e., proxy) and K5-derived activity intensities (i.e., criterion) were used to evaluate validity.

**Results:** Accelerometry data was accessible for 73 and 72 of the 75 participants for the Apple and Garmin, respectively. Epoch-by-epoch agreement with the K5 showed that Actigraph, Apple, and Garmin correctly classified time sedentary 77%, 97%, 86%; light 60%, 55%, 57%; moderate 74%, 71%, 72%, and vigorous 50%, 50%, 67% of the time, respectively. MAE was 1.7, 1.5, and 1.8 minutes for sedentary; 1.7, 2.0, and 2.0 for light; 0.6, 0.7, 0.7 for moderate, and 0.4, 0.6, and 0.6 for vigorous for ActiGraph, Apple, and Garmin, respectively.

**Conclusions:** Raw accelerometry data from wrist-placed consumer wearables in this study performed comparable to a wrist-placed research-grade accelerometry device when classifying activity intensity. The findings herein highlight the potential of accurate, reproducible, open-access, and device-agnostic methods of quantifying physical activity intensity.

# Calibration of raw accelerometry and heart rate from consumer wearable devices during sleep in children

**Ms. Olivia Finnegan<sup>1</sup>**, Dr. R. Glenn Weaver<sup>1</sup>, Mr. James White<sup>1</sup>, Ms. Xuanxuan Zhu<sup>1</sup>, Dr. Sarah Burkart<sup>1</sup>, Dr. Michael Beets<sup>1</sup>, Dr. Trey Brown<sup>2</sup>, Dr. Russell Pate<sup>1</sup>, Dr. Massimiliano de Zambotti<sup>3</sup>, Dr. Greg Welk<sup>4</sup>, Dr. Srihari Nelakuditi<sup>1</sup>, Dr. Rahul Ghosal<sup>1</sup>, Dr. Yuan Wang<sup>1</sup>, Dr. Bridget Armstrong<sup>1</sup>, Dr. Elizabeth Adams<sup>1</sup>, Dr. Layton Reesor-Oyer<sup>1</sup>, Dr. Christopher D. Pfledderer<sup>1</sup>, Mr. Roddrick Dugger<sup>1</sup>, Ms. Meghan Bastyr<sup>1</sup>, Ms. Hannah Parker<sup>1</sup>, Ms. Lauren von Klinggraeff<sup>1</sup>

<sup>1</sup>University of South Carolina, Columbia, USA, <sup>2</sup>University of South Carolina School of Medicine, Columbia, USA, <sup>3</sup>SRI International, Menlo Park, USA, <sup>4</sup>Iowa State University, Ames, USA

**O.1.04 - Improving measurement of movement behaviour in children, UKK - Hall C (Level 3), June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** Consumer wearables have the capacity to measure motion via 3-axes accelerometry and heart rate (HR) via photoplethysmography measurement, which is the main information currently used by research-grade devices to classify sleep/wake patterns. The objective of this study was to examine the accuracy of HR and raw accelerometry collected via two popular consumer wearables (Garmin Vivoactive 4S, Apple Watch series 7) compared to a criterion measure of HR (3-lead ECG) and accelerometry (wrist-placed ActiGraph GT9X) during sleep and across sleep stage in children.

**Methods:** 38 children (M=8.5 years, SD=2.4, 42% black, 61% male) underwent overnight laboratory-based polysomnography (PSG), including a 3-lead ECG, while concurrently wearing an ActiGraph accelerometer, an Apple watch, and a Garmin device on their non-dominant wrist. Euclidean norm minus one (ENMO) and mean amplitude deviation (MAD) were calculated from the raw accelerometry data for each device. HR in beats per minute was calculated from the 3-lead ECG and collected from the consumer wearable devices. Lin's concordance correlation coefficient (LCCC) and mean absolute error (MAE) were calculated to assess agreement between the consumer wearables and research-grade devices overall and in each sleep stage.

**Results:** The LCCC for HR from Apple and Garmin compared to the criterion indicated a high level of agreement (0.976, 0.942, respectively) with no substantial variation across sleep stages. For accelerometry, LCCC indicated a weaker agreement between Apple and Garmin accelerometry data and the criterion: ENMO (0.89, 0.71, respectively) and MAD (0.91, 0.66, respectively). LCCC for the accelerometry variables varied by sleep stage, with stronger agreement between the consumer wearables and the criterion during N1 and N2 sleep stages than in N3 and REM stages of sleep. For Apple, MAE of ENMO was 0.01, MAD was 0.002 and HR was 1.66. For Garmin, MAE for ENMO was 0.02, MAD was 0.005 and HR was 2.54.

**Conclusions:** Research and clinical application of consumer wearable technology is largely limited by the black-box (proprietary) nature of the algorithms used for sleep classification. This study suggests the possibility of using raw data from consumer wearables to ultimately enable the development of device-agnostic open-source algorithms to detect sleep in children.



# Calibration of raw accelerometry and heart rate data from consumer wearable devices during simulated free-living activities in children

**Mr. James W. White III<sup>1</sup>**, Dr. R. Glenn Weaver<sup>1</sup>, Ms. Olivia Finnegan<sup>1</sup>, Miss Xuanxuan Zhu<sup>1</sup>, Mr. Nick Tindall<sup>1</sup>, Ms. Hannah Parker<sup>1</sup>, Dr. Sarah Burkart<sup>1</sup>, Dr. Michael W. Beets<sup>1</sup>, Dr. Trey Brown<sup>4</sup>, Dr. Russ Pate<sup>1</sup>, Dr. Massimiliano de Zambotti<sup>3</sup>, Prof. Greg Welk<sup>2</sup>, Dr. Srihari Nelakuditi<sup>1</sup>, Dr. Rahul Ghosal<sup>1</sup>, Dr. Yuan Wang<sup>1</sup>, Dr. Bridget Armstrong<sup>1</sup>, Dr. Elizabeth L. Adams<sup>1</sup>, Dr. Layton Reesor-Oyer<sup>1</sup>, Dr. Christopher D. Pfledderer<sup>1</sup>, Ms. Meghan Bastyr<sup>1</sup>, Ms. Lauren Von Klinggraeff<sup>1</sup>  
<sup>1</sup>University of South Carolina, Columbia, USA, <sup>2</sup>Iowa State University, Ames, USA, <sup>3</sup>SRI International, Menlo Park, USA, <sup>4</sup>Prisma Health, Columbia, USA

**O.1.04 - Improving measurement of movement behaviour in children, UKK - Hall C (Level 3), June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical

**Purpose:** Consumer wearables (e.g., Apple watch, Garmin) incorporate accelerometry to assess movement and photoplethysmography to capture heart rate (HR). The raw movement and HR data from consumer wearables has been overlooked in device-reference comparisons that have focused on processed metrics like steps and calories. The aim of this study was to examine the accuracy of consumer wearables' raw accelerometry and HR data compared to research-grade monitors in children across simulated free-living activities.

**Methods:** Seventy children (5-12yrs, 57% male, 71% White) participated in a 60-minute protocol consisting of 5-minute activities completed at varying intensities (e.g., seated, watching a video, walking, and playing tag). Children wore two consumer wearables (Apple Watch Series 7 and Garmin Vivoactive 4S) and a research-grade accelerometer (ActiGraph GT9X) on their non-dominant wrist, and a chest-placed, research-grade HR monitor (Actiheart 5, ECG), concurrently. Mean absolute error (MAE) was calculated for consumer wearables compared to the ActiGraph for the following metrics: vector magnitude (VM), Euclidean Norm Minus One (ENMO), and Mean Amplitude Deviation (MAD) (i.e., milligravity-mg). MAE was calculated for HR (i.e., beats per minute-bpm) for consumer wearables compared to Actiheart. Lin's Concordance Correlation Coefficient (CCC) was calculated to assess agreement between consumer wearables and research-grade indicators of HR and movement.

**Results:** MAE values for accelerometry were VM 215.2mg and 221.1mg; ENMO 214.1mg and 219.3mg; MAD 34.3mg and 51.8mg for Apple and Garmin, respectively. MAE values for Apple and Garmin HR were 3.5bpm and 11.5bpm, respectively. Raw accelerometry from Apple and Garmin indicated strong concordance with raw accelerometry from ActiGraph in terms of VM (CCC=0.90 and CCC=0.92), ENMO (CCC=0.90 and CCC=0.92), and MAD (CCC=0.96 and CCC=0.91), respectively. Apple HR indicated strong concordance (CCC=0.96), while Garmin HR exhibited moderate concordance (CCC=0.71).

**Conclusions:** The raw accelerometry data from consumer wearables were comparable to raw accelerometry estimates from ActiGraph. While HR estimates from Apple and Garmin were comparable to Actiheart, Apple HR estimates outperformed Garmin's based on MAE and concordance. Results suggest that the underlying accelerometry and HR data from consumer wearables are comparable to research-grade monitors. Open-source algorithms could use these metrics for estimating physical activity energy expenditure in children.

# Reciprocal effects between affect and physical activity: A systematic review and continuous-time meta-analysis of intensive longitudinal studies

**Dr. GERALYN RUISSSEN**<sup>1</sup>, Associate Professor Eli Puterman<sup>2</sup>, Dr. Rebecca Kuiper<sup>3</sup>, Dr. Genevieve Dunton<sup>4</sup>, Dr. Ryan Rhodes<sup>5</sup>, Dr. Mark Beauchamp<sup>2</sup>

<sup>1</sup>University of Alberta, Edmonton, Canada, <sup>2</sup>University of British Columbia, Vancouver, Canada, <sup>3</sup>Utrecht University, Utrecht, Netherlands, <sup>4</sup>University of Southern California, Los Angeles, USA, <sup>5</sup>University of Victoria, Victoria, Canada

**O.1.04 - Improving measurement of movement behaviour in children, UKK - Hall C (Level 3), June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical

**Purpose:** Despite research using intensive longitudinal methods examining the reciprocal relationships between affect and physical activity in daily life, efforts to quantitatively synthesize the accumulated empirical evidence remains a challenge due to differences in the time intervals when affect and physical activity are measured. The purpose of this study was to quantify the *presence* and *temporal specificity* of reciprocal relationships between (positive and negative) affect and physical activity measured in naturalistic settings.

**Methods:** In this preregistered meta-analysis (PROSPERO CRD42020180035; <https://osf.io/wkhhb2/>), we synthesized evidence for within-person reciprocal relationships between affect and physical activity using 17 effect sizes from 13 primary studies using nine unique datasets ( $N_{total} = 45,677$  observations across 624 participants), accounting for between-person differences in effects and variation in time intervals in primary studies by using a novel random-intercept continuous-time meta-analysis (RI-CTmeta). RI-CTmeta averages the transformed standardized lagged relationships for one or more targeted time intervals ( $\Delta t^*$ ), which for the present study was  $\Delta t^* = 1.5$  hrs.

**Results:** Results indicated that people engaged in more physical activity after ( $\Delta t^* = 1.5$  hrs) they experienced higher than usual positive affect ( $\phi = 0.04$ , 95% CI [0.01, 0.07]); however, they did not significantly deviate from their average physical activity levels after they experienced lower than usual negative affect ( $\phi = -0.02$ , 95% CI [-0.05, 0.01]). Conversely, when people engaged in more physical activity than usual, they experienced subsequent ( $\Delta t^* = 1.5$  hrs) reductions in negative affect ( $\phi = -0.01$ , 95% CI [-0.02, -0.002]). However, when engaged in more physical activity than usual, participants did not subsequently deviate from their average positive affect levels ( $\phi = 0.01$ , 95% CI [-0.01, 0.02]). The size of the observed effects (in both directions) between positive and negative affect and physical activity varied continuously over time, with the maxima/minima of these continuous functions observed about 2.5 hrs preceding and following a physical activity bout.

**Conclusions:** The results provide mixed support for a reciprocal relationship between affective states and physical activity, which varied as a function of the time-interval under consideration. Medium-term (i.e., 2-3 hrs) timescales appear to be most sensitive to detecting these reciprocal relationships and, therefore, should be examined in future research.

# Peer similarity in objectively assessed physical activity during physical education class

**Dr. Katherine Arlinghaus<sup>1</sup>**, Dr. Tyler Prochnow<sup>2</sup>

<sup>1</sup>University of Minnesota School of Public Health, Minneapolis, USA, <sup>2</sup>Texas A&M University Department of Health Behavior, College Station, USA

**O.1.04 - Improving measurement of movement behaviour in children, UKK - Hall C (Level 3), June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical

**Purpose:** Physical activity engagement among adolescents is significantly impacted by peer influence. Physical education (PE) class provides an opportunity for physical activity and social interaction. Yet, how adolescent physical activity is shaped by social connections during PE class is not well understood. This study examined how physical activity during PE class was related to peer physical activity in the class.

**Methods:** During the first and last weeks of a semester-long PE class in a Houston, Texas public charter school, adolescents ( $n=156$ ,  $13.51 \pm 1.45$  years old, 52.6% female, 85.3% Hispanic) nominated up to three female and three male students they felt closest to in PE. Each day of PE, adolescents wore Polar Heart Rate monitors and were given a goal number of minutes to be in moderate-vigorous physical activity (MVPA; defined as  $\geq 65\%$  of age-estimated maximum heart rate). The mean percentage of MVPA goal minutes achieved during the semester was calculated. Linear network autocorrelation models were used to determine significant associations between MVPA, gender, grade, body mass index z-score, and the MVPA of the students they felt closest to in PE. Separate models were conducted for the start and end of semester. Separable temporal exponential random graph modeling was used to examine how MVPA during class impacted the odds of social connections forming over the course of the semester.

**Results:** Adolescent MVPA was significantly associated with the MVPA of the students they felt closest to at the end of the semester ( $B=0.04$ ,  $p<.01$ ); however, this effect was not significant at the start of the semester ( $B=0.01$ ,  $p=.29$ ). Students with higher MVPA during class were significantly more likely to gain new incoming connections throughout the semester ( $PE=0.007$ ,  $p<.03$ ).

**Conclusions:** Findings indicate the presence of social influence on adolescents' MVPA during PE. Additionally, longitudinal results suggest a popularity effect for high MVPA during PE. These results imply that the opportunities for MVPA provided during PE class may be a mechanism for youth to establish social connections, making PE important for both adolescent social and physical health. Network interventions such as opinion leader training or segmentation to reinforce norms may be appropriate.

# Utilising accelerometry and machine learning to assess children's fundamental movement skills

**Prof. Scott Duncan**<sup>1</sup>, Dr. Tom Stewart<sup>1</sup>, Prof. Kelly Macintosh<sup>2</sup>, Dr. Phil Hill<sup>2</sup>, Prof. Lisa Barnett<sup>3</sup>, Prof. Michael Duncan<sup>4</sup>, Dr. Charlotte Jelleyman<sup>1</sup>, Dr. Wesley O'Brien<sup>5</sup>, Dr. Justin Richards<sup>6</sup>, Mr. Alex Swain<sup>2</sup>, Prof. Melitta McNarry<sup>2</sup>

<sup>1</sup>Auckland University of Technology, Auckland, New Zealand, <sup>2</sup>Swansea University, Swansea, United Kingdom, <sup>3</sup>Deakin University, Melbourne, Australia, <sup>4</sup>Coventry University, Coventry, United Kingdom,

<sup>5</sup>University College Cork, Cork, Ireland, <sup>6</sup>Victoria University of Wellington, Wellington, New Zealand

**O.1.04 - Improving measurement of movement behaviour in children, UKK - Hall C (Level 3), June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical

**Purpose:** Fundamental movement skills (FMS) are foundational movements that become the 'building blocks' to more advanced movement skills and leading an active lifestyle. Despite the importance of FMS, practitioners have relied on direct observation scoring methods, which integrates a subjective element and requires significant human resource and expertise. The aim of this study was to determine the accuracy of an automated measure of FMS competency using wearable accelerometers.

**Methods:** Fourteen school-aged children (8-16 years) wore seven accelerometers (ActiGraph GT9X), sampling at 100 Hz, positioned on both wrists, knees and ankles, and the torso. Participants completed five skills from the Test of Gross Motor Development Third Edition (overhand throw, one-handed strike, kick, hop, slide). Each skill was video recorded and FMS competency scores (range: 1–10) were subsequently manually determined by two fully-trained researchers. The raw accelerometer data were then segmented into individual actions and signal features were extracted and used as input variables to a machine learning model (random forest) to predict the FMS competency score. The importance of each variable was determined using the gini index.

**Results:** Preliminary results showed the random forest model was able to correctly assign the competency score to overhand throws 75.8% of the time. The two most important signal features for predicting overhand throw competency were from the gyroscope sensor (correlation between y- and z-axes, and skewness of the z-axis). The total acceleration in the y-axis was the third most important feature. Complete results for all skills will be presented at the conference.

**Conclusion:** Preliminary results for the overhand throw skill show promise for automating the measurement of FMS competency and highlight the importance of using the gyroscope sensor in addition to the accelerometer. Such a system would greatly enhance our ability to understand the true associations between FMS and health-related outcomes, quickly identify at-risk individuals, and accurately quantify the long-term effects of physical literacy interventions.

# From 'Kids in Action!' to 'Chic@s en Acción!': Transferring a Dutch youth participatory action research to the Spanish context

**Dr. Teatske Altenburg**<sup>1</sup>, Ms. Laura Belmon<sup>1</sup>, Dr. Pilar De Miguel-Etayo<sup>2, 3</sup>, Prof. Luis A Moreno<sup>2, 3</sup>, Other - on Behalf of the GrowH! Consortium<sup>4</sup>

<sup>1</sup>Amsterdam UMC, Vrije Universiteit Amsterdam, Department of Public and Occupational Health, Amsterdam Public Health research institute, Amsterdam, Netherlands, <sup>2</sup>Growth, Exercise, Nutrition and Development (GENUD) Research Group, University of Zaragoza, Instituto Agroalimentario de Aragón (IA2), Instituto de Investigación Sanitaria de Aragón (IIS Aragón), Zaragoza, Spain, <sup>3</sup>CIBEROBN, (Physiopathology of Obesity and Nutrition CB15/00043), Institute of Health Carlos III (ISCIII), Madrid, Spain, <sup>4</sup>Department Prevention and Evaluation, Leibniz Institute for Prevention Research and Epidemiology – BIPS, Bremen, Germany

**O.1.05 - What have we learned recently on participatory research designs, UKK - Hall D (Level 2 - main floor), June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** In the 'Kids in Action!' study (2016-2019), youth participatory action research (YPAR) was combined with Intervention Mapping to develop, implement and evaluate actions aimed at promoting healthy energy balance-related behaviors together with 9-12-year-old children from a deprived neighborhood in Amsterdam, the Netherlands. This study aims to evaluate the feasibility, acceptability and potential impact of transferring this YPAR approach to Zaragoza, Spain, and the potential for wider uptake.

**Methods:** First, the Dutch Kids in Action! practical protocol was adapted to 'Chic@s en Acción!', based on the latest insights from similar projects and the local context. Subsequently, in so called 'action teams' children conducted peer-research to assess the needs of same-aged children in their neighborhood, in terms of health behaviors and aspects in their environment contributing to their health behaviors. In the action phase, the action teams will co-create, co-implement and co-evaluate actions aimed at improving their health behaviors. The process of implementing Chic@s en Acción! will be evaluated on feasibility, acceptability and potential impact using (focus group) interviews with participating children and other involved stakeholders.

**Results:** Adaptations included integrating systems science elements (e.g. causal loop diagrams), applying a different recruitment strategy (e.g. by Aragón's Public Health and Education Department) and including a smaller age range (i.e. 9-11-year-olds). Three action teams were established (since November 2021), including children from two schools in a deprived neighborhood in Zaragoza and an academic researcher. The action teams showed that being alone at home, using screens and unhealthy family behaviors are barriers for children's healthy behaviors. The action phase will start in November 2022. Results of this phase will be presented at the conference. First evaluations of Chic@s en Acción! showed that this approach is feasible and acceptable for the children participating in the action teams.

**Conclusion:** This study provides insight in the adaptations that are necessary for the transfer and wider uptake of the participatory 'Kids in Action' approach. Additionally, the study will demonstrate differences and similarities in children's needs in terms of factors influencing their health behaviors and co-created actions to promote their health behaviors.



# Perceptions of how Social Determinants of Health Interact to Influence Children's Health and Disparities in Seven Communities across the United States

**Dr. Larissa Calancie**<sup>1</sup>, Dr. Travis Moore<sup>1</sup>, Ms. Julia Appel<sup>1</sup>, Ms. Casey Burns<sup>2</sup>, Dr. Melissa Fair<sup>3</sup>, Ms. Erin Fisher<sup>4</sup>, Dr. Yvonne Greer<sup>5</sup>, Dr. Erin Hennessy<sup>1</sup>, Ms. Melanie Houston<sup>1</sup>, Ms. Kara Ihedigbo<sup>6</sup>, Ms. Annemarie Medina<sup>7</sup>, Ms. Debra Nevels<sup>8</sup>, Ms. Sabrina Plattner<sup>7</sup>, Dr. Cynthia A. Thomson<sup>7</sup>, Ms. L. Denise Turner<sup>9</sup>, Ms. Mary Ulseth<sup>1</sup>, Ms. Christina Warriner<sup>1</sup>, Ms. Kelsey Werner<sup>11</sup>, Ms. Sally Wills<sup>10</sup>, Dr. Christina Economos<sup>1</sup>  
<sup>1</sup>Tufts University, What's your pet's name?, USA, <sup>2</sup>Coalition for a Healthy Greater Worcester, Worcester, USA, <sup>3</sup>Furman University, Greenville, USA, <sup>4</sup>Lurie Children's Hospital of Chicago, Chicago, USA, <sup>5</sup>Y-Eat Right, Milwaukee, USA, <sup>6</sup>Harris County Public Health, Houston, USA, <sup>7</sup>University of Arizona, Tucson, USA, <sup>8</sup>Medical College of Wisconsin, Milwaukee, USA, <sup>9</sup>YMCA of Metropolitan Chicago, Chicago, USA, <sup>10</sup>LiveWell Greenville, Greenville, USA, <sup>11</sup>Social System Design Lab, St. Louis, USA

**O.1.05 - What have we learned recently on participatory research designs, UKK - Hall D (Level 2 - main floor), June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** Community groups such as coalitions can create the conditions for whole-of-community change through advocacy, partnerships, pooling resources, and other approaches. The purpose of this study is to describe how coalition committees perceive the complex systems that influence several nutrition-related trends in their communities. Learning what is salient to community groups provides insight to researchers and professionals seeking to partner with these groups.

**Methods:** Ninety-five participants from seven coalition committees located across the United States (US) participated in a Stakeholder-Driven Community Diffusion theory-informed study from 2018 – 2022. The intervention employed Community-based System Dynamics methods to create maps of the systems that each committee perceive to influence community-specific trends of interest. Content analysis was conducted on the systems maps using both deductive and inductive coding. Each map was double coded. Themes and accompanying system structures are reported.

**Results:** Initial results show that participants perceive interactions and interdependencies across a variety of social determinants of health. While each coalition committee started the process by considering the factors that influence and are influenced by nutrition-related trends such as food insecurity or healthy weights in childhood, every group included factors representing multiple types of social determinants of health in their maps, including education, neighborhood environments, and healthcare. System structures showing trade-offs between cost of housing and other basic needs were present in most maps, as were connections between healthy food access, mental health, and healthcare costs. Every group modeled facets of health inequities during the process, though details of which and how groups are affected varied between the communities.

**Conclusions:** Social and structural determinants of health were salient to the coalition committees, and they clearly linked those determinants to health behaviors and outcomes. The systems maps qualitatively show how some health disparities are perpetuated over time. Common themes across geographically dispersed groups suggest opportunities for national policy and systems change. Common system structures could be used as seed models to start conversations about health inequities and opportunities for intervention in other communities.

# Developing community-based partnership research to prevent type 2 diabetes among schoolchildren and students in Indigenous communities: a realist synthesis

**Assistant Professor Dave Bergeron<sup>1,2</sup>**, Associate Professor Maman Joyce Dogba<sup>1</sup>, Associate Professor Marie-Claude Tremblay<sup>1</sup>

<sup>1</sup>Université du Québec à Rimouski, Rimouski, Canada, <sup>2</sup>Université Laval, Québec, Canada

**O.1.05 - What have we learned recently on participatory research designs, UKK - Hall D (Level 2 - main floor), June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** To improve the prevention of type 2 diabetes (T2D) in Indigenous communities, the mobilization of Indigenous stakeholders is necessary for the development of new interventions that meet their needs. Community-based participatory research (CBPR) is recognized as essential for the development of these new interventions because it allows for deeper and more comprehensive transformation of interventions, policies, communities and institutions. As CBPR is used in various social and cultural contexts to develop interventions for the prevention of T2D in Indigenous communities, it is important to identify the different underlying elements that may influence its development in Indigenous communities. The objectives of this research are to: 1) understand the underlying elements involved in CBPRs with Indigenous communities to prevent T2D in schoolchildren and students and 2) validate a program theory explaining how and under which circumstances CBPRs in Indigenous communities to prevent T2D in schoolchildren and students produce their outcomes.

**Methods:** A realist synthesis was conducted. In the first step, an initial program theory was developed and validated with the members of an Indigenous Patient Circle. Next, five databases were searched (CINAHL, PsycINFO, MEDLINE, SCOPUS and Public Health Database). Articles were considered if they: described a CBPR with Indigenous community(ies), focused on T2D prevention among schoolchildren and students, and were published in English, French or Spanish. Selected articles were analyzed using a directed content analysis approach with NVivo 12, which helped to refine the initial program theory.

**Results:** Twenty-five articles from five CBPRs were included. Among the elements present in the refined program theory, the presence of positive experiences of Indigenous partners in previous research, the development of relationships between Indigenous partners and researchers, and the respect and sensitivity of researchers to the history and perspective of Indigenous partners would contribute to the perception of a sense of equality with researchers among Indigenous partners and promote the participation of Indigenous community members in CBPRs.

**Conclusion:** This research could support the development of CBPRs with Indigenous communities that are more in line with local practices and thus support the development of T2D prevention interventions that are more deeply rooted in Indigenous knowledge.

# Children's COOPeration Denmark (Child-COOP) feasibility study: a participatory system dynamics approach targeting childhood health in a small Danish community

**Dr. Knud Ryom<sup>1</sup>, Dr. Helene Kirkegaard<sup>2</sup>**, Prof. Steven Allender<sup>3</sup>, Mrs. Christina Breddam<sup>4</sup>, Prof. Helle Terkildsen Maindal<sup>1,5</sup>, Dr. Jane Nautrup Østergaard<sup>2</sup>

<sup>1</sup>Department of Public Health, Aarhus University, Aarhus, Denmark, <sup>2</sup>Steno Diabetes Center Aarhus, Aarhus University Hospital, Aarhus, Denmark, <sup>3</sup>Global Centre for Preventive Health and Nutrition (GLOBE), Institute for Health Transformation, School of Health and Social Development, Deakin University, Geelong, Australia,

<sup>4</sup>Randers Municipality, Randers, Denmark, <sup>5</sup>Steno Diabetes Center Copenhagen, Copenhagen, Denmark

**O.1.05 - What have we learned recently on participatory research designs, UKK - Hall D (Level 2 - main floor), June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** Improving childhood health and well-being are complex due to the multi-level determinants and considered a wicked problem. System-based participatory approaches have shown promising potential to solve such complex problems. However, limited evidence exists using such methods in a Danish context. To determine the feasibility and acceptability of a system-based participatory approach targeting children's health and well-being in a Danish community with low socio-economic status.

**Methods:** This study evaluate the system-based participatory approach, by feasibility testing the approach using qualitative and quantitative methods. The approach is based on Group Model Building (GMB), a participatory system dynamics method, which has been used to engage the community, create consensus of the drivers of childhood health, identify local opportunities and develop context specific actions. The feasibility testing are based on a process evaluation, using interviews with stakeholders and tracking the implementation of actions through Rippled effects. Interview were collected six months after the GMB process and Rippled effects were assessed a year after first meeting of the GMB.

**Results:** Preliminary findings suggested that the feasibility of conducting a full-scale evaluation was confirmed for intervention acceptability, GMB process, implementation, capacity building and adherence. However, difficulties to organize within the local community and participating municipality were identified. Furthermore, communication efforts on the results from the project was found to be important in both the local community and municipality. Implementation of context specific actions is ongoing, Rippled effects of these will be presented.

**Conclusion:** The potential of this participatory system dynamics approach includes opportunities for community engagement and local capacity building and the feasibility suggests that an upscaling of the intervention for effectiveness testing is feasible.

# Reducing and breaking up sedentary behaviour at school among adolescents using a participatory approach

**Ms. Veerle Van Oeckel**<sup>1</sup>, Prof. Benedicte Deforche<sup>1,2</sup>, Ms. Janneke de Boer<sup>1</sup>, Ms. Lea Delfmann<sup>1</sup>, Prof. Maïté Verloigne<sup>1</sup>

<sup>1</sup>Ghent University, Ghent, Belgium, <sup>2</sup>Vrije Universiteit Brussel, Brussels, Belgium

**O.1.05 - What have we learned recently on participatory research designs, UKK - Hall D (Level 2 - main floor), June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** Adolescents spend the majority of the day sedentary, especially sitting in class at school and while making homework. As high levels of sedentary time are associated with adverse physical and mental health effects, effective interventions are needed. To improve effectiveness, literature recommends a participatory approach in which adolescents are actively involved in the choice and development of intervention strategies. This study aimed to evaluate the effectiveness and process of a participatory developed intervention targeting adolescents' sedentary behaviour at school and while making homework.

**Methods:** We conducted a clustered controlled trial in Flanders, Belgium, including 1 control school and 1 intervention school, each with 3 participating classes from Grade 7 or 8. The intervention was developed from November '21 to March '22 in close collaboration with pupils and teachers. The 6-week intervention included a.o. posters, movement breaks and standing desks. At pre- and post-test (March '22 and May-June '22), sedentary time and prolonged sedentary time were measured using an Axivity AX3 accelerometer and a questionnaire. The questionnaire also measured psychosocial determinants of (prolonged) sedentary time. Accelerometer and questionnaire data are being analysed in R using multilevel generalised linear models. Questionnaires and focus groups among pupils and teachers were used to evaluate the process of intervention implementation. Questionnaire data will be analysed using descriptive statistics. Focus group data will be analysed in NVivo using qualitative content analysis.

**Results:** 99 pupils (13.38±0.70 yr, 55.1% boys) participated in the study. Preliminary analyses of questionnaire data showed that the intervention was effective to reduce sedentary time, but not to increase the number of breaks in sedentary time, in class. No effects were found on (prolonged) sedentary time while making homework. The intervention was delivered as intended and was received by the majority of the pupils. In general, pupils and teachers liked the project and appreciated that the project was developed by pupils and teachers from their school.

**Conclusion:** Preliminary findings indicate that the intervention was effective to reduce sedentary time in the classroom. Furthermore, the intervention was implemented and received well. Therefore, a participatory approach can be promising to change adolescents' health behaviour.

# Culturally grounded health promotion with the Kanien'kehá:ka community of Kahnawà:ke

**Miss Hariata Tai Rakena**, Associate Professor Lee Schaefer

<sup>1</sup>Johns Hopkins University, Baltimore, USA, <sup>2</sup>University of Saskatchewan, Saskatoon, Canada

**O.1.05 - What have we learned recently on participatory research designs, UKK - Hall D (Level 2 - main floor), June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** Despite increasing calls to develop culturally grounded health promotion initiatives in partnership with Indigenous communities, evidence of this research approach is limited. In the First Nations community of Kahnawà:ke, the need to increase Kanien'kehá:ka cultural content, connection to land, spiritual aspects of wellbeing, and multigenerational interaction in community health promotion initiatives was highlighted. The purpose of this study was to gain an understanding of culturally meaningful elements involved in an Indigenous approach to holistic health, specific to the community of Kahnawà:ke. This exploration then informed the development of physical activity health resource recommendations.

**Methods:** This indigenist community-based participatory research utilized an instrumental case study design, driven by three research propositions: (a) the influence of Kahnawà:ke's natural environment on culture; (b) culturally driven physical activity as a vehicle for cultural practice; (c) community voice is strengthened via co-design. Two data collection methods were used; a contextual description of the case study setting, and unstructured knowledge holder conversations. Analysis drew on categorical aggregation and direct interpretation techniques.

**Results:** The findings situate the significance of Kahnawà:ke's name, translating to "on the river"; a place-based epistemology that underpins socio-political factors that simultaneously undermine and support the community's cultural continuation and wellbeing. The philosophical findings of the study present the importance of land, language, and culture as primary; and identity, belonging and wellbeing as secondary.

**Conclusion:** The practical study findings propose three pragmatic recommendations: (a) tools to introduce cultural traditions; (b) a practical experience of cultural traditions; (c) a discussion model. This research contributes toward Indigenous health promotion initiatives in physical activity and health curriculum, and offers insight into the expression of indigeneity, which is specific to place, nuanced, multidimensional, and ever evolving.



# Multivariate Physical Activity Association Patterns for Fundamental Motor Skills and Physical Fitness in Preschool Children

**Miss Elisabeth Straume Haugland<sup>1</sup>**, Dr. Ada Kristine Ofrim Nilsen<sup>1</sup>, Dr. Katrine Nyvoll Aadland<sup>1</sup>, Prof. Anthony David Okely<sup>1,2</sup>, Prof. Eivind Aadland<sup>1</sup>

<sup>1</sup>Western Norway University of Applied Sciences, Sogndal, Norway, <sup>2</sup>Early Start and School of Health and Society, University of Wollongong, Wollongong, Australia

**O.1.06 - How is early childcare education linked to child health? UKK - K1 (+K2) (Level 3), June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** F. Early care and education

**Purpose:** Physical activity (PA) is essential for children's development of fundamental motor skills (FMS) and physical fitness (FIT). However, there is limited evidence regarding which intensities that are strongest associated with FMS and FIT in young children. As many children have suboptimal FMS and FIT, early childhood has been highlighted as an important phase for optimizing PA levels, and such, possibly improve FMS and FIT. The Active Learning Norwegian Preschool(er)s (ACTNOW) cluster-randomized controlled trial sought to explore effects of a 7-month professional development intervention, co-created with preschool staff targeting preschoolers PA opportunities, and providing them the necessary competency to deliver the PA-intervention consisting of four core components to the children (moderate-to-vigorous PA, motor-challenging PA, cognitively engaging PA, and physically active learning) in their respective preschools. Using baseline data and a novel analytic approach, the aim of the present study was to determine the cross-sectional multivariate PA intensity signatures associated with FMS and FIT in children aged 3-5 years.

**Methods:** A total of 952 preschoolers (mean age 4.3 yr, 51% boys) were included from the ACTNOW-sample. Included participants provided valid data on PA (ActiGraph GT3X+), body mass index, socioeconomic status, and at least one FMS or FIT outcome during 2019-2020. FMS was evaluated by a process-oriented test battery (9 items) across three domains: locomotor skills, object control skills, and balance skills. FIT was assessed through three tests including speed-agility, handgrip, and standing long jump. We performed multivariate pattern analyses consisting of 17 PA intensity variables from the vertical axis, ranging from 0-99 to  $\geq 15000$  counts per minute.

**Results:** All outcomes were significantly associated with the PA intensity spectrum (explained variance for locomotor skills: 7.82%; object control skills: 4.97%; balance skills: 1.63%; speed agility: 5.78%; standing long jump: 9.31%; handgrip strength: 2.89%). Associations were strongest for PA intensities in the moderate and vigorous range. The results also showed that associations were significant across subgroups (sex and age).

**Conclusion:** Our findings show that the PA intensity spectrum is associated with both FMS and FIT in early childhood and that PA-promotion from an early age may benefit child development.

# Parents of preschoolers use multiple strategies to feed their children: Findings from an observational video study of parent-preschooler dyads

**Dr. Katie Loth**<sup>1</sup>, Ms. Ziyu Ji<sup>2</sup>, Dr. Nidhi Kohli<sup>3</sup>, Dr. Jennifer Fisher<sup>4</sup>, Dr. Jayne Fulkerson<sup>5</sup>

<sup>1</sup>Department of Family Medicine and Community Health, University of Minnesota Medical School, Minneapolis, USA, <sup>2</sup>Division of Biostatistics, School of Public Health, University of Minnesota, Minneapolis, USA,

<sup>3</sup>Department of Educational Psychology, University of Minnesota, Minneapolis, USA, <sup>4</sup>Department of Social and Behavioral Sciences, College of Public Health, Temple University, Philadelphia, USA, <sup>5</sup>School of Nursing, University of Minnesota, Minneapolis, USA

**O.1.06 - How is early childcare education linked to child health? UKK - K1 (+K2) (Level 3), June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Parents influence their children's eating through a broad range of food parenting practices, or goal-directed actions that parents engage to guide their child's eating behaviors. While experts agree that parent-child feeding relationships are bidirectional, most studies on food parenting practices to date have been cross-sectional, limiting our understanding of this bi-directional relationship. Guided by a current conceptual framework of food parenting, developed by Vaughn and colleagues, the current observational study aimed to: 1) characterize the broad range of food parenting practices used by parents of preschoolers during shared mealtimes at home, including differences by child gender, and 2) describe child responses to specific food parenting practices.

**Methods:** Forty parent-child dyads participated by completing a survey and video-recording two in-home shared meals. Meals were coded using an in-depth, bi-directional behavioral coding protocol that coded the occurrence of 11 distinct food parenting practices (e.g. indirect/direct commands, praise, bribes) and eight child responses (e.g., eat, refuse, cry/whine); the coding protocol was developed based on existing literature.

**Results:** Results revealed that parents engaged in a broad range of food parenting practices with their preschooler at meals. On average, parents used 10.51 (SD 7.83; Range 0-30) food parenting practices per mealtime. Use of *indirect* and *direct commands* to eat were the two most common practices used; these food parenting practices were used by 97.5% (n=39) and 87.5% (n=35) of parents at recorded meals, respectively. No one specific feeding practice consistently yielded compliance or refusal from the child; instead child responses were most often mixed (i.e., compliance followed by refusal, or refusal followed by compliance). However, use of *praise to prompt eating* was the food parenting practice that most often resulted in child compliance; 80.8% of children "only complied" following parent's use of praise as a prompt to eat.

**Conclusion:** Findings from this study deepen our understanding of the types and frequency of food parenting practices used by parents of preschoolers during meals eaten at home and illuminate child responses to specific food parenting practices. These observations set the stage for future observational studies seeking to more deeply understand the bi-directional relationship between parents and children at mealtimes.

# The Impact of Non-Parental Childcare on Preschool-Aged Children's Sleep Duration

**Ms. Hannah Parker<sup>1</sup>**, Dr. Sarah Burkart<sup>1</sup>, Dr. Layton Reesor-Oyer<sup>1</sup>, Ms. Michal T. Smith<sup>1</sup>, Ms. Lauren von Klinggraeff<sup>1</sup>, Mr. Roddrick Dugger<sup>1</sup>, Mr. James W. White III<sup>1</sup>, Ms. Olivia Finnegan<sup>1</sup>, Ms. Meghan Bastyr<sup>1</sup>, Dr. Christopher D. Pfledderer<sup>1</sup>, Dr. Elizabeth L. Adams<sup>1</sup>, Dr. R. Glenn Weaver<sup>1</sup>, Dr. Michael W. Beets<sup>1</sup>, Dr. Bridget Armstrong<sup>1</sup>

<sup>1</sup>University of South Carolina, Columbia, USA

**O.1.06 - How is early childcare education linked to child health? UKK - K1 (+K2) (Level 3), June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** F. Early care and education

**Purpose:** Adequate sleep duration is linked with positive health outcomes in children. Identifying day-level contextual factors that influence children's sleep duration can pinpoint potential targets for improving children's sleep. Daycare, a form of daily structure, is a contextual factor that may be related to sleep for preschool-aged children by supporting consistent bedtimes and waketimes. The purpose of this study was to examine if attending daycare on a given day was associated with sleep duration that same night.

**Methods:** Children (N=74, 4.7±0.9 yrs, 48.3% female, 63.2% White) were instructed to wear an Axivity AX3 accelerometer on their dominant wrist 24 hours/day for 14 days to measure sleep duration. Data were processed with GGIR (v2.6-4) and wear-time was a-priori defined as ≥16 hours/day. Caregivers reported the number of hours their child attended daycare each day. Linear mixed-effects models predicted day-level sleep duration from hours spent in daycare. We included child age, sex, household income and accelerometer wear-time as covariates. Weekends were excluded from analysis.

**Results:** Children wore accelerometers for an average of 9.3±1.2 (range = 1-11) days and children attended 3.4 days of daycare per week on average. Children spent an average of 5.0±2.9 hours/day in daycare and had an average of 6.6±2.8 hours of sleep/night. Mixed models indicated that for every additional hour children spent in daycare above their own average daycare time, children had 2.2 hours (95%CI = -2.7, 7.0) more sleep that night. Compared to children who attend less hours of daycare on average, children who attend more hours of daycare had less sleep on average (B = -1.5 hours; 95%CI = -12.7, 9.7).

**Conclusion:** On days when children spend more time in daycare than usual, they do not sleep significantly more that night. Similarly, children who spend more time in daycare on average, do not sleep more than compared to children who spend less time in daycare. Ultimately, more research is needed to understand other possible day-level factors that influence sleep duration in preschool-aged children.

# Policy, System, and Environmental Interventions Addressing Physical Activity in Early Childhood Education Settings: A Systematic Review

**Dr. Cody Neshteruk<sup>1</sup>**, Dr. Sarah Burkart<sup>2</sup>, Dr. Emily Flanagan<sup>3</sup>, Dr. Courtney Luecking<sup>4</sup>, Dr. Emily Melnick<sup>5</sup>, Dr. Chelsea Kracht<sup>3</sup>

<sup>1</sup>Duke University School of Medicine, Durham, USA, <sup>2</sup>University of South Carolina, Columbia, USA,

<sup>3</sup>Pennington Biomedical Research Center, Baton Rouge, USA, <sup>4</sup>University of Kentucky, Lexington, USA,

<sup>5</sup>Arizona State University, Phoenix, USA

**O.1.06 - How is early childcare education linked to child health?, UKK - K1 (+K2) (Level 3), June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** F. Early care and education

**Purpose:** Early childhood education (ECE) settings play a critical role in promoting children's physical activity. Policy, systems, and environment (PSE) approaches can facilitate physical activity in priority populations (i.e., racial/ethnic minorities, low resource groups) at the population-level. The purpose of this review was to 1) characterize the inclusion of priority populations within ECE physical activity interventions containing PSE approaches and 2) identify effective ECE interventions within these populations.

**Methods:** We systematically searched seven databases (January 2000-February 2022) for ECE-based interventions focusing on children (0-6 years) that utilized at least one PSE approach. Eligible studies included a physical activity (i.e., total physical activity) or related outcome (i.e., gross motor skills or physical activity environment) and population characteristics. Information related to the study population, recruitment strategy, intervention, outcomes, and main findings were extracted. Methodological quality was assessed using the Downs and Black Checklist. Central tendencies were used to describe study characteristics and a narrative synthesis was used to compare studies with effective outcomes.

**Results:** Forty-seven studies, representing 44 unique interventions were identified. Most studies were stand-alone ECE interventions (24/44, 55%) or an ECE intervention with a parent component (13/44, 30%). Half of studies included one PSE approach (22/44, 50%) and a fourth included three or more approaches (12/44, 27%). Physical environment changes [e.g., adding play equipment, modifying space (26/44, 59%)] and system level changes [e.g., integration of physical activity into routines or schedule changes, (22/50 50%)] were the most common PSE approaches. For Aim 1, almost half of studies were conducted in predominantly priority populations (20/44, 45%). Studies were primarily rated as good (51%) or fair (38%) methodological quality. For Aim 2, just ten studies demonstrated effectiveness at improving physical activity outcomes in priority populations, mostly improving the physical activity environment (6/10). Interventions were heterogeneous, containing a range of PSE approaches (1-4) and varied in length (15 weeks to 2 years).

**Conclusions:** Few ECE physical activity interventions containing PSE approaches were tested in priority populations. Even fewer were effective in improving physical activity outcomes. There are clear opportunities to target priority populations by incorporating PSE approaches in ECE physical activity interventions.

# Associations between 24-hour movement behaviours and executive functions in preschool children: A compositional analysis

Associate Prof. Dylan Cliff<sup>1</sup>, Dr. Zhiguang Zhang<sup>2</sup>, Associate Professor Steven Howard<sup>1</sup>, Dr. Jade Burley<sup>1</sup>, **Dr. Devan Antczak**<sup>1</sup>, Prof. Timothy Olds<sup>3</sup>, Dr. Dot Dumuid<sup>3</sup>

<sup>1</sup>University of Wollongong, Wollongong, Australia, <sup>2</sup>Beijing Normal University, Beijing, China, <sup>3</sup>University of South Australia, Adelaide, Australia

**O.1.06 - How is early childcare education linked to child health?, UKK - K1 (+K2) (Level 3), June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** F. Early care and education

**Purpose:** The movement behaviours (MB) of sleep, sedentary behaviour (SED), light (LPA) and moderate-to-vigorous physical activity (MVPA) form a finite composition over the 24-hour day. Previous studies investigating associations between MB and cognitive development in preschool children have used traditional analyses which don't account for the compositional nature of MB data. The aim of this study is to investigate compositional associations between MB and executive functions in preschool children.

**Methods:** Participants were 270 children (age =  $4.2 \pm 0.7$ y) from the Preschool Activity, Technology, Health, Adiposity, Behaviour and Cognition (PATH-ABC) study. MVPA, LPA and SED were measured using accelerometry (hip-mounted ActiGraph for 3-7 days) and sleep duration was parent-reported. Executive functions, including phonological and visual-spatial working memory (WM), inhibition and shifting, were assessed using the validated Early Years Toolbox. A single outcome developed using factor analysis to combine executive function domains was also used. Cross-sectional associations between MB and executive functions were examined using isometric log-ratio predictors in linear mixed models, adjusted for clustering, child age and sex, parental education, and children's level of television/program viewing and electronic/game app use. Differences in executive functions were estimated for the reallocation of time between MB.

**Results:** The MB composition was significantly associated with executive function ( $p=0.004$ ), and visual-spatial ( $p=0.019$ ) and phonological WM ( $p=0.003$ ). Relative to the remaining behaviours: MVPA was positively associated with executive function ( $\beta=0.50$ ,  $p=0.008$ ) and phonological WM ( $\beta=0.42$ ,  $p=0.029$ ); LPA was negatively associated with executive function ( $\beta= -0.83$ ,  $p=0.016$ ) and visual-spatial WM ( $\beta= -0.95$ ,  $p= 0.034$ ); SED was positively associated with executive function ( $\beta= -0.85$ ,  $p=0.001$ ), visual-spatial ( $\beta=0.97$ ,  $p=0.002$ ) and phonological WM ( $\beta=0.90$ ,  $p=0.001$ ), and; sleep was negatively associated with phonological WM ( $\beta= -0.70$ ,  $p=0.016$ ).

**Conclusions:** The MB composition was associated with executive function in preschool children, and increasing daily time in MVPA and SED, and decreasing LPA may support their executive function development.



# The association between children's outdoor play, activity intensity and spatial location at child care centres in Vancouver, BC

**Ms. Rachel Ramsden<sup>1,2,3</sup>**, Dr. Mariana Brussoni<sup>1,2,3</sup>

<sup>1</sup>University Of British Columbia, Vancouver, Canada, <sup>2</sup>British Columbia Children's Hospital Research Institute, Vancouver, Canada, <sup>3</sup>Human Early Learning Partnership, Vancouver, Canada

**O.1.06 - How is early childcare education linked to child health?, UKK - K1 (+K2) (Level 3), June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** F. Early care and education

**Purpose:** Children are more active when they are outside than indoors (Gray et al., 2015). Participation in outdoor play benefits children's physical development, spatial awareness, motor skills and physical activity level (Santer et al., 2007; Thomas & Harding, 2011; Tremblay et al., 2015). To enhance children's outdoor play, it is important to understand outdoor environments that support the early years (0-6 years). This study aims to understand the association between outdoor play behavior, activity intensity and outdoor play affordances at child care centres in Vancouver, Canada.

**Methods:** Data from 8 child care centres in the PROMoting Early Childhood Outside (PRO-ECO) study were used. A total of 130 children aged 2.5 – 6 years attending participating child care centres were recruited to participate in this study. The expanded *Tool for Observing Play Outdoors (TOPO)* (Loebach & Cox, 2020) and the *Children's Activity Rating Scale (CARS)* (Puhl et al., 1990) were mobilized using observational behavior mapping to measure children's observed outdoor play and activity intensity in relation to physical spatial location during designated outdoor play times at child care (Cox et al., 2018). Descriptive maps outlining the frequency of play behavior and activity level for each child care centre were produced. Multivariable logistic regression, adjusting for covariates, was used to assess the relationship between children's physical activity intensity and play behavior.

**Results:** A total of 1,733 play observations were collected in this cross-sectional study. Of these, 18.5% (321) involved moderate or fast movement activity intensity. Children had increased odds of participating in moderate and fast activity intensities when participating in physical outdoor play behaviours (OR: 3.61, 95% CI: 2.20:5.91), including gross motor, vestibular and rough-and-tumble play. Children exhibited higher activity intensities on pathways (e.g. trike paths), play structures (e.g. slides and climbing walls) and fence lines.

**Conclusions:** This study suggests that children's activity intensity is influenced by outdoor play behavior. In addition, outdoor affordances and spatial location are important predictors of children's activity intensity and play behavior. The results of this study will have implications for the planning and design of outdoor child care spaces to support outdoor play at increased activity intensities.

# Understanding older people's engagement with online yoga classes: a realist analysis

**Dr. Abby Haynes<sup>1,2</sup>**, Dr. Heidi Gilchrist<sup>2,1</sup>, Dr. Juliana S Oliveira<sup>1,2</sup>, Prof. Catherine Sherrington<sup>1,2</sup>, Prof. Anne Tiedemann<sup>1,2</sup>

<sup>1</sup>Institute for Musculoskeletal Health, The University of Sydney and Sydney Local Health District, Sydney, Australia, <sup>2</sup>School of Public Health, The University of Sydney, Sydney, Australia

**O.1.07 - Physical function and ageing - from prevention to intervention, UKK - K3+4 (Level 3), June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** The Successful AGEing (SAGE) RCT is testing an innovative 40-week yoga-based exercise program aimed at healthy ageing and fall prevention in 700 people aged 60+. Following COVID-19 restrictions, face-to-face classes moved online so some participants attended a hybrid program, while others attended classes entirely online. Our evaluation aimed to explain high adherence rates across all classes and positive feedback regarding improved physical function and mental wellbeing.

**Methods:** We conducted a two-stage realist process evaluation that developed and tested program theories. Initial theories about participants' engagement with the hybrid yoga program were generated via discussion with the research partners (comprising trial leaders and the yoga instructors). Data was collected via purposively sampled interviews and focus groups with participants (n=33) and yoga instructors (n=4), observations of classes, review of feedback forms (n=46) and routine trial data. Analysis involved coding deductively to the initial program theories, and inductively as we identified potential new/revised theories. Workshops with research partners reviewed unfolding analyses. A second stage of evaluation tested the program theories with participants in entirely online classes.

**Results:** Findings indicate that SAGE works well for most participants—regardless of the delivery mode—due to the quality of yoga instruction, program structure and inherent yoga characteristics. Gains in transitioning online included greater convenience, and uptake by those who find face-to-face classes too exposing. Losses included perceptions of less effective observation/correction by yoga instructors. Unsuitable home environments and pain create barriers for some. Yoga instructors developed strategies for maximising observation/correction, social connection, rapport and adaption to home constraints in teleyoga. Technology support was initially required by some participants and instructors. We identified 16 likely mechanisms configured within six program theories: 1. It's worth the effort, 2. In expert hands, 3. A communal experience, 4. Finding yoga within reach, 5. Building yoga habits and 6. Yoga's special properties.

**Conclusions:** Online delivery of SAGE retains much of the value of the well-received face-to-face program for most participants, and increases value and reach for some. This indicates that teleyoga can provide engaging, accessible and scalable yoga-based healthy ageing and fall prevention programs.

# The Effectiveness of a Computer-Tailored Web-Based Physical Activity Intervention Using Fitbit Activity Trackers in Older Adults (Active for Life): Randomized Controlled Trial

**Dr. Stephanie Alley**<sup>1</sup>, Associate Professor Jannique van Uffelen<sup>2</sup>, Dr. Stephanie Schoeppe<sup>1</sup>, Prof. Lynne Parkinson<sup>3</sup>, Dr. Susan Hunt<sup>1</sup>, Ms. Deborah Power<sup>1</sup>, Ms. Natasha Waterman<sup>1</sup>, Ms. Courtney Waterman<sup>1</sup>, Dr. Quyen To<sup>1</sup>, Prof. Mitch Duncan<sup>3</sup>, Prof. Anthony Schneiders<sup>1</sup>, Prof. Corneel Vandalanotte<sup>1</sup>

<sup>1</sup>Central Queensland University, Rockhampton, Australia, <sup>2</sup>KU Leuven, Leuven, Belgium, <sup>3</sup>The University of Newcastle, Callaghan, Australia

**O.1.07 - Physical function and ageing - from prevention to intervention, UKK - K3+4 (Level 3), June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** Preliminary evidence suggests that web-based interventions with computer-tailored advice and Fitbit activity trackers may be well suited for older adults. The aim of this study was to examine the effectiveness of Active for Life, a 12-week web-based physical activity intervention with 6 web-based modules of computer-tailored advice to increase physical activity in older Australians.

**Methods:** A total of 243 participants were randomly assigned to tailoring + Fitbit (n=78, 32.1%), tailoring only (n=96, 39.5%), and wait-list control (n=69, 28.4%). The computer-tailored advice was based on either participants' Fitbit data (tailoring + Fitbit participants) or self-reported physical activity (tailoring-only participants). The main outcome was change in wrist-worn accelerometer (ActiGraph GT9X)–measured moderate to vigorous physical activity (MVPA) from baseline to post-intervention (week 12). Generalized linear mixed model analyses were conducted with a  $\gamma$  distribution and log link to compare MVPA over time within each trial arm and between each of the trial arms.

**Results:** At post-intervention (week 12) study attrition was 28% (22/78) in the Fitbit + tailoring group, 39% (37/96) in the tailoring only group and 27% (18/69) in the wait-list control group. The overall time by group interaction for MVPA was borderline significant ( $p=.05$ ). There were no significant within-group changes for MVPA over time in the tailoring + Fitbit group (+3%, 95% CI –24% to 40%) or the tailoring-only group (–4%, 95% CI –24% to 30%); however, a significant decline was seen in the control group (–35%, 95% CI –52% to –11%). The tailoring + Fitbit group participants increased their MVPA significantly more than those in the control group (59%, 95% CI 6%-138%). However, no between group differences for MVPA changes over time were seen between the tailoring + Fitbit group and the tailoring only group (8%, 95% CI -27% to 59%) or between the tailoring only group and the control group (48%, 95% CI -1% to 20%).

**Conclusions:** A computer-tailored physical activity intervention with Fitbit integration resulted in improved MVPA outcomes in comparison with a control group in older adults.

# Leading the Way Together: A Cluster Randomised Controlled Trial of the 5R Shared Leadership Program in Older Adult Walking Groups

Prof. Katrien Fransen<sup>1</sup>, Prof. Tegan Cruwys<sup>2</sup>, Prof. Catherine Haslam<sup>3</sup>, Prof. Seghers Jan<sup>1</sup>, Dr. Julie Vanderlinden<sup>1</sup>, Prof. van Uffelen Jannique<sup>1</sup>, Mrs. Elvire Verbaander<sup>1</sup>, Prof. Iserbyt Peter<sup>1</sup>, **Prof. Filip Boen<sup>1</sup>**  
<sup>1</sup>KU Leuven, Leuven, Belgium, <sup>2</sup>The Australian National University, Canberra, Australia, <sup>3</sup>The University of Queensland, Brisbane, Australia

**O.1.07 - Physical function and ageing - from prevention to intervention, UKK - K3+4 (Level 3), June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** With a rapidly ageing society, healthy ageing has become a key challenge for older adults. Engagement in physical activity, and particularly walking, is a key strategy that contributes to healthy ageing. The present study aimed to evaluate the efficacy of a group walking program for older adults that incorporates the 5R Shared Leadership Program (5R<sup>S</sup>), compared to a regular group walking program, based on the social identity approach. By implementing a structure of shared leadership and strengthening peer leaders' identity leadership, 5R<sup>S</sup> has been associated with greater performance and well-being in other contexts.

**Methods:** Our cluster randomised controlled trial included 19 walking groups (i.e., the clusters;  $N = 503$ ;  $M_{age} = 69.23$  years,  $SD = 6.68$ ), in which older adults participated in a 12-week structured group walking program. Nine of these walking groups ( $n = 304$ ) were randomly assigned to the intervention condition and received additionally the 5R<sup>S</sup> program.

**Results:** Results revealed that 5R<sup>S</sup> was successful in strengthening the identity leadership qualities of the appointed peer leaders. Moreover, multilevel regressions showed that 5R<sup>S</sup> succeeded in increasing group cohesion and walking activity to a greater extent than a regular group walking program, while participants' group identification and well-being increased to a similar extent in both conditions. Using structural equation modelling, we found that group identification mediated the impact of peer leaders' identity leadership on group cohesion and well-being, but not walking activity.

**Conclusion:** We can conclude that by harnessing the capacity of the group and its peer leaders, 5R<sup>S</sup> constitutes a promising intervention to engage older adults in physical activity.

# Psychological and behavioural predictors of perceived ADL disability in older adults

**Miss Nicola Camp<sup>1</sup>**, Dr. Kirsty Hunter<sup>1</sup>, Dr. Daniele Magistro<sup>1</sup>

<sup>1</sup>Nottingham Trent University, Nottingham, United Kingdom

**O.1.07 - Physical function and ageing - from prevention to intervention, UKK - K3+4 (Level 3), June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** The way that older adults perceive their ability to function in various activities of daily living (ADLs) can influence their ability to live independently within a community. The underlying factors which influence this perception are unclear, however there are suggested links between several psychological and behavioural variables such as health perception, self-efficacy, depressive symptoms, and activity level. The purpose of this study was to identify the influences between perception of health, fear of falling (FoF), general self-efficacy (GSE), depressive symptoms (DS), physical activity level (PA), sedentary behaviour (SB), and perceived ADL disability.

**Methods:** A cross-sectional study design used an online survey consisting of several validated measures related to health perception, self-efficacy, fear of falling, depressive symptoms, physical activity/sedentary behaviour, and perceived ADL disability. This was distributed via email to local charity groups (e.g., U3A, AgeUK) and social media (e.g., Twitter, Facebook) with the aim of recruiting older adults. Data was analysed using a Pearson Bivariate Correlation analysis to describe the relationships between all variables. Following this, an structural equation modelling (SEM) PATH analysis was conducted to further understand the connections between each variable. To assess the fit of the model, the following criteria were used: Chi-squared statistic ( $p > 0.05$ ), normed chi-squared ( $\chi^2/df < 3$ ), Goodness-of-Fit index (GFI  $> 0.9$ ), Normed-Fit index (NFI  $> 0.9$ ), Comparative-Fit index (CFI  $> 0.9$ ) and Root Mean Square Error of Approximation (RMSEA  $< 0.05$ ).

**Results:** 473 participants completed the online survey (152 males, 321 females; mean  $\pm$  SD age  $69 \pm 7$  years). Pearson correlation analysis showed significant moderate-strong relationships between all variables ( $p < 0.05$ ). SEM path analysis model showed an excellent fit when all participants were included:  $\chi^2 = .67$  ( $p = .88$ ),  $\chi^2(3) = .22$ , GFI = .99, NFI = .99, CFI = .99, RMSEA = .01. There were significant interactions between PA and sedentary behaviour ( $b = 0.37$ ,  $p < 0.001$ ), as well as PA and depressive symptoms ( $b = -0.25$ ,  $p < 0.001$ ). SB was significantly predicted by DS ( $b = 0.33$ ,  $p < 0.001$ ), FoF ( $b = 0.10$ ,  $p < 0.05$ ) and GSE ( $b = -0.36$ ,  $p < 0.001$ ). Perceived ADL disability showed no significant interactions with being physically active, however there was a positive interaction with sedentary behaviour ( $b = 0.18$ ,  $p < 0.001$ ).

**Conclusion:** This model demonstrates the importance of psychological variables in the prediction of activity level and/or sedentary behaviour in UK community-dwelling older adults, as well as how these behaviours may predict perceived ADL disability.



# Trajectories of physical activity from mid to old age in women: 21 years of data from the Australian Longitudinal Study on Women's Health

**Dr. Yuta Nemoto<sup>1,2,3</sup>**, Prof. Wendy Brown<sup>1</sup>, Prof. Gita Mishra<sup>1</sup>, Dr. Gregore Mielke<sup>1</sup>

<sup>1</sup>The University of Queensland, Brisbane, Australia, <sup>2</sup>Tokyo Medical University, Tokyo, Japan, <sup>3</sup>Tokyo Metropolitan Institute of Gerontology, Tokyo, Japan

**O.1.07 - Physical function and ageing - from prevention to intervention, UKK - K3+4 (Level 3), June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** Women's physical activity levels vary during the life course. However, evidence of physical activity trajectories among mid-aged women is scarce. In this study, we analyzed 21 years of data from women born in 1946–51 to: 1) identify trajectories of physical activity in the transition from mid- to early old-age; 2) investigate the predictors of different trajectories of physical activity.

**Methods:** This study used data from the 1946–51 cohort of the Australian Longitudinal Study on Women's Health (N = 10,371). Mailed surveys from 1998 (Survey 2: age 47–52) to 2019 (Survey 9: age 68–73) at 3-year intervals were used to collect data on leisure-time physical activity, sociodemographic factors (country of birth, area of residence, educational attainment, marital status, economic status, working duration, number of births), health conditions (menopause status, BMI, physical function), and health behaviors (smoking, alcohol status). Physical activity was calculated as MET.minutes/week. Group-based trajectory modeling was conducted to identify physical activity trajectories from age 47-52 to 68-73. Multinomial logistic regression models were used to examine the predictors of physical activity trajectories.

**Results:** Five physical activity trajectories were identified: Low (13.3%), Moderate (50.4%), Moderate-increasing (22.2%), High (6.6%), and High-declining (7.7%). The High-declining trajectory showed significant physical activity decline from age 47–52 (median: 2647.3 MET.minutes/week) to age 68–73 (median: 799.2 MET.minutes/week). In comparisons between the High and High decline trajectories, living in outer regions, using hormone replacement therapy or oral contraceptives, peri-menopause, overweight and obese, and increased BMI between Surveys 2 and 5 were associated with higher odds of the High-declining trajectory. In contrast, high educational attainment, high economic status, more hours in paid work, never given birth, high physical function, and decreased BMI from Survey 2 to 5 were associated with lower odds of the High-declining trajectory.

**Conclusions:** There were five unique trajectories of physical activity from mid to old age. In addition to well-known determinants of physical activity, menopause status, number of births, and weight gain were associated with a declining trajectory. Menopausal women with children were more likely to gain weight. These results could inform the development of targeted physical activity interventions for menopausal women with children.

# Preventing decline in physical functioning in older age: The "whole picture" from the UK REACT trial

Prof. Afroditi Stathi<sup>1</sup>, **Prof. Colin Greaves<sup>1</sup>**, Prof. Jack Guralnik<sup>3</sup>, Prof. W Jack Rejeski<sup>4</sup>, Mx. The REACT Research Group<sup>2</sup>, Dr. Janet Withall<sup>1</sup>, Prof. Janice Thompson<sup>1</sup>, Prof. Gordon Taylor<sup>5</sup>, Prof. Heidi Johansen-Berg<sup>8</sup>, Prof. James Bilzon<sup>7</sup>, Prof. Selena Gray<sup>10</sup>, Dr. Rosina Cross<sup>5</sup>, Dr. Max Western<sup>7</sup>, Dr. Jolanne de Koning<sup>7</sup>, Dr. Peter Ladlow<sup>11</sup>, Dr. Jessica Bollen<sup>5</sup>, Dr. Sarah Moorlock<sup>1</sup>, Prof. Melvyn Hillsdon<sup>5</sup>, Prof. Ken Fox<sup>6</sup>, Dr. Tristan Snowsill<sup>5</sup>, Dr. Antonieta Medina-Lara<sup>5</sup>, Prof. Colin Green<sup>5</sup>

<sup>1</sup>University of Birmingham, Birmingham, United Kingdom, <sup>2</sup>Universities of Exeter, Bath, Bristol, Loughborough, Oxford, various, United Kingdom, <sup>3</sup>University of Maryland, Baltimore, USA, <sup>4</sup>Wake Forest University, Winston-Salem, USA, <sup>5</sup>University of Exeter, Exeter, United Kingdom, <sup>6</sup>University of Bristol, Bristol, United Kingdom, <sup>7</sup>University of Bath, Bath, United Kingdom, <sup>8</sup>University of Oxford, Oxford, United Kingdom, <sup>9</sup>Loughborough University, Loughborough, United Kingdom, <sup>10</sup>University of West of England, Bristol, United Kingdom, <sup>11</sup>Defence Medical Rehabilitation Centre (DMRC), Loughborough, United Kingdom

**O.1.07 - Physical function and ageing - from prevention to intervention, UKK - K3+4 (Level 3), June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** Mobility limitation in older age reduces quality of life, generates substantial health and social care costs, and increases mortality. The REtirement in ACTION (REACT) trial aimed to establish whether or not a community-based active ageing intervention could prevent decline in physical functioning in older adults at risk of developing mobility limitation.

**Methods:** Physically frail or pre-frail older adults (age $\geq$ 65; Short Physical Performance Battery (SPPB) score 4–9) were recruited into a two-arm, multi-centre randomised controlled trial, with parallel process and health economic evaluations. Participants were randomly assigned to receive brief healthy ageing advice or a 12-month, group-based, multimodal exercise and behavioural maintenance programme delivered in community centres. The primary outcome was lower limb physical function (SPPB score) at 24 months. The process evaluation included multistakeholder qualitative research and intervention fidelity assessment designed to evaluate a pre-specified logic model.

**Results:** 777 participants (mean age 77.6; 66% female) were randomised and primary outcome data at 24 months were provided by 628 (80.8%) participants. At 24-month follow-up, SPPB scores there was a significant and clinically meaningful difference favouring the intervention arm compared with controls (adjusted mean difference 0.49, 95%CI: 0.06 to 0.92). Self-reported muscle-strengthening activity (but not accelerometer-measured physical activity) significantly increased in the intervention arm compared with controls. Of those who started the intervention (16.1% did not engage), mean session attendance was 67.7%. Session attendance was associated with positive changes in exercise competence, relatedness and enjoyment and perceived physical, social and mental well-being benefits (but not changes in autonomy). Fidelity analysis revealed considerable scope for improving the delivery of the behavioural maintenance support sessions. The intervention was cost-effective compared with control, saving £103 per participant, with a quality-adjusted life-year gain of 0.04 (95%CI: 0.006 to 0.074) within the 2-year trial window.

**Conclusion:** A 1-year multimodal exercise and behaviour-maintenance intervention prevented decline in physical functioning in at-risk older adults over 24-months, whilst saving money for health services. The process evaluation identified ways to further increase programme effectiveness. Overall, the results indicate that the decline in physical functioning in older age is modifiable using affordable, targeted interventions like REACT.

# Barriers and Facilitators to Scaling Healthy Eating and Active Living Policy, Systems, and Environmental Interventions to More Rural Communities in Louisiana

Ms. Nila Pradhananga<sup>1</sup>, Dr. Laura Balis<sup>2</sup>, Dr. Denise Holston<sup>1</sup>, Dr. Melissa Cater<sup>3</sup>, Dr. Bailey Houghtaling<sup>1, 4, 5</sup>

<sup>1</sup>School of Nutrition and Food Sciences, Louisiana State University (LSU) & LSU Agricultural Center, Baton Rouge, USA, <sup>2</sup>Pacific Institute for Research and Evaluation, Louisville, USA, <sup>3</sup>Agricultural and Extension Education and Evaluation, Louisiana State University (LSU) & LSU Agricultural Center, Baton Rouge, USA, <sup>4</sup>Department of Human Nutrition, Foods, and Exercise, Virginia Tech, Blacksburg, USA, <sup>5</sup>Gretchen Swanson Center for Nutrition, Omaha, USA

**O.1.08 - Scaling up interventions in community and health care settings, Clarion Hotel Gillet - Room Gillesalen, June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** Louisiana Cooperative Extension Services (LCES) is part of a national network of practitioners in the United States charged with bridging innovations to local communities. The purpose of this study was to identify barriers and facilitators to LCES delivery of healthy eating and active living policy, systems, and environmental (PSE) interventions in rural Louisiana communities to inform scaling.

**Methods:** A qualitative research design was used. Semi-structured focus group discussions with LCES Family and Consumer Science practitioners (n=40 participants), following the updated 2022 Consolidated Framework for Implementation Research (2022 CFIR), were conducted in 2022 at each of five regional LCES trainings. LCES has identified PSE interventions as a priority area, although they have not been fully adopted across rural Louisiana. Focus group discussions were audio recorded and transcribed verbatim. The constant comparison method and a deductive coding approach following the 2022 CFIR was used, including *Inner Setting* (LCES organization), *Outer Setting* (rural communities), *Innovation* (healthy eating and active living PSE interventions), and *Individuals* (implementation actors/partners). Barrier or facilitator were also used as codes. Analysis was iterative: two researchers independently coded transcripts using a qualitative analysis software and met to discuss discrepancies; after initial coding, two researchers reviewed all codes for coding agreement and re-coded when appropriate based on consensus.

**Results:** LCES practitioners described more barriers (n=210) than facilitators (n=100). The most prominent barriers were at the *Inner Setting*, specifically communication streams, inconsistent access to knowledge and information, limited available resources, and issues with organizational culture. In addition, barriers in the *Outer Setting* were also prominent, such as challenges with community partnerships and the rural community context. *Individual* barriers mainly included limited time, knowledge, and skills to fully prioritize rural PSE interventions. These barriers were coupled with *Innovation* barriers, regarding the complexity of rural PSE interventions for healthy eating and active living. LCES practitioners also described multiple facilitators at these levels aiding in delivery of rural PSE interventions for healthy eating and active living.

**Conclusions:** Barriers should be matched to implementation strategies that are needed to support ongoing rural PSE interventions and to ensure successful scaling to more rural communities in Louisiana.

# Health-promoting and health-constraining environmental features and physical activity and sedentary behaviour in adolescence: a geospatial cross-sectional study

**Dr Matthew Hobbs<sup>1</sup>**, Dr. Tom Stewart<sup>2</sup>, Dr. Lukas Marek<sup>1</sup>, Prof. Scott Duncan<sup>2</sup>, Associate Professor Malcolm Campbell<sup>1</sup>, Prof. Simon Kingham<sup>1</sup>

<sup>1</sup>University of Canterbury, Christchurch, New Zealand, <sup>2</sup>Auckland University of Technology, Auckland, New Zealand

**O.1.08 - Scaling up interventions in community and health care settings, Clarion Hotel Gillet - Room Gillesalen, June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Adolescence is a key period of the life course characterised by physiological, mental and social change and the built environment may influence adolescent physical activity and sedentary behaviour. This study first examines the extent of access to both health-promoting (i.e. parks) and health-constraining (i.e. fast-food outlets) environmental features. Second, it investigates associations between environmental exposure to such features and physical activity, sedentary behaviour, and travel behaviours.

**Methods:** Data were sourced from the Built Environment in Adolescent New Zealanders (BEANZ) study (n=194) an eight-site cross-sectional study comprising a robust sample of adolescents. Access to environmental features was based on the New Zealand Healthy Location Index (HLI); a nationwide composite measure of access to five health-promoting (i.e. physical activity facilities) and five health-constraining (i.e. fast-food outlets) features. We combined the HLI, a multidimensional environmental measure with accelerometry and global positioning system data to define access to the environment. Linear mixed models evaluated the association between different levels of access to health-promoting and health-constraining environments, and each physical activity and transportation outcome variable while considering the multistage sampling design (students nested within schools).

**Results:** Adolescents spent most of their time in very close proximity to a range of both health-promoting and health-constraining features. Several associations were detected between time spent in areas with the best access to health-promoting features and reduced sedentary time and less travel by motor vehicle. For instance, for every 1% increase in time in areas with the lowest access to health-promoting environments, sedentary time increased by 1.6 minutes, vehicular travel increased by 0.47 minutes, and light intensity activity increased by 0.41 minutes.

**Conclusions:** This study addresses an important gap in our current understanding of environmental exposure and access by integrating GPS and accelerometry data. We respond to calls to move beyond static definitions of place, to more dynamic metrics combining GPS and accelerometry as well as multidimensional environmental metrics. Our findings add to a growing body of robust evidence which posits that the decreases typically seen during adolescence in physical activity and increases in sedentary behaviour may be partly due to the environments where they spend their time.

# Influence of policy on the effective and sustainable delivery of exercise referral schemes: a retrospective analysis (1990-2020).

**Prof. Emily Oliver<sup>1</sup>**, Dr. Caroline Dodd-Reynolds<sup>2</sup>

<sup>1</sup>Newcastle University, Newcastle, United Kingdom, <sup>2</sup>Durham University, Durham, United Kingdom

**O.1.08 - Scaling up interventions in community and health care settings, Clarion Hotel Gillet - Room Gillesalen, June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** Exercise referral schemes involve the delivery of structured physical activity support to those with, or at risk of, poorer health. National policy guidance and approaches differ, and delivery environments have changed substantially since exercise referral's emergence. Previous work highlights ambiguity in national guidelines and varying local practices (Oliver et al., 2016); however, beyond this there has been little examination of how policy contexts can influence schemes. Where this has been explored in single schemes (e.g., Henderson et al., 2018), operational cultures have been identified as critical determinants of sustainability. Here, we redress this imbalance to examine factors that have driven, undermined, or supported effective and sustainable exercise referral practices. We integrate policy, political and behavioural sciences to explore how and why schemes, and the people working within them, have changed over the past 30 years.

**Methods:** A retrospective naturalistic design was adopted. Schemes were purposively selected for variety in terms of governance (e.g., nationally-governed schemes, local authority led, charity led), with participants (e.g., commissioners, delivery and managerial staff) recruited using snowball and purposive sampling methods. Qualitative and visual data were generated using semi-structured interviews, adapting life-history methodologies (such as storyboarding, life history diagrams e.g., Söderström, 2020) to triangulate scheme histories.

**Results:** Analysis of data is ongoing. A three-stage approach is being applied, using: (i) narrative policy analysis to 'story' changes in the policy landscape, (ii) Hood's (1986) taxonomy to identify influential policy tools (e.g., the role of funding "treasure" and governance "authority"), and (iii) Archer's (2020) morphogenetic framework to analyse how agency, culture and structure within schemes are influenced.

**Conclusion:** Findings will inform recommendations for the development of sustainable physical activity referral systems that can effectively target health inequalities. Implications will have broad interest for policymakers, practitioners, and researchers working in community-based provision (e.g., social prescribing systems) and physical activity promotion. This high-level longitudinal analysis offers additional learning from its methodological innovation (adapting life-history methods to scheme entities) and the integration of multiple disciplinary perspectives.



# Equipping the future generation of teachers to promote optimal academic outcomes through physical activity: TransformUs Higher Ed

**Dr. Natalie Lander**<sup>1</sup>, Dr. Emiliano Mazzoli<sup>1</sup>, Prof. Amanda Telford<sup>2</sup>, Dr. Kate Ridely<sup>3</sup>

<sup>1</sup>Deakin University, Melbourne, Australia, <sup>2</sup>RMIT University, Melbourne, Australia, <sup>3</sup>Flinders University, Adelaide, Australia

**O.1.08 - Scaling up interventions in community and health care settings, Clarion Hotel Gillet - Room Gillesalen, June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** *TransformUs Higher Ed* equips future teachers with pedagogies, strategies and concepts to promote academic outcomes through physical activity for the students they go on to teach. More than 1200 undergraduate teachers from one Australian university have participated, thus far. A limitation is the lack of understanding around implementation and effectiveness at a population-level. Therefore, the aim of this research was to expand the program across two universities and investigate the effect of the program on undergraduate teachers' teaching confidence and competence, and their willingness to deliver active pedagogies in current and future teaching, in comparison to a control university group.

**Methods:** Pre/post surveys with pre-service teachers ( $n = 580$ ) and post-program interviews with lecturers ( $n = 12$ ) were conducted. The implementation and evaluation were guided by RE-AIM. Surveys were analysed via linear mixed models, checklists via descriptive analysis and a framework approach was used for the interview data.

**Results:** Significant improvements were observed in undergraduate teachers' confidence and competence, as well as their willingness to implement physically active pedagogic strategies following the intervention, in comparison to the control. Three key themes spanning multiple dimensions informed recommendations for program scalability: "co-design", "embedded in practice" and "evidence of impact".

**Conclusions:** This research provided important knowledge for improving evidence-based practice within organisations and systems. *TransformUs Higher Ed* has the potential to advance the teaching capability of teachers, and transform the learning experience of all primary school students.

# What happens to school healthy eating and physical activity programs when implementation support stops?

**Dr. Nicole Nathan**<sup>1,2,3</sup>, Dr. Alix Hall<sup>1,2,3</sup>, Mr. Adam Shoesmith<sup>1,2,3</sup>, Prof. Luke Wolfenden<sup>1,2,3</sup>

<sup>1</sup>The University of Newcastle, Newcastle, Australia, <sup>2</sup>Hunter New England Population Health, Newcastle, Australia, <sup>3</sup>National Centre of Implementation Science, Newcastle, Australia

**O.1.08 - Scaling up interventions in community and health care settings, Clarion Hotel Gillet - Room Gillesalen, June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** Governments have invested billions in the implementation, at scale, of chronic disease prevention (CDP) interventions in schools. However <20% of public health interventions are sustained once implementation support is removed. Of those that do sustain it is unknown if this is related to the characteristics of the CDP itself, the strategies used to support their initial implementation or both. We will present a series of case studies from >15yrs of school-based research (of both success and failures) to explore the contexts and circumstances where CDP interventions have continued or ceased in schools once implementation support has stopped. Example of these case studies include:

## **Methods and Results:**

Example 1: *Crunch&Sip* is a school-based program where teachers provide a time in class for children to eat a piece of fruit and/or vegetables that they have brought from home. The program was first introduced in 2006 and achieved a high level of implementation across a large population of schools in Australia (approx. 80%) following an initial 11-15 month implementation period. During initial implementation schools received training, program resources, incentives, follow-up support, and implementation feedback from external health promotion unit. 10yr longitudinal data from a population wide monitoring survey found the program continued to be implemented in >90% of schools that had initially implemented it.

Example 2: A 12-month multi-strategy intervention was undertaken to support NSW schools' implementation of a mandatory physical activity policy. Implementation support included: identifying and training school champions, on-going support, provision of resources, principals mandated change and action planning. Overall 400 teachers provided primary outcome data. Immediately following the intervention, intervention teachers recorded a greater increase in weekly minutes of physical activity than control teachers by approximately 44.2 min (95% CI 32.8 to 55.7;  $p<0.001$ ). However at longer term follow-up the effect size had significantly dropped 27.1 min (95% CI 15.5 to 38.6;  $p\leq 0.001$ ).

**Conclusions:** Policy makers, practitioners and researchers will, through case study analysis, identify characteristics of interventions, contexts and initial implementation support strategies that influence CDP to sustain or are at risk of failing.

# Patient and Physician Engagement in a Produce Prescription Program at a Federally Qualified Health Center

**Associate Professor Kelly Ylitalo**<sup>1</sup>, Ms. Wendy Cox<sup>2</sup>, Ms. Braden Popelsky<sup>1</sup>, Ms. Reanna Clavon<sup>1</sup>, Dr. Kathryn Janda<sup>1</sup>, Dr. Matt Rafalski<sup>2</sup>, Dr. John Gill<sup>2</sup>, Ms. Katie Walter<sup>3</sup>, Dr. Burritt Hess<sup>2</sup>

<sup>1</sup>Baylor University, Waco, USA, <sup>2</sup>Waco Family Medicine, Waco, USA, <sup>3</sup>World Hunger Relief, Waco, USA

**O.1.08 - Scaling up interventions in community and health care settings, Clarion Hotel Gillet - Room Gillesalen, June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** The “Food as Medicine” movement encourages public health and medical professionals to recognize the role of diet in health and embrace solutions to improve healthy eating and food access. This study describes patient and physician engagement with a Produce Prescription (PRx) program to improve access to fresh vegetables in a health care setting.

**Methods:** The PRx program (2017-2021) was a partnership between a multi-site Federally Qualified Health Center, a sustainable farm, and an academic institution in central Texas. During biannual harvest seasons, patients redeemed “prescriptions” for initial produce boxes and subsequent “refills.” Baseline cross-sectional surveys on food insecurity, measured using the United States Household Food Security Module, were embedded in electronic medical records. Refill surveys assessed satisfaction and confidence. Electronic surveys to prescribing physicians assessed program knowledge, expectations, and motivations for prescriptions to potential participants. Frequencies and proportions were used to describe programmatic data, patient food insecurity, patient satisfaction, and physician feedback.

**Results:** Across 8 biannual harvest seasons and 9,986 produce boxes, 8,046 patients received prescriptions, 6,227 patients redeemed prescriptions for  $\geq 1$  box, and 720 patients redeemed for  $\geq 2$  boxes. Initial prescription redemption rates ranged from 64.5-82.7% across all seasons; refill rates ranged from 6.8-16.7%. Among participants, 70.8% sometimes or often worried food would run out, 66.7% sometimes or often ran out of food, and 71.7% sometimes or often could not afford balanced meals. Among those with refills, there was very high satisfaction with food quality (95.8%), variety (97.2%), and 94.2% were confident preparing meals from produce. Among physicians (n=22), 100% self-reported knowing enough about PRx to make patient recommendations and 100% believed PRx had potential benefit for patients. Common motivating factors for writing PRx prescriptions were chronic conditions (77%), obesity (73%), low socioeconomic status (64%), and food insecurity (59%).

**Conclusions:** The PRx program created cross-sector capacity to deliver a perishable food program within a multi-site health care system. PRx participants reported high levels of food insecurity and high levels of satisfaction with produce. Incorporating “Food as Medicine” initiatives and food insecurity screening in low-income health care settings may help patients and physicians prioritize nutrition and food access.

# Systems approaches to scaling up in public health: A systematic review and narrative synthesis of evidence

Dr. Harriet Koorts<sup>1</sup>, Dr. Jiani Ma<sup>1</sup>, Dr. Christopher Swain<sup>2</sup>, **Prof. Harry Rutter**<sup>3</sup>, Prof. Jo Salmon<sup>1</sup>, Dr. Kristy Bolton<sup>1</sup>

<sup>1</sup>Institute for Physical Activity and Nutrition (IPAN), School of Exercise and Nutrition Sciences, Deakin University, Geelong, Australia, <sup>2</sup>Cancer Epidemiology Division, Cancer Council Victoria, Melbourne, Australia,

<sup>3</sup>Department of Social and Policy Sciences, University of Bath, Bath, United Kingdom

**O.1.08 - Scaling up interventions in community and health care settings, Clarion Hotel Gillet - Room Gillesalen, June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** Despite many global public health successes at scale, efficacious interventions seldomly achieve system-wide integration for population-level impact. Scaling up health interventions is complex, and we know little about the *how* of scaling up. For example, how to support researchers, policymakers, and practitioners to operationalise systems thinking approaches when scaling up in research and in practice. This presentation will describe systematic review findings that sought to explore how systems approaches have been used in scaling up public health interventions.

**Methods:** The review follows the PRISMA guidelines and is registered with PROSPERO. Seven electronic databases were searched for studies published during 2016-2021. Eligible studies involved interventions targeting at least one of the four chronic disease risk factors (e.g., physical inactivity, smoking, alcohol consumption, diet/obesity) and were conducted in a real-world setting or an evaluation of a previously scaled intervention. A narrative synthesis approach was used to interpret how systems approaches were operationalised in the scale-up process and/or evaluate scale-up outcomes.

**Results:** Twenty-one studies were eligible. Studies were categorised as (i) high, (ii) moderate, and (iii) low use of systems approach in scaling up. Five studies (classified as '*high* use of systems approach') planned and implemented the scale-up with an explicit focus on relations between system elements and using system changes to drive impact at scale. Seven studies (classified as '*moderate* use of systems approach') considered the systems elements impacting the scale-up process or outcome but were not embedded from the outset as to what is required to achieve system-level changes. Eight studies (classified as '*low* use of systems approach') were designed to work at multiple levels among multiple agencies by default in an intervention setting, although the complexity of the system and the relationsd between the system elements were not articulated.

**Conclusions:** The use of systems approaches in scale-up is still in its infancy. Systems approaches to guide scale-up processes, or to inform evaluation design, were rarely explicitly described in studies. When systems approaches were described, they were usually brief or lacked theoretical explanations. Increased guidance is needed on how to operationalise and communicate the use of systems approaches in practice.

# Barriers and facilitators to online grocery shopping among Supplemental Nutrition Assistance Program (SNAP) Participants: A Mixed Method Study

**Dr. Alison Gustafson**<sup>1</sup>, Ms. Emily DeWitt<sup>1</sup>, Ms. Rachel Gillespie<sup>1</sup>, Dr. Elizabeth Anderson Steeves<sup>2</sup>

<sup>1</sup>University of Kentucky, Lexington, USA, <sup>2</sup>Gretchen Swanson Nutrition Center, Knoxville, USA

**O.1.09 - Multi-source data collection using e- & m-Health methodologies, towards improved mental and physical health, Clarion Hotel Gillet - Room Akademien, June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** The Supplemental Nutrition Assistance Program (SNAP) Online Purchasing Pilot (OPP) allows households to use their SNAP Electronic Benefit Transfer (EBT) to purchase groceries online from authorized retailers across the United States (US). There have been efforts to expand online shopping options for SNAP recipients, yet few SNAP shoppers use their EBT benefits online. An online shopping intervention was developed and tested to improve online shopping practices and purchase of fruits and vegetables.

**Methods:** This mixed methods study examined impact of a pilot effectiveness study across three arms: 1) brick and mortar shopping “BM”; 2) online shopping with no behavioral intervention components “O”; and 3) online shopping + place-based text message and behavioral support for online shopping “O+I” [SNAP benefits (total sample, n=129, n=40 SNAP recipients and n=89 non-SNAP recipients)]. We also conducted qualitative structured interviews with SNAP participants who were part of arm 2 or 3 of the intervention (n=26). Descriptive statistics and t-tests assessed quantitative findings, and conventional content analysis was used to identify qualitative themes. Quantitative and qualitative results were layered and interpreted collectively.

**Results:** Survey results found no differences in perceptions of online grocery shopping between SNAP and non-SNAP recipients (p-values ranged from 0.2-1.0), and that 97% of SNAP recipients surveyed agreed that they felt comfortable using their SNAP benefits online. For those who used their EBT card online in “O+I” spent more on fruits and vegetables compared to those who didn’t use their EBT card online in “O+I” (\$12.89 vs. \$7.98, p=.02).

Five qualitative themes were identified and provided valuable context to the quantitative survey results. Themes included: challenges to online shopping, benefits to online shopping, online shopping using SNAP benefits, financial factors, and future use of online shopping.

**Conclusions:** Using SNAP/EBT online seems to present few unique barriers and assists with purchasing more fruits and vegetables with tailored assistance through text messages and behavioral nudges. The results of this study can be used to inform policy and programmatic actions to make online grocery shopping more appealing to SNAP recipients and reduce barriers to entry in the US.



# Impact of a web-based physical activity intervention on depression, anxiety, stress and quality of life

**Prof. Corneel Vandelanotte**<sup>1</sup>, Prof. Mitch Duncan<sup>2</sup>, Prof. Ron Plotnikoff<sup>2</sup>, Dr. Amanda Rebar<sup>1</sup>, Dr. Stephanie Alley<sup>1</sup>, Dr. Stephanie Schoeppe<sup>1</sup>, Dr. Quyen To<sup>1</sup>, Prof. Kerry W Mummery<sup>3</sup>, Associate Professor Camille Short<sup>4</sup>  
<sup>1</sup>Central Queensland University, Rockhampton, Australia, <sup>2</sup>University of Newcastle, Newcastle, Australia, <sup>3</sup>University of Alberta, Alberta, Canada, <sup>4</sup>University of Melbourne, Melbourne, Australia

**O.1.09 - Multi-source data collection using e- & m-Health methodologies, towards improved mental and physical health, Clarion Hotel Gillet - Room Akademien, June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Regular engagement in physical activity is associated with improved mental health. However, few studies have investigated the impact of web-based physical activity interventions on mental health outcomes. Those studies that did examine this had small sample sizes and only used self-report measures for physical activity. Therefore, this study examined the impact of a web-based personally tailored physical activity intervention on depression, anxiety, stress and quality of life using both self-reported and device-based measures in a fully powered sample.

**Methods:** A total of 501 Australian adults were randomised into either a control group or a pooled intervention condition who received a 3-month physical activity intervention delivered via personalised webbased videos or personalised website-text. Previously, this intervention has demonstrated to improve self-reported physical activity (Active Australia Survey), but not device-measured (GT3X-Actigraph accelerometer) physical activity. At baseline, 3- and 9-months, depression, anxiety and stress were assessed using the DASS21, and quality of life was assessed using the SF-12V2. General linear mixed models examined differences between groups over time.

**Results:** Most participants (>80%) reported normal levels of depression, anxiety or stress. Relative to baseline levels, significant reductions of depression, anxiety, stress and the SF12 mental health component were observed in the pooled intervention group at 3 and 9 months. Relative to the control group, significant reductions were observed in the pooled intervention group for depression and stress (3-months only) and anxiety (3- and 9-months), but not quality of life.

**Conclusion:** A web-based intervention that was not effective in improving device-measured physical activity, but that was effective to improve self-reported physical activity, did have a positive impact on depression, anxiety, stress and mental quality of life. To our knowledge our study is the first to examine mental health outcomes in a trial that assessed physical activity changes in response to a web-based intervention both using devices and a self-reported questionnaire. However, these findings need to be confirmed in future studies.

# Provision of social support is associated with 3-month weight loss in the mobile Lifestyle Intervention for Food and Exercise (mLIFE) study

**Dr. Gabrielle Turner-McGrievy<sup>1</sup>**, Dr. Courtney Monroe<sup>1</sup>, Dr. Carolina Delgado-Diaz<sup>1</sup>, Dr. Kelli DuBois<sup>1</sup>, Ms. Halide Aydin<sup>1</sup>, Dr. Sara Wilcox<sup>1</sup>

<sup>1</sup>University of South Carolina, Columbia, USA

**O.1.09 - Multi-source data collection using e- & m-Health methodologies, towards improved mental and physical health, Clarion Hotel Gillet - Room Akademien, June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** To examine baseline characteristics of the mobile Lifestyle Intervention for Food and Exercise (mLIFE) study participants as well as the relationship between social support activities and 3-month weight loss in cohort 1.

**Methods:** Adults with overweight/obesity were recruited to participate in a one-year remotely delivered intervention (two total cohorts) and could live anywhere in the U.S. The intervention is delivered through the mLIFE app and includes podcasts, tips of the day, diet and physical activity (FitBit) self-monitoring, and objective tracking of weight (FitBit Aria scale). Social support-related activities in the app include requesting and responding to support, providing a “thumbs up” to other participants when they complete a self-monitoring or intervention activity, and reaching out to participants who haven’t logged on in the past 24 hours. Participants are randomized to the mLIFE+points group (receive up to 8 points a day for completing different social support activities) or the mLIFE group (participants can do the same social support activities but do not see their points). Among participants with 3-month weight data (data combined across group assignment), linear regression was conducted to examine the relationship between total number of social support activities (points earned) and 3-month % weight loss, adjusting for age, race, and sex. We hypothesized that the total number of social support activities (e.g., total points) would be significantly associated with weight loss.

**Results:** Participants (n=106, mean age 49.3±11.8 y, 93% female, mean BMI 33.6±5.5 kg/m<sup>2</sup>) were recruited for cohort 1 (76 participants had objective weight data and 102 participants had points data). Participants were from 29 different U.S. states. Participants earned a mean of 214.9±137.5 points for social support activities (out of 672 possible points in 12 weeks) and lost a mean of -3.5±3.8% body weight. Results of the linear regression indicated that number of points earned significantly predicted % weight loss ( $R^2=0.17$ ,  $F(4,74) = 3.60$ ,  $p=0.01$ ), such that for every 100 social support activities, participants lost -0.5% of their body weight ( $B = -0.005$ ,  $p=0.014$ ).

**Conclusions:** Providing social support was associated with weight loss at 3 months. Future work will examine the one-year outcomes among the complete sample.

# Ecological momentary assessment of leisure-time physical activity and active transport: preliminary findings from the Continuous Observations of Behavioural Risk Factors in Asia (COBRA) study

**Dr. Sarah Edney<sup>1</sup>**, Assistant Professor Chuen Seng Tan<sup>1</sup>, Prof. Rob Van Dam<sup>1,2</sup>, Dr. Falk Müller-Riemenschneider<sup>1,3</sup>

<sup>1</sup>National University of Singapore, Singapore, Singapore, <sup>2</sup>The George Washington University, Washington DC, USA, <sup>3</sup>Charité-Universitätsmedizin Berlin, Berlin, Germany

**O.1.09 - Multi-source data collection using e- & m-Health methodologies, towards improved mental and physical health, Clarion Hotel Gillet - Room Akademien, June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** The Continuous Observations of Behavioural Risk Factors in Asia (COBRA) study aims to understand how health behaviours are shaped by interactions between people and their environments. The purpose of this study was to describe patterns of leisure-time physical activity and active transport as reported via ecological momentary assessments (EMA).

**Methods:** Participants were sent 6 EMA surveys per day between 8am and 9.30pm for 9 days. Each EMA asked about engagement in leisure-time physical activity or active transport since the previous EMA survey. Participants responded to 87.0% of all EMA surveys (15,883/18,252 surveys), and each took 1.5 minutes (standard deviation [SD] 2.6) to complete. For the current study, EMA responses were collapsed to the day-level (i.e., 9 days per participant) and are analysed descriptively.

**Results:** Participants (N=338) were mostly female (63.6%) with a mean age of 41.3 years (SD 13.7) and mean BMI of 23.4kg/m<sup>2</sup> (SD 4.2), 63.6% female), who provided a total of 3018 person-days of EMA monitoring (out of 3042 days, 99.2%). Participants reported engaging in leisure-time physical activity or active transport on 27.6% (832/3018) and 28.2% (850/3018) of days, respectively. On average, participants reported engaging in leisure-time physical activity on 2.5 (SD 2.4) days per week, and active transport on 2.5 (SD 2.0) days per week. Over 70% of participants reported 1 or more days of leisure-time physical activity (71.9%: 243/338) or active transport (73.4%: 248/338). Approximately one-fifth of participants reported 5 or more days of leisure-time physical activity (19.2%: 65/338) or active transport (22.8%: 77/338). Across the week, the proportion of participants who reported leisure-time physical activity (30.8%) or active transport (30.1%) on the weekend was higher as compared to weekdays (leisure-time physical activity: 26.1%; active transport: 27.2%). Further analysis, including linkage to accelerometer data, will be available within the coming months.

**Conclusion:** Gaining a comprehensive understanding of patterns of physical activity is essential to aid the design of public health interventions. Our next steps are to: (1) examine the social and physical context of physical activity as reported via EMA, and (2) investigate day-level associations between physical activity and social and physical environment contextual factors.

# Understanding participation in an online diabetes prevention programme. A mixed methods study

**Ms. clair Haseldine**<sup>1</sup>, Prof. Patricia M Kearney<sup>1,2</sup>, Dr. Grainne O'Donoghue<sup>3</sup>, Dr. Fiona Riordan<sup>1</sup>, Dr. Claire Kerins<sup>1</sup>, Ms. Margaret Humphreys<sup>2</sup>, Ms. Liz Kirby<sup>2</sup>, Dr. Sheena McHugh<sup>1</sup>

<sup>1</sup>University College Cork, Cork, Ireland, <sup>2</sup>Health Service Executive, Cork, Ireland, <sup>3</sup>University College Dublin, Dublin, Ireland

**O.1.09 - Multi-source data collection using e- & m-Health methodologies, towards improved mental and physical health, Clarion Hotel Gillet - Room Akademien, June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Diabetes prevention programmes (DPPs) prevent diabetes in those at high risk. Yet, many people at high risk are not referred or do not participate in DPPs. Digital DPPs (e.g., online or mobile) provide new ways to reach participants, however there is limited research on factors that affect participation in such programmes. To gain an understanding of factors influencing participation in digital diabetes prevention programmes

**Methods:** This study uses an explanatory sequential mixed methods design. Quantitative administrative data (e.g., age, gender, and reasons for declining) were collected by educators on all those invited to a national online DPP in Ireland between June 2021 and September 2022. A bespoke questionnaire (adapted from the English-DPP evaluation) was administered to attenders to examine factors affecting participation. Data was analysed descriptively. Focus group discussions and interviews were conducted with programme attenders and educators and are being analysed using framework analysis with the Theoretical Domains Framework.

**Results:** Of 158 people at risk invited to attend the online DPP, 73 accepted (46%). Of those, 39 (53%) were male and average age was 60 years. Overall, 85 (54%) declined with 26 (31%) decliners citing technology as the main barrier to participation. Remote interviews and focus groups were conducted with 13 attenders and 8 educators. Initial qualitative analysis suggests fear of developing diabetes motivated many to participate and having family members or knowing someone with diabetes positively influenced participation. Family and educator support helped facilitate online participation. Joining an online group was perceived as less daunting than joining an in person group, with some participants feeling they could be more open online which may have also positively influenced participation. Support of the group facilitated retention to the programme.

**Conclusion:** While the online format was considered convenient by both educators and attenders, simultaneously, difficulty with technology was the most commonly cited reason not to participate. Study findings can be used to inform tailored implementation strategies for other digital DPPs internationally and may be useful for other health interventions that were forced to adapt to online delivery due to Covid 19.

# Do holistic mHealth interventions have the potential to promote healthy ageing? A systematic review and meta-analysis

**Ms. Shenglin Zheng**<sup>1</sup>, Dr. Sarah Edney<sup>1</sup>, Mr. Chin Hao Goh<sup>2</sup>, Dr Jacqueline Mair<sup>1,3</sup>, Oscar Castro<sup>3</sup>, Associate Professor Bee Choo Tai<sup>1,2</sup>, Dr. Alicia Salamanca-Sanabria<sup>3</sup>, Associate Professor Tobias Kowatsch<sup>4,5,6</sup>, Prof. Rob M van Dam<sup>1,7</sup>, Associate Professor Falk Müller-Riemenschneider<sup>1,2,8</sup>

<sup>1</sup>Saw Swee Hock School of Public Health, National University of Singapore and National University Health System, Singapore, Singapore, <sup>2</sup>Yong Loo Lin School of Medicine, National University of Singapore and National University Health System, Singapore, Singapore, <sup>3</sup>Future Health Technologies, Singapore-ETH Centre, Campus for Research Excellence And Technological Enterprise (CREATE), Singapore, Singapore, <sup>4</sup>Institute for Implementation Science in Health Care, University of Zürich, Zürich, Switzerland, <sup>5</sup>School of Medicine, University of St. Gallen, St. Gallen, Switzerland, <sup>6</sup>Centre for Digital Health Interventions Department of Management, Technology and Economics ETH Zürich, Zürich, Switzerland, <sup>7</sup>Departments of Exercise and Nutrition Sciences and Epidemiology, Milken Institute School of Public Health, The George Washington University, Washington, USA, <sup>8</sup>Digital Health Centre, Berlin Institute of Health, Charité University Medical Centre Berlin, Berlin, Germany

**O.1.09 - Multi-source data collection using e- & m-Health methodologies, towards improved mental and physical health, Clarion Hotel Gillet - Room Akademien, June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Good physical and mental health are essential for healthy ageing. Holistic mobile health (mHealth) interventions - integrating content targeting physical activity, diet, and mental health - could support healthy ageing and be scaled up to the population level. This review is the first to provide an overview of holistic mHealth interventions and address their effects on related behavioural and health outcomes in adults.

**Methods:** MEDLINE via PubMed, Embase, Cochrane Library, PsycINFO, Scopus, China National Knowledge Infrastructure, and Google Scholar (first 200 records) were searched in April 2022. Eligible studies were randomised controlled trials (RCTs) and non-randomized studies of interventions (NRSIs) if they (i) targeted a general adult population ( $\geq 18$  years old), (ii) included combined content on physical activity, diet, and mental health, and (iii) were delivered via mHealth technologies. Searches returned 4,292 unique records that were screened for eligibility. Narrative synthesis and meta-analysis were conducted. The most frequently reported outcome measures from four outcome domains (weight, physical activity, diet, and mental health) in RCTs were pooled using random-effects meta-analysis.

**Results:** Twenty-eight studies (reported in 37 articles) with 5,094 participants (63.4% female, mean age 39.8 years (SD=12.5)) were included; 21 of the 28 were RCTs, and 7 NRSIs. Most were conducted in high-income countries. Apps, text messages, and websites were the top three mHealth technologies employed. Notably, 54% of the studies adopted a mixed channel, using a combination of apps, wearables, text messages, and websites. Meta-analysis results showed that participation in a holistic mHealth intervention led to significant reductions in weight (9 RCTs, 839 participants, mean difference -1.62 kg, 95% CI -2.74 to -0.50). Reductions in stress levels were observed but did not reach statistical significance (5 RCTs, 353 participants, standardised mean difference -0.21, 95% CI -0.42 to 0.004). There were no significant pooled intervention effects for self-reported moderate-to-vigorous intensity physical activity or diet quality.

**Conclusions:** Holistic mHealth interventions may aid weight loss among general adult populations. However, such effects were small and measured directly after interventions with moderate to high risk of biases. Further high-quality research is needed focusing on middle- or low-income countries and investigating long-term effects.



# Parent-related correlates of 24-hour movement behaviors in 0- to 4-year-old children: the My Little Moves Project

**Dr. Jessica Gubbels<sup>1</sup>**, Dr. Sanne Veldman<sup>2</sup>, Mr. Jelle Arts<sup>2</sup>, Prof. Arnoud Verhoeff<sup>3, 4</sup>, Prof. Mai Chin A Paw<sup>2</sup>, Dr. Teatske Altenburg<sup>2</sup>

<sup>1</sup>Maastricht University, dep. of Health Promotion, NUTRIM School of Nutrition and Translational Research in Metabolism, Maastricht, Netherlands, <sup>2</sup>Amsterdam Public Health Research Institute, Amsterdam UMC, Vrije Universiteit Amsterdam, dep. of Public and Occupational Health, Amsterdam, Netherlands, <sup>3</sup>Public Health Service Amsterdam, Sarphati Amsterdam, Amsterdam, Netherlands, <sup>4</sup>University of Amsterdam, dep. of Sociology, Amsterdam, Netherlands

**O.2.10 - Movement behaviors and health in children and families, UKK - Main Hall (Level 6), June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Early childhood is a period of rapid development and habit formation. Parents play a crucial role in shaping their young children's behavior. Current research shows mixed findings regarding which parental factors influence young children's 24-hour movement behaviors (physical activity, sedentary behavior including screen time, and sleep). Therefore, this study aims to examine parent-related correlates of 24-hour movement behaviors in 0- to 4-year-old children living in the Netherlands.

**Methods:** This presentation includes baseline data of the My Little Moves project from the Netherlands, a longitudinal observational study with a follow up duration of 18 months. Participants are recruited through the Amsterdam Sarphati Cohort, which includes detailed information on children's development collected through Youth Health Care services, as well as other channels (e.g., childcare centers). A total of 200 children will be recruited for the sub study on correlates of 24-hour movement behaviors. Data on 24-hour movement behaviors is being collected using a proxy-report app for parents: the My Little Moves App, specifically developed for this project. Data on potential parent-related determinants is being collected through questionnaires for parents. Multivariate linear regression analyses will be used to examine the associations between parental factors and children's 24-hour movement behaviors, adjusted for other covariates (including child factors and other environmental factors).

**Results:** Associations between parent-related factors and children's 24-hour movement behaviors will be discussed. Examined parent-related data include parental 24-hour movement behaviors (based on the International Physical Activity Questionnaire and Wisconsin Sleep Questionnaire), relevant parenting practices (including the Preschooler Physical Activity Parenting Practices questionnaire and screen time parenting) and parental background characteristics (including age, gender, socio-economic status).

**Conclusions:** The findings of the study will advance our current understanding of correlates of young children's 24-hour movement behaviors, thereby providing valuable input for the development of interventions stimulating young children's healthy 24-hour movement behaviors through their parents.

# The 24-hour movement behaviour profiles and cardiometabolic outcomes in 8-year-old children.

**Dr. Anna Fogel<sup>1</sup>**, Ms. Natarajan Padmapriya<sup>2</sup>, Ms. Claire Marie Jie Lin Goh<sup>3</sup>, Dr. Jonathan Bernard<sup>4</sup>, Dr. Lynette Lynette Pei Chi Shek<sup>1, 5</sup>, Prof. Yap Seng Chong<sup>1, 2</sup>, Prof. Kok Hian Tan<sup>6</sup>, Associate Professor Shiao-Yng Chan<sup>1</sup>, Prof. Fabian Yap<sup>6</sup>, Prof. Keith M. Godfrey<sup>7</sup>, Prof. Yung Seng Lee<sup>8</sup>, Prof. Johan G. Eriksson<sup>1</sup>, Dr. Mya Thway Tint<sup>1</sup>, Associate Professor Falk Mueller-Riemenschneider<sup>3</sup>

<sup>1</sup>Singapore Institute for Clinical Sciences, Singapore, Singapore, <sup>2</sup>Department of Obstetrics & Gynaecology and Human Potential Translational Research Programme, Yong Loo Lin School of Medicine, National University of Singapore, Singapore, Singapore, <sup>3</sup>Saw Swee Hock School of Public Health, National University of Singapore, Singapore, Singapore, <sup>4</sup>Université de Paris, Centre for Research in Epidemiology and Statistics (CRESS), Inserm, Inrae, F-75004, Paris, France, <sup>5</sup>Department of Paediatrics, Yong Loo Lin School of Medicine, National University of Singapore, Singapore, Singapore, <sup>6</sup>KK Women's and Children's Hospital, Singapore, Singapore, <sup>7</sup>Medical Research Council Lifecourse Epidemiology Unit, University of Southampton, Southampton, United Kingdom, <sup>8</sup>Department of Paediatrics, Yong Loo Lin School of Medicine, National University of Singapore, Singapore, Singapore

**O.2.10 - Movement behaviors and health in children and families, UKK - Main Hall (Level 6), June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** New physical activity guidelines for children address all movement behaviours (MB) throughout the day. We have identified 24-hour MB profiles in children from the Growing Up in Singapore Towards healthy Outcomes (GUSTO) cohort. The purpose of this study was to investigate the associations between 24-hour MB profiles with cardiometabolic indicators in 8-year-old children.

**Methods:** Cardiometabolic indicators and 24-hour MB measures were collected at age 8 years (n=614). Wrist accelerometers were worn for 7 consecutive days to derive information on light, moderate and vigorous physical activity, inactivity and night sleep. Four profiles emerged in latent profile analysis: “Rabbits” (very high moderate and vigorous physical activity, low inactivity and average sleep), “Chimpanzees” (high moderate physical activity, low inactivity and average sleep), “Pandas” (low physical activity, high inactivity and high night sleep) and “Owls” (low physical activity, high inactivity and low night sleep). Anthropometrics, skinfold thickness, abdominal circumference (AC), QMR measures of fat and lean mass, blood pressure, fatty liver index (FLI) and metabolic biomarkers were used to derive BMI z-score, sum of skinfolds (SS) and metabolic risk score (MRS). Multivariable linear regression was performed to investigate the associations, adjusting for confounders.

**Results:** The profile of “Chimpanzees” was the most prevalent; time spent in each behaviour was closest to the mean and this profile was therefore used as a reference to compare the estimates of other profiles. The largest differences were observed with children with the “Panda” profile. “Pandas”, compared to “Chimpanzees”, had higher BMI z-scores (mean difference: 0.29 [0.03, 0.55]), higher SS (5.41 [2.21, 8.62] mm), higher AC [2.01 [0.49, 3.53] cm), higher body fat % (2.11 [0.41, 3.81]), lesser lean body mass % (-2.62 [-4.71, -0.53]), higher MRS (0.62 [0.11, 1.12] units) and higher FLI (1.65 [0.40, 2.90]). Overall, “Rabbits” had better and “Owls” had worse outcomes compared to “Chimpanzees”, though these differences were not significant (p>0.05). We will further analyse these associations longitudinally (pending).

**Conclusions:** High inactivity combined with low physical activity seems to be the most detrimental to cardiometabolic health, even in the presence of longer night sleep (“Pandas”).

# Natural blue spaces are associated with Australian preschool children's movement behaviours.

**Ms. Phoebe George**<sup>1,2</sup>, Dr. Kevin Murray<sup>2</sup>, Prof. Stewart Trost<sup>3</sup>, Associate Professor Hayley Christian<sup>1,2</sup>

<sup>1</sup>Telethon Kids Institute, Perth, Australia, <sup>2</sup>School of Population and Global Health, The University of Western Australia, Perth, Australia, <sup>3</sup>School of Human Movement and Nutrition Sciences, University of Queensland, Brisbane, Australia

**O.2.10 - Movement behaviors and health in children and families, UKK - Main Hall (Level 6), June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Natural outdoor environments such as blue spaces (oceans, rivers, lakes and swamps) are important physical activity settings. It is unclear if natural blue spaces promote physical activity in very young preschool aged children. We examined associations between the amount and type of blue space, proximity to the beach and pre-schooler's device measured movement behaviours.

**Methods:** Accelerometer data from 1,073 preschool children in the PLAYCE baseline study were processed into movement behaviours using a machine learned physical activity classification algorithm specifically developed for children under five (Ahmadi et al. 2020). Geographic Information Systems were used to identify total percentage neighbourhood blue space and the components of blue space (ocean, riverways and lakes and swamps) for 1600m and 5000m buffer areas around children's home residence. Distance to the closest beach, patrolled beach and dog beach were also calculated. Multiple linear regression analyses were used, adjusting for age, and parent education. Results were stratified by sex.

**Results:** Riverways were associated with preschool boy's walking ( $\beta = 1.2$  seconds/day,  $p \leq 0.028$ ) in a 5000m buffer area, and the 1600m ( $\beta = 1.8$  seconds/day,  $p \leq 0.002$ ) and 5000m ( $\beta = 1.2$  seconds/day,  $p \leq 0.020$ ) in preschool girls. In the 5000m buffer area riverways were negatively associated with preschool girls' light activities and games ( $\beta = -6.0$  seconds/day,  $p \leq 0.004$ ) and the percentage of lake and swamp were negatively associated with preschool girls walking ( $\beta = -1.2$  seconds/day,  $p \leq 0.004$ ).

Amongst preschool boys who owned a dog, greater distance to the dog beach was positively correlated with sedentary time ( $\beta = 76$  seconds/day,  $p \leq 0.013$ ) in the 5000m buffer area.

There were no significant associations between total blue space in, or distance to closest or patrolled beach and pre-schooler movement behaviours.

**Conclusions:** These findings suggest that greater amounts of neighbourhood blue space as well as a variety of blue space type has the potential to support positive movement behaviours (less sedentary time and higher amounts of physical activity such as walking) in young children. These findings could be used to inform urban planning and highlight the need for greater protection of natural environments as key health promoting settings for all ages.

# The prospective associations of 24-hour movement behaviours with executive function and academic achievement among school-aged children in Singapore

**Ms. Padmapriya Natarajan**<sup>1,2</sup>, Dr. Jonathan Y. Bernard<sup>3</sup>, Ms. Sarah Yi Xuan Tan<sup>1</sup>, Ms. Claire Marie Jie Lin Goh<sup>1</sup>, Prof. Lynette Pei Chi Shek<sup>4,5,6</sup>, Prof. Yap Seng Chong<sup>2,4</sup>, Prof. Kok Hian Tan<sup>7,8</sup>, Associate Professor Shiao-Yng Chan<sup>2,4</sup>, Prof. Kok Peng Fabian Yap<sup>7,8,9</sup>, Prof. Keith M. Godfrey<sup>10,11</sup>, Prof. Yung Seng Lee<sup>4,5,6</sup>, Prof. Michael J. Meaney<sup>4,12</sup>, Prof. Johan G. Eriksson<sup>2,4,13</sup>, Associate Professor Chuen Seng Tan<sup>1</sup>, Assistant Professor Evelyn Chung Ning Law<sup>4,5</sup>, Associate Professor Falk Müller-Riemenschneider<sup>1,14</sup>

<sup>1</sup>Saw Swee Hock School of Public Health, National University of Singapore, Singapore, Singapore, <sup>2</sup>Department of Obstetrics & Gynaecology and Human Potential Translational Research Programme, Yong Loo Lin School of Medicine, National University of Singapore, Singapore, Singapore, <sup>3</sup>Université de Paris, Centre for Research in Epidemiology and Statistics (CRESS), Inserm, Inrae, F-75004 Paris, France, <sup>4</sup>Singapore Institute for Clinical Sciences, Agency for Science, Technology and Research (A\*STAR), Singapore, Singapore, <sup>5</sup>Department of Paediatrics, Yong Loo Lin School of Medicine, National University of Singapore, Singapore, Singapore, <sup>6</sup>Khoo Teck Puat-National University Children's Medical Institute, National University Health System, Singapore, Singapore, <sup>7</sup>KK Women's and Children's Hospital, Singapore, Singapore, <sup>8</sup>Duke-National University of Singapore, Singapore, Singapore, <sup>9</sup>Lee Kong Chian School of Medicine, Nanyang Technological University, Singapore, Singapore, <sup>10</sup>Medical Research Council Lifecourse Epidemiology Centre, University of Southampton, Southampton, United Kingdom, <sup>11</sup>NIHR Southampton Biomedical Research Centre, University of Southampton and University Hospital Southampton NHS Foundation Trust, Southampton, United Kingdom, <sup>12</sup>Ludmer Centre for Neuro-informatics and Mental Health, McGill University, Montreal QC, Canada, <sup>13</sup>Department of General Practice and Primary Health Care, University of Helsinki and Folkhälsan Research Center, Helsinki, Finland, <sup>14</sup>Berlin Institute of Health, Charité University Medical Centre, Berlin, Germany

**O.2.10 - Movement behaviors and health in children and families, UKK - Main Hall (Level 6), June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Physical activity (PA), sedentary behaviour/inactivity (SB) and sleep are collectively referred to as 24h movement behaviours (24h-MB). We aimed to investigate the prospective associations of 24h-MBs with executive function and academic achievement in school-aged children.

**Methods:** Children in the Growing Up in Singapore Towards healthy Outcomes (GUSTO) cohort were asked to wear an accelerometer (Actigraph-GT3x+) on their wrist for seven consecutive days to measure 24h-MB at ages 5.5 and 8 years. The NEuroPSYchology test (NEPSY-II) and the Wechsler Individual Achievement Test (WIAT-III) were used to assess executive function (inhibition errors, switching error, repetition and recall) and academic achievement (numerical operations, spelling and oral-reading -fluency and -accuracy), at ages 8.5 and 9 years, respectively. Latent variables were generated based on executive function and academic achievement measures using confirmatory factor analysis. Compositional data analyses using isometric-logratio (ilr) coordinates and compositional isotemporal substitution were performed to investigate the associations of 24h-MB with outcomes, adjusting for sex, ethnicity, maternal age and education, and BMI of children at ages 5 or 8 years.

**Results:** In total, 432 children were included in the analysis. No associations were observed between composition of 24h-MB and executive function. However, relative to light-intensity PA (LPA), inactivity and sleep, higher moderate-to-vigorous PA (MVPA) was associated with lower academic achievement [For each unit increase in  $MVPA_{(ilr1)}$  at age 5.5 years, the mean difference in academic achievement (95% confidence interval): -0.367 (-0.726, -0.009) z-score; and for  $MVPA_{(ilr1)}$  at age 8 years: -0.282 (-0.616, 0.052) z-score]. The substitution model showed that reallocation of 5 to 60 min/day from MVPA to sleep was associated with increased academic achievement, but the expected decrease in academic achievement was modest for the reallocations of the same amount of time from sleep to MVPA. The estimated changes in the outcomes were not statistically significant for remaining pairs of reallocations.

**Conclusion:** In our study, the composition of 24h-MB was not associated with executive function. Higher MVPA, relative to LPA, inactivity and sleep, was associated with lower academic achievement. Further investigation on domain-specific activities is warranted to better understand relationships between 24h-MBs and executive function and academic achievements.

# The Associations Between Movement Behaviours and Insomnia Symptoms Among Preschoolers – Results from the SUNRISE Finland Pilot Study

**Dr. Elina Engberg**<sup>1,2</sup>, Prof. Jari Lahti<sup>2</sup>, Ms. Hanna Paasio<sup>1</sup>, Prof. Anthony Okely<sup>3</sup>, Prof. Eva Roos<sup>1,2</sup>, Dr. Marja Leppänen<sup>1,2</sup>

<sup>1</sup>Folkhälsan Research Center, Helsinki, Finland, <sup>2</sup>University of Helsinki, Helsinki, Finland, <sup>3</sup>University of Wollongong, Wollongong, Australia

**O.2.10 - Movement behaviors and health in children and families, UKK - Main Hall (Level 6), June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Previous studies have reported associations of less physical activity (PA) and more sedentary (SED) and screen time with unfavourable sleep outcomes among children and adolescents. However, little is known about the relationship between movement behaviours and insomnia symptoms of young children. We examined whether PA, SED, sleep duration, or screen time associate with insomnia symptoms among 3- to 4-year-old children.

**Methods:** Fifty-eight children (mean age  $4\pm0.5$  years, 52% girls) participated in the cross-sectional SUNRISE Finland Pilot Study in 2022. Waist-worn ActiGraph accelerometers measured children's SED and different intensities of PA. Parents (85% mothers) of 49 children reported screen time (use of any electronic screen device or watching television, movies or videos while sitting or lying down), restrained sitting, and sleep duration (including naps) in 24 hours, and completed the Pediatric Insomnia Severity Index (PISI). PISI includes dimensions of Sleep Onset Problems (SOP) and Sleep Maintenance Problems (SMP), with higher scores indicating more symptoms. We used Spearman's partial correlation to examine associations between movement behaviours and PISI, and Mann Whitney U test to compare PISI between children who met and did not meet the WHO movement behaviour guidelines (total and moderate- to vigorous-intensity PA [MVPA], screen time, sleep duration, and restrained sitting).

**Results:** MVPA (crude  $r_s=-0.30$ ,  $p=0.035$ ) and VPA (crude  $r_s=-0.30$   $p=0.038$ ) associated negatively with SOP, but not after adjustments. Screen time associated with SOP after adjusting for age, sex, parent education, and household income (crude  $r_s=0.49$ ,  $p<0.001$ ; adjusted  $r_s=0.48$   $p<0.001$ ). In addition, children (50%) who met the screen time guideline ( $\leq 1$  h/24 h) had lower SOP compared to those who did not meet the guideline (mean  $2.2\pm1.9$  vs.  $4.2\pm2.8$ ,  $p=0.005$ ). SED and sleep duration, or meeting the other movement behaviour guidelines did not associate with PISI, but children (31%) who met all movement behaviour guidelines had a lower SOP compared to others ( $2.1\pm2.1$  vs.  $3.7\pm2.6$ ,  $p=0.024$ ).

**Conclusions:** Results from this pilot study indicate that less sedentary screen time and meeting all movement behaviour guidelines were associated with less sleep onset problems among preschoolers. These results need to be verified in a larger sample from the SUNRISE Main Study.



# Longitudinal changes in children's 24-hour activity compositions over two school years

**Mr. Aaron Miatke (corresponding author)<sup>1,2</sup>**, Prof. Tim Olds<sup>1,2</sup>, Prof. Carol Maher<sup>1</sup>, Dr. Francois Frayssse<sup>1</sup>, Dr. Dot Dumuid<sup>1,2</sup>

<sup>1</sup>University of South Australia, Adelaide, Australia, <sup>2</sup>Murdoch Children's Research Institute, Melbourne , Australia

**O.2.10 - Movement behaviors and health in children and families, UKK - Main Hall (Level 6), June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** The summer school holiday period has been proposed as a key time of year where negative health outcomes may develop in children due to reduced physical activity (PA) and increased sedentary behaviour (SB). The aim of this study was to examine longitudinal changes in 24-h activity compositions during the in-school and summer school holiday periods in a sample of Australian children.

**Methods:** Participants (n=343; 9.4 ± 0.3 years and in Grade 4 at enrolment) were children enrolled in the longitudinal Life on Holidays study (LoH). 24-h activity compositions were measured at the start and end of each school year for two years, and once during the interposed summer holiday period, using (1) accelerometry (time spent in sleep, SB, light PA, moderate-to-vigorous PA (MVPA)) and (2) use of time recall (time spent in 8 activity domains). Compositional multi-level multivariate linear models were used to estimate changes in 24-h activity compositions across timepoints while accounting for nesting of observations within participant, within school. Interaction effects for sex, age, puberty, weight status, socio-economic position (SEP) were tested. Model-based estimates were plotted to show activity trajectories across the two years.

**Results:** Children's activity composition differed across time points (p<0.001). Generally, over the two years, SB increased while MVPA and sleep decreased. Activity composition during summer holidays was significantly different to activity composition at every school timepoint. Using accelerometer data children accrued significantly less MVPA (range: -23; -14 min/day) and more SB (range: 15; 42 min/day) during holidays vs. in-school timepoints (sleep and LPA generally not significant). Using use-of-time recall data children accrued significantly less physical activity (range: -50; -16 min/day) and school-related activity (range: -174; -105 min/day); and more screen time (range: 37; 119 min/day), self-care (range: 20; 40 min/day), and domestic/social activities (range: 27; 33 min/day) during holidays vs in-school timepoints.

**Conclusions:** Children accrue less MVPA and more SB during the summer school holiday period. Summer holidays may be a key intervention point to reduce the burden of disease related to physical inactivity.

# The impact of the world's first regulatory intervention on child digital game time, homework time, and out-of-campus learning in China: a natural experiment evaluation of the ENERGISE study

**Dr. Bai Li**<sup>1</sup>, Dr. Selene Valerino Perea<sup>1</sup>, Prof. Charlie Foster<sup>1</sup>, Prof. Keith Syrett<sup>4</sup>, Dr. Weiwen Zhou<sup>2</sup>, Prof. Yihong Xie<sup>3</sup>, Dr. Zouyan He<sup>3</sup>, Prof. Yunfeng Zou<sup>3</sup>, Prof. Frank de Vocht<sup>5</sup>

<sup>1</sup>School for Policy Studies, University of Bristol, Bristol, United Kingdom, <sup>2</sup>Guangxi Centre for Diseases Control and Prevention, Nanning, China, <sup>3</sup>Guangxi Medical University, Nanning, China, <sup>4</sup>Law School, University of Bristol, Bristol, United Kingdom, <sup>5</sup>Bristol Medical School, University of Bristol, Bristol, United Kingdom

**O.2.11 - Policies for healthy environments in children and youth, UKK - Level 6 Foyer, June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** In 2021, the Chinese government introduced nationwide regulations to restrict the time that children (7-18 years) should spend on digital games, homework, and out-of-campus learning, to improve child health and wellbeing. This was the world's first regulatory intervention on child sedentary behaviour (SB). The impact of this intervention could have important research and policy implications globally. We evaluated the effect of this regulatory intervention on child SB.

**Methods:** With a pre-post natural experiment design, we used surveillance data collected by the Guangxi Autonomous Region authority from 9 to 18 years students, before (wave 1) and after (wave 2) the introduction of the regulatory intervention, for repeated analyses (n=7,054) and repeated cross-sectional analyses (n=99,947). The regionally representative data were collected using a multi-stage random sampling from 31 counties. Pre-post differences were analysed for self-reported total SB time and key SB outcomes (e.g. homework time, out-of-campus learning time, screen viewing time and electronic device use time), using multilevel models adjusted for relevant covariates. We also explored subgroup differences by sex, stage of education, residency, and baseline weight status.

**Results:** At wave 2, students reduced their total daily SB time by 13.8% (95% CI: -15.9 to -11.7%, approximately 46 minutes less) on average and spent significantly less time on homework (and were 2.8 times more likely to meet the standards set by the regulation, 95% CI: 2.47-1.14) and out-of-campus learning. Students also reduced their screen-viewing time by 6.4% (95%CI: -9.6 to -3.3%, approximately 10 minutes less), and were 20% more likely to meet international daily screen time recommendations (95% CI: 1.1 to 1.3). The reduction in homework and screen-viewing time was larger in secondary school students ( $p < 0.0001$  for interaction) than in primary school students. We did not find an intervention effect on other outcomes. Population-level (repeated cross-sectional) analyses showed similar findings as the longitudinal (repeated) analyses.

**Conclusions:** The regulatory intervention has been effective in reducing total SB time among Chinese children and adolescents, mainly through reducing time spent on homework, out-of-campus learning and screen viewing. Similar but culturally appropriate regulatory interventions could be considered by policy makers in other countries.

# International school-related sedentary behaviour recommendations for children and youth

Associate Prof. Travis Saunders<sup>1</sup>, **Dr. Nicholas Oliver Corey Kuzik**<sup>2</sup>, Prof. Mark Tremblay

<sup>1</sup>University of Prince Edward Island, Charlottetown, Canada, <sup>2</sup>Children's Hospital of Eastern Ontario Research Institute, Ottawa, Canada

**O.2.11 - Policies for healthy environments in children and youth, UKK - Level 6 Foyer, June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Existing sedentary behaviour guidelines for children and youth target overall sedentary behaviour and recreational screen time, without any specific recommendations regarding school-related sedentary behaviours (i.e., sedentary behaviours performed during the school day, or within the influence of school). This presentation will describe the recent development of international evidence-based recommendations for school-related sedentary behaviours for children and youth.

**Methods:** A panel of international experts was convened by the Sedentary Behaviour Research Network (SBRN) in November 2020 to guide the development of these recommendations for children and youth aged ~5–18 years. The recommendations were informed by 1) age-relevant existing sedentary behaviour guidelines, 2) published research on the relationship between overall sedentary behaviour and health, 3) a de novo systematic review on the relationship between school-related sedentary behaviours and health and/or academic outcomes, and 4) a de novo environmental scan of the grey literature to identify existing recommendations for school-related sedentary behaviours.

Draft recommendations were presented to the Expert Panel in June 2021. Following thorough discussion and modifications, updated recommendations were distributed for stakeholder feedback from July 9–26. Feedback was received from 148 stakeholders across 23 countries, leading to additional updates to the recommendations. Following further rounds of discussion and updates with the Expert Panel in August and September 2021, consensus was achieved on the final recommendations, which were released on April 5, 2022.

**Results:** A healthy day includes breaking up extended periods of sedentary behaviour and incorporating different types of movement into homework whenever possible, while limiting sedentary homework. School-related screen time should be meaningful, mentally or physically active, and serve a specific pedagogical purpose that enhances learning. Replacing sedentary learning activities with movement-based learning activities, and replacing screen-based learning activities with non-screen-based learning activities, can further support students' health and wellbeing.

**Conclusions:** These recommendations present the first evidence-based recommendations for school-related sedentary behaviours for children and youth. These recommendations will support the work of parents, caregivers, educators, school system administrators, policy makers, researchers and healthcare providers interested in promoting student health and academic success.

# Preschool children's physical activity in the home, childcare and neighbourhood environment: A latent profile analysis using device-based measures.

**Ms. Pulan Bai**<sup>1,2</sup>, Dr. Jasper Schipperijn<sup>3</sup>, Dr. Michael Rosenberg<sup>4</sup>, Dr. Hayley Christian<sup>1,2</sup>

<sup>1</sup>School of Population and Global Health, The University of Western Australia, Perth, Australia, <sup>2</sup>Telethon Kids Institute, The University of Western Australia, Perth, Australia, <sup>3</sup>Department of Sports Science and Clinical Biomechanics, University of Southern Denmark, Odense, Denmark, <sup>4</sup>School of Human Sciences (Exercise and Sport Science), The University of Western Australia, Perth, Australia

**O.2.11 - Policies for healthy environments in children and youth, UKK - Level 6 Foyer, June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** There is a significant evidence gap around using 'location-specific' physical activity data to explore the characteristics of physical environment domains where preschool children are physically active. A latent profile analysis approach using device-based physical activity location data can address this evidence gap by classifying preschool children into subgroups based on where they accumulate physical activity. We explored profiles of preschool children based on which environmental domains they accumulate moderate to vigorous physical activity (MVPA), and investigated the underlying characteristics of the physical environmental features within each profile.

**Methods:** A GIS map layer of the Perth and Peel region (Western Australia) was imported from OpenStreetMap into ArcGIS Pro for analysis. Combined 7-day accelerometer and Global Positioning System (GPS) data from 115 preschool children aged 2 to 5 years old was analysed in ArcGIS Pro to identify where preschool children accumulated MVPA within five environmental domains: 1) home, 2) childcare, 3) <500m from home, 4) 500-1600m from home, and 5) >1600m from home. Latent profile analysis was performed with the five environmental domain specific mean minutes of MVPA as outcome variables. Independent t-tests were performed to explore if there were any significant differences between profiles in terms of the physical environmental characteristics of each domain.

**Results:** Three profiles were identified: "Home bodies" (n=41), "Active except close to home" (n=61), and "Active except in local neighbourhood" (n=13). Compared to other profiles, "Home bodies" had less parks and playgrounds within their 500-1600m neighbourhood and the "Active except in local neighbourhood" profile had fewer sports and recreation centres within the <500m neighbourhood (both  $P<0.05$ ). The "Active except close to home" profile had less school grounds within the <500m neighbourhood, but more parks and playgrounds and sport and recreation centres in their 500-1600m neighbourhood compared to the other two profiles (all  $P<0.05$ ).

**Conclusions:** Findings suggest preschool children's MVPA profiles are reflections of their physical environmental opportunities. Future policy and planning should consider that local access to parks and playgrounds, school grounds and sport and recreation centres is important for supporting young children to be physically active.

# National school food standards in secondary schools in England: how well do schools comply and how does this influence students' dietary intake?

**Dr. Miranda Pallan<sup>1</sup>**, Dr. Marie Murphy<sup>1</sup>, Dr. Breanna Morrison<sup>1</sup>, Dr. Alice Sitch<sup>1,2</sup>, Prof. Peymane Adab<sup>1</sup>  
<sup>1</sup>University of Birmingham, Birmingham, United Kingdom, <sup>2</sup>National Institute for Health Research Biomedical Research Centre, Birmingham, United Kingdom

**O.2.11 - Policies for healthy environments in children and youth, UKK - Level 6 Foyer, June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** School food standards (SFS) in England are in place to promote healthy eating in school students. They are a legal requirement for state-funded schools. In secondary schools, there has been little evaluation of compliance with the standards and their influence on student dietary intake. In the FUEL study, we aimed to evaluate SFS compliance in secondary schools and explore associations between compliance-level and students' dietary intakes.

**Methods:** We conducted a cross-sectional study with 36 state-funded secondary schools and 2,273 students aged 11-15 years in the Midlands, UK. We assessed SFS compliance through review of school food menus and observations of foods and drinks offered in the school canteens. We grouped standards according to whether they were aiming to increase dietary variety or aiming to restrict the provision of high fat, sugar and salt (HFSS) foods/drinks, and assessed compliance with these standards. We assessed student dietary intakes on two separate occasions using an online 24-hour dietary recall measure (Intake24) and estimated intakes of energy, free sugar, fat, fibre, fruit and vegetables, sugar-sweetened drinks, confectionery and HFSS items during school lunch, the school day, and 24 hours. Using multilevel models and controlling for student and school characteristics, we explored the association between school SFS compliance-level and student dietary intakes.

**Results:** Overall, schools were compliant with 64% of SFS. Standards with the lowest compliance were those restricting HFSS foods/drinks. Compliance with SFS aiming to increase dietary variety was associated with marginally lower lunchtime energy intake ( $B=-2.14\text{kcal}$ ; 95% CI:  $-3.88\text{kcal}$ ,  $-0.41\text{kcal}$ ) and fat intake ( $B=-0.12\text{g}$ ; 95% CI:  $-0.19\text{g}$ ,  $-0.04\text{g}$ ), but higher lunchtime percent energy from free sugars ( $B=0.14\%$ ; 95% CI:  $0.06\%$ ,  $0.22\%$ ). School compliance with SFS aiming to restrict HFSS items was associated with marginally higher 24-hour free sugar intake ( $B=0.29\text{g}$ ; 95% CI:  $0.03\text{g}$ ,  $0.56\text{g}$ ) and confectionery item intake (IRR:  $1.01$ ; 95% CI:  $1.00-1.01$ ).

**Conclusions:** Secondary schools do not fully comply with the national SFS and there is no evidence that compliance-level is associated with improved student nutritional intake. Adaptation of the current SFS may be needed to more positively influence nutritional intake in secondary school students.



# Parent Perceptions of Universal School Meals During the COVID-19 Pandemic in Two U.S. States

**Dr. Leah Chapman<sup>1,8</sup>**, Dr. Deborah Olarte<sup>1</sup>, Dr. Wendi Gosliner<sup>2</sup>, Dr. Lorrene Ritchie<sup>2</sup>, Dr. Marlene Schwartz<sup>3</sup>, Dr. Michele Polacsek<sup>4</sup>, Dr. Christina Hecht<sup>2</sup>, Mr. Kenneth Hecht<sup>2</sup>, Dr. Lindsey Turner<sup>5</sup>, Dr. Anisha Patel<sup>6</sup>, Ms. Margaret Read<sup>7</sup>, Ms. Tara Daly<sup>1</sup>, Dr. Juliana Cohen<sup>1,8</sup>

<sup>1</sup>Merrimack College, Center for Health Inclusion, Practice and Research, North Andover, USA, <sup>2</sup>University of California Division of Agriculture and Natural Resources, Oakland, USA, <sup>3</sup>University of Connecticut, Rudd Center for Food Policy & Health, Hartford, USA, <sup>4</sup>University of New England in Maine, Biddeford, USA, <sup>5</sup>Boise State University, Center for School and Community Partnerships, Boise, USA, <sup>6</sup>Stanford University, Stanford Maternal and Child Health Research Institute, Palo Alto, USA, <sup>7</sup>Share Our Strength | No Kid Hungry, Washington, DC, USA, <sup>8</sup>Harvard T.H. Chan School of Public Health, Boston, USA

**O.2.11 - Policies for healthy environments in children and youth, UKK - Level 6 Foyer, June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** In response to the COVID-19 pandemic, Congress funded a Universal School Meals (USM) program that offered two school meals daily to all students at no charge regardless of family income. Prior literature on the district-level analogue to USM (known as the Community Eligibility Program [CEP]) indicates that offering meals to all students at no charge increases school meal participation, reduces stigma, and can help improve household food security and reduce diet-related disparities. The federal pandemic USM program ended with the 2021-22 school year and most states reverted to the CEP, with tiered pricing, including free-and-reduced-price meals (FRPM) for students whose families meet income eligibility criteria (and full cost for those who are not eligible). However, several states, including California and Maine, adopted a state-level USM policy. This study aimed to understand parent perceptions of the federal and new state USM policies in California and Maine in order to strengthen the policies' implementations and inform consideration of USM policies by additional states and federally.

**Methods:** Semi-structured interviews were conducted over the phone with 60 parents of students in elementary, middle, and high schools in rural and urban communities in California (n=46 parents) and Maine (n=14 parents). All interviewees met FRPM income eligibility. Using grounded theory, transcripts were analyzed qualitatively, applying principles of content analysis to identify themes and domains. Application of the codes and inter-rater reliability were conducted with trained research assistants.

**Results:** The primary themes identified were that USM saved families money and time, as parents had fewer meals to purchase and prepare for their children. Additionally, the schools' assumption of this responsibility reduced stress for parents. USM reduced stigma for parents, who described feelings of shame when they previously filled out paperwork to determine their family's free or reduced-priced meal eligibility. Parents also indicated they were satisfied with the quality and amount of food served in school meals.

**Conclusions:** Parents were satisfied with the quality and amount of food provided by school meals, and believed USM saved them money and time and reduced stress. Parents also felt USM reduced stigma for families, particularly for parents themselves.

# Food environments within and outside of schools play a critical role in curtailing rise in obesity among school age children

**Dr. Punam Ohri-Vachaspati<sup>1</sup>**, Dr. Francesco Acciai<sup>1</sup>, Ms. Kristen Lloyd<sup>2</sup>, Dr. David Tulloch<sup>2</sup>, Ms. Sarah Martinelli<sup>1</sup>, Dr. Katie Disantis<sup>3</sup>, Dr. Robin DeWeese<sup>1</sup>, Dr. Emily Melnick<sup>1</sup>, Dr. Derek DeLia<sup>2</sup>, Dr. Michael Yedidia<sup>2</sup>  
<sup>1</sup>Arizona State University, Phoenix, AZ, USA, <sup>2</sup>Rutgers University, New Brunswick, NJ, USA, <sup>3</sup>Thomas Jefferson University, Philadelphia, PA, USA

**O.2.11 - Policies for healthy environments in children and youth, UKK - Level 6 Foyer, June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** To identify alterable factors in the food environments in schools and their surrounding communities that were associated with trends in obesity rates among school-aged children.

**Methods:** Body mass indices were calculated at four time points between 2013 and 2020 using nurse measured heights and weights of students attending 115 K-12 schools in low-income communities. School-level obesity prevalence was used as the outcome variable. Detailed data on the food environment within schools was captured through annual surveys and summarized into indices capturing healthfulness of school lunch meals and competitive foods. The food environment within 0.25 miles of schools was captured each year during the study period. Densities and presence of different types of outlets likely to be frequented by students (limited-service restaurants, convenience stores, small grocery stores, and upgraded [healthy] convenience stores) were calculated. Data were analyzed using linear regression models adjusting for repeated measurements.

**Results:** The sample of children from 115 schools included predominantly black (47%) and Hispanic (49%) students with high rates of eligibility for free and reduced-price meals (80%). Rates of obesity significantly increased in schools with the unhealthiest school lunch meal offerings and unhealthiest a la carte options ( $p < .001$  and  $p < .01$ , respectively). Similarly, schools exposed to the greatest increase in convenience store density and limited service restaurant density saw significantly worsening obesity trends ( $p < .01$  for both). Overall, prevalence of obesity increased from 26% to 29% over the course of the study. Schools with the unhealthiest food environment both within and outside had a significant increase in the proportion of students with obesity (26% to 33%,  $p < .01$ ) over the course of the study. Schools with the healthiest food environment both within and outside did not see a significant change in obesity prevalence (24% to 25%,  $p = 0.563$ ).

**Conclusion:** These findings highlighting the importance of the school food environment on student obesity rates have significant policy implications. Both the food environments within and outside of school matter, suggesting that in addition to enhancing the quality of food served in schools, policies and interventions to improve food options around schools can help curtail the rising obesity trends.

# Hypothetical lifestyle interventions and their effects on overweight/obesity incidence in children and adolescents from vulnerable and non-vulnerable groups

**Dr. Claudia Börnhorst**<sup>1</sup>, Prof. Iris Pigeot<sup>1,2</sup>, Prof. Stefaan De Henauw<sup>3</sup>, Mrs. Annarita Formisano<sup>4</sup>, Prof. Lauren Lissner<sup>5</sup>, Prof. Denéz Molnár<sup>6</sup>, Prof. Michael Tornaritis<sup>9</sup>, Prof. Luis Moreno<sup>7,8</sup>, Prof. Thomas Veidebaum<sup>10</sup>, Dr. Tanja Vrijkotte<sup>11</sup>, Prof. Vanessa Didelez<sup>1,2</sup>, Dr. Maike Wolters<sup>1</sup>, Other - on behalf of the GrowH! consortium<sup>1</sup>

<sup>1</sup>Leibniz Institute for Prevention Research and Epidemiology - BIPS, Bremen, Germany, <sup>2</sup>Institute of Statistics, Faculty of Mathematics and Computer Science, University of Bremen, Bremen, Germany, <sup>3</sup>Department of Public Health and Primary Care, Ghent University, Ghent, Belgium, <sup>4</sup>Institute of Food Sciences, National Research Council, Avellino, Italy, <sup>5</sup>School of Public Health and Community Medicine, Institute of Medicine, Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden, <sup>6</sup>Department of Pediatrics, Medical School, University of Pécs, Pécs, Hungary, <sup>7</sup>GENUD (Growth, Exercise, Nutrition and Development) Research Group, Faculty of Health Sciences, Universidad de Zaragoza, Instituto Agroalimentario de Aragón (IA2), Instituto de Investigación Sanitaria Aragón (IIS Aragón), Zaragoza, Spain, <sup>8</sup>Centro de Investigación Biomédica en Red de Fisiopatología de la Obesidad y Nutrición (CIBEROBN), Madrid, Spain, <sup>9</sup>Research and Education Institute of Child Health, Strovolos, Cyprus, <sup>10</sup>National Institute for Health Development, Estonian Centre of Behavioral and Health Sciences, Tallinn, Estonia, <sup>11</sup>Amsterdam University Medical Center (AMC), Amsterdam, Netherlands

**O.2.12 - Hot topics for children health behaviours, UKK - Hall B, June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** G. Children and families

## **Purpose:**

**Methods:** Our sample comprised 10 877 children aged 2 to <10 years at baseline who participated in the well-phenotyped IDEFICS/I.Family cohort. Children were followed over 14 years from 2007/2008 to 2020/21. Applying the parametric g-formula, the risk of developing OW/OB was estimated under five hypothetical lifestyle interventions regulating screen time, sugar-sweetened beverages (SSB) consumption, sleep duration, eating while doing something else and membership in a sports club. Interventions that impose adherence to recommendations (e.g. screen time recommendations) were compared to so-called 'shift' interventions that change the interventional variable by a certain amount (e.g. decreasing screen time by 30 minutes). In addition, the effectiveness of interventions in vulnerable groups such as children of parents with low/medium educational level or children of mothers with OW/OB was assessed.

**Results:** The 13-year risk of developing overweight or obesity was 30.7% under no intervention and 25.4% when multiple interventions were imposed jointly. The most effective intervention was to meet screen time recommendations which could reduce the incidence of OW/OB by 2.2 [confidence interval: 0.7-4.4] percentage points over a 13-year period. If all children were members in a sports club, the incidence could be reduced by 1.6 [0.4-2.7] percentage points. When targeting only children of parents with low/medium education, we would intervene on 19.2% of children while still reaching an intervention effect of 1.0 percentage points risk reduction. Meeting sleep recommendations (risk difference: -0.6 [-1.1;-0.3]) showed a similar intervention effect as compared to increasing sleep duration by 30 minutes/day (risk difference: -0.6 [-0.0;-0.3]).

**Conclusions:** Joint interventions addressing several lifestyle factors may be most effective. Specific emphasis should be placed on the reduction of screen time and on enabling participation in a sports club for children of families with low/medium educational background.

# Unpacking the lunchbox: what is the cost to Australian families?

**Miss Alexandra Manson**<sup>1</sup>, Prof. Rebecca Golley<sup>1</sup>, Dr. Rachel Sutherland<sup>2, 3</sup>, Prof. Luke Wolfenden<sup>2, 3</sup>, Dr. Brittany Johnson<sup>1</sup>

<sup>1</sup>Caring Futures Institute, College of Nursing and Health Sciences, Flinders University, Adelaide, Australia,

<sup>2</sup>National Centre of Implementation Science, Newcastle, Australia, <sup>3</sup>School of Medicine and Public Health, University of Newcastle, Newcastle, Australia

**O.2.12 - Hot topics for children health behaviours, UKK - Hall B, June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Most Australian children bring a lunchbox packed from home, or purchase food from an onsite canteen, with most of the food consumed during school hours being misaligned with nutrition guidelines. Cost is a commonly raised barrier by parents/caregivers to healthy lunchbox provision. However, little is known about how much Australian families spend on children's school lunches. We aimed to examine the cost of current school lunchbox provision, and whether these costs differs by indicators of socioeconomic position, or nutritional quality.

**Methods:** This study was a secondary analysis of cross-sectional data, with data collected in 2017 in NSW, Australia. Lunchboxes of students aged 4-12 years at catholic primary schools were assessed at the start of the day, with nutrition and cost assessed through photography assessment methods and a validated School Food Checklist. Costs (AUD) were adjusted for inflation as of mid-2022. Descriptive statistics and multivariable linear regression analyses were performed.

**Results:** The lunchboxes of 1026 students (kindergarten to grade 6) were analysed, from 12 schools. The mean cost of lunchboxes was \$3.87(SD 1.33), containing a mean energy of 2699kJ(SD 859), with 37.3%(SD 23.9) of energy sourced from unhealthy foods. Students with only healthy items in their lunchboxes had a lower mean cost (\$3.13(SD 1.02)) than those with mostly healthy foods ( $\geq 50\%$  kJ from healthy foods) (\$3.78(SD 1.07)) or mostly unhealthy foods ( $< 50\%$  of kJ from healthy foods) contributing to their lunchbox energy (\$4.45(SD 1.69)). A preliminary multiple linear regression found the greatest predictors of higher lunchbox cost were ( $p < 0.05$ ) a higher level of socio-economic disadvantage (beta 0.15) and a higher proportion of energy from unhealthy choices (beta 0.25) when controlling for socio-demographics.

**Conclusions:** Families residing in a greater area of disadvantage have higher lunchbox costs. Further, there are higher costs for an unhealthier lunchbox, consistent with international evidence. This understanding of the cost of children's lunchboxes can direct school nutrition interventions and support families with healthy food provision. Efforts to support the packing of healthier lunchboxes, that are mindful of affordability, may reduce financial burden on families.

# Parental support and co-physical activity predicts young children's adherence to World Health Organization guidelines

Prof. Amy S Ha<sup>1</sup>, Dr. Johan Y Y Ng<sup>1</sup>, **Ms. Shan Jiang**<sup>1</sup>

<sup>1</sup>The Chinese University of Hong Kong, Shatin, Hong Kong

**O.2.12 - Hot topics for children health behaviours, UKK - Hall B, June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Developing a physically active lifestyle in young children is important as habits and routines built during early childhood could carry over to later stages of their lives. Based on the World Health Organization's recommendations, young children should accrue at least 180 minutes of physical activity per day of any intensities, of which 60 minutes or more should be moderate-to-vigorous physical activity (MVPA). Children should also spend no more than 60 minutes per day on sedentary screen time. Since young children's behaviors are largely shaped by their parents, we examined how parent-related variables, in conjunction with environmental factors, impacted children's activity behaviors.

**Methods:** Participants of this cross-sectional study were 137 preschool-aged children (age = 4.4 years,  $SD = 2.9$ ; 46% girls) and their parents (80% mothers). Physical activity was measured using ActiGraph accelerometers, and participants' co-activity was extracted based on proximity data collected using the devices. Using questionnaires, parents reported children's daily sedentary screen time, the proximity between their homes and playgrounds, and their support towards children's physical activity. Children were considered to have met activity guidelines if their daily activity time and MVPA exceeded 180 and 60 minutes, respectively, and their average screen time was less than 60 minutes. A binomial logistic regression was conducted to examine whether the measured environmental and parental factors predicted children's adherence to activity guidelines.

**Results:** In this study, 16% of children met the World Health Organization's physical activity guidelines. Results of the logistic regression suggested that parents' self-reported support towards children's physical activity (e.g., logistic support, encouragement;  $B = 1.10$ ,  $p = .009$ ) and parent-child co-physical activity time ( $B = 0.04$ ,  $p = .004$ ) were significant predictors of children's adherence to activity guidelines. By contrast, the effect of proximity to playgrounds and parents' own MVPA on the outcome were not significant.

**Conclusions:** Parents' support towards young children's physical activity, either in form of providing logistic support, encouragement, or engaging in co-activity were found to be important predictors of children's adherence to physical activity guidelines. Establishing a positive attitude and developing family routines in physical activity is therefore imperative in children in early childhood.



# The association of the timing of evening food intake with adiposity among preschool-aged children in Finland – moderation by chronotype

**Miss Jenna Rahkola**<sup>1</sup>, Mr. Aku-Ville Lehtimäki<sup>1</sup>, Ms. Anna Abdollahi<sup>1,2</sup>, Dr. Henna Vepsäläinen<sup>2</sup>, Miss Josefine Björkqvist<sup>1</sup>, Dr. Ilona Merikanto<sup>3,4,5</sup>, Prof. Eva Roos<sup>1</sup>, Prof. Maijaliisa Erkkola<sup>2</sup>, Dr. Reetta Lehto<sup>1,2</sup>

<sup>1</sup>Folkhälsan Research Center, Helsinki, Finland, <sup>2</sup>Department of food and Nutrition, University of Helsinki, Helsinki, Finland, <sup>3</sup>Faculty of Medicine, University of Helsinki, Helsinki, Finland, <sup>4</sup>Department of Public Health and Welfare, Finnish Institute for Health and Welfare, Helsinki, Finland, <sup>5</sup>Orton Orthopaedics Hospital, Helsinki, Finland

**O.2.12 - Hot topics for children health behaviours, UKK - Hall B, June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Later timing of food intake has been identified as a possible contributor to overweight/obesity, but the evidence is inconclusive and limited in younger children. Moreover, studying the timing of eating relative to the internal circadian time instead of the clock time has been suggested to be more relevant in this connection. Hence, we examined the association of the timing of evening food intake as clock time and relative to sleep onset (a proxy of circadian timing) with BMI z-score and waist circumference, and whether these associations are moderated by chronotype among preschool-aged children.

**Methods:** The sample consist of 627 Finnish 3–6-year-olds from a cross-sectional survey that was a part of the DAGIS research. Food intake was measured with a 3-day food record and sleep with a hip-worn actigraphy. Three variables were formed to describe the timing of evening food intake: time of the last eating occasion, time between the last eating occasion and sleep onset, and the percentage of total daily energy intake (%TDEI) consumed around sleep onset (onwards from two hours before sleep onset). Chronotype was assessed as a sleep debt corrected midpoint of sleep on weekend. Researchers measured children's weight, height, and waist circumference. The data were analyzed with linear mixed-effects models.

**Results:** The last eating occasion occurring earlier relative to sleep onset (Estimate = -0.006, 95%CI = -0.010; -0.002) and lower %TDEI consumed around sleep onset (Estimate = 2.9E-4, 95%CI = 2.0E-5; 0.001) were associated with smaller waist circumference (log-transformed) even after adjusting for several possible confounders. Other investigated associations were not significant, and no interactions with chronotype were found.

**Conclusions:** The results suggest that later eating relative to sleep onset associates with larger waist circumference in preschoolers. Results also highlight the importance of studying the timing of eating relative to sleep onset instead of actual clock time since no associations were found regarding the clock time of the last eating occasion. Further research should study whether changing the timing of eating in the evening can induce changes in adiposity measures.

# Effect of nationwide school policy on device-measured physical activity in Danish children and adolescents

**Ms. Natascha Holbæk Pedersen**<sup>1</sup>, Prof. Anders Grøntved<sup>1</sup>, Associate Professor Jan Christian Brønd<sup>1</sup>, Associate Professor Niels Christian Møller<sup>1</sup>, Assistant Professor Kristian Traberg Larsen<sup>1</sup>, Associate Professor Birgit Debrabant<sup>2,3</sup>, Dr. Sofie Koch<sup>4</sup>, Prof. Jens Troelsen<sup>4</sup>, Prof. Søren Brage<sup>5</sup>, Prof. Jasper Schipperijn<sup>4</sup>, Prof. Jacob Hjelmborg<sup>3</sup>, Prof. Niels Wedderkopp<sup>1</sup>, Associate Professor Lars Breum Christiansen<sup>4</sup>, Associate Professor Peter Lund Kristensen<sup>1</sup>

<sup>1</sup>Centre of Research in Childhood Health, Research Unit for Exercise Epidemiology, Department of Sports Science and Clinical Biomechanics, University of Southern Denmark, Odense, Denmark, <sup>2</sup>Data Science and Statistics, Department of Mathematics and Computer Science, University of Southern Denmark, Odense, Denmark, <sup>3</sup>Epidemiology, Biostatistics and Biodemography, University of Southern Denmark, Odense, Denmark, <sup>4</sup>Research unit for Active Living, Department of Sports Science and Clinical Biomechanics, University of Southern Denmark, Odense, Denmark, <sup>5</sup>MRC Epidemiology Unit, University of Cambridge, Cambridge School of Clinical Medicine, Institute of Metabolic Science, Cambridge, United Kingdom

**O.2.12 - Hot topics for children health behaviours, UKK - Hall B, June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** The Danish Government introduced a new school policy in 2014. The policy entailed several structural changes including a requirement of 45 minutes of physical activity daily integrated in scheduled lessons. The main objective of this natural experiment was to evaluate the effect of the school policy on device-measured physical activity in Danish children and adolescents aged 6-17.

**Methods:** The effect was evaluated using an interrupted time-series approach. Pre-policy data consisted of device-measured physical activity data from 2,346 children and adolescents from four historical studies completed between 2009-2012. In 2017/18, a post-policy data collection was completed in 2,470 children and adolescents. Schools, age-groups, and seasons were carefully matched. Physical activity data were collected using accelerometry. Main outcome was any bodily movement. Secondary outcomes were moderate to vigorous physical activity and mean counts per minute. Data were analyzed using mixed-effect linear regression.

**Results:** The Danish school policy interrupted a linear decreasing pre-policy trend in movement, moderate to vigorous physical activity and mean counts per minute during school hours, and increases were observed in all physical activity outcomes post-policy during a standardized school day (8:10am – 1pm). Specifically, we observed an increase during a standardized school day in 2017/2018 of 14.2 minutes of movement per day (95% CI: 11.4; 17.0,  $p < 0.001$ ), 6.5 minutes of moderate to vigorous physical activity per day (95% CI: 4.7; 8.3,  $P < 0.001$ ), and 141.8 counts per minute per day (95% CI: 108.5; 175.2,  $P < 0.001$ ). Increases were more pronounced in the youngest children (1<sup>st</sup>- 5<sup>th</sup> grade) compared to older ones (6<sup>th</sup>-9<sup>th</sup> grade). No effect was observed in any outcomes when measured during a full day.

**Conclusion:** A national school policy may be a useful strategy to increase physical activity during school time among children and adolescents, and results are important to decision-makers at all levels.

# Salad bars and primary students' fruit and vegetable consumption: A group-randomized trial with objective assessments

**Associate Professor Marc Adams**<sup>1</sup>, Prof. Michael Todd<sup>1</sup>, Assistant Professor Mindy McEntee<sup>1</sup>, Prof. Punam Ohri-Vachaspati<sup>1</sup>, **Prof. Meg Bruening**<sup>2</sup>

<sup>1</sup>Arizona State University, Phoenix, USA, <sup>2</sup>The Pennsylvania State University, University Park, USA

**O.2.12 - Hot topics for children health behaviours, UKK - Hall B, June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** School salad bars are often promoted to increase children's fruit and vegetable (FV) intake. However, very little evidence exists to support those claims, especially using objective measures. Further, it is unknown how nutrition marketing may enhance the impact of school salad bars on children's FV behaviors. Thus, we sought to examine the efficacy of school salad bars and nutrition marketing on children's consumption of FVs during school lunch.

**Methods:** We conducted a cluster-randomized factorial trial between 2017 and 2019 among 13 low-income primary schools in Arizona, USA (n=3,029 children; 57.7% Hispanic; 79.1% free/reduced priced lunch) to examine changes in children's FV consumption over 10+ weeks in schools offered salad bars + nutrition marketing (n=3 schools), salad bars alone (n=3 schools), nutrition marketing alone (n=3 schools), or a wait-list control (n=4 schools). FV consumption, defined as the aggregate amount in grams of FV selected minus the amount discarded by individual trays at lunch, was measured using plate waste methodology. Negative binomial models, adjusted for student sex, grade, race/ethnicity, free/reduced-price lunch, and clustering at the school level, were used to assess the effect of salad bars, nutrition marketing, and salad bars + marketing conditions.

**Results:** Mean consumption at baseline was 69.8g ( $\pm 14.3$ ) for control, 50.0g ( $\pm 10.3$ ) for salad bar alone, 36.9g ( $\pm 7.5$ ) for marketing alone, and 41.3g ( $\pm 7.3$ ) for salad bar + marketing conditions. By 10 weeks, consumption was 47.1g ( $\pm 9.7$ ) for the control, 62.8g ( $\pm 12.8$ ) for salad bar alone, 42.0g ( $\pm 8.6$ ) for marketing alone, and 61.8g ( $\pm 11.9$ ) for salad bar + marketing conditions. Compared to the change in FV consumption between baseline and 10 weeks for the control condition, FV consumption for salad bar alone (OR = 5.28 [1.28, 21.80], p = .022), marketing alone (OR = 4.36 [1.04, 18.20], p = .044), and salad bar + marketing (OR = 3.59 [0.95, 13.60], p = .059) conditions were greater by 10 weeks, adjusting for individual-level confounding.

**Conclusions:** This trial offers strong evidence confirming salad bars increase FV consumption among low-income primary school students in the US. Relevance to national school food systems and policy will be discussed.

# Job demands and Physical Activity: A Moderated Mediation Model of Self-Regulatory Fatigue and Job Appraisals

**Prof. Cecilie Thøgersen-Ntoumani<sup>1, 2</sup>**

<sup>1</sup>University of Southern Denmark, Odense, Denmark, <sup>2</sup>Curtin University, Perth, Australia

O.2.13 - What have we learned recently on motivation and behavior change, UKK - Hall C (Level 3), June 16, 2023, 2:15 PM - 3:45 PM

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Research suggests that high job demands (such as workload or emotional demands) are associated with low levels of physical activity engagement. However, psychological mechanisms explaining this association are less well understood and research has primarily been cross-sectional. The purpose of the study was two-fold, specifically to examine: 1) whether any prospective associations between job demands (workload and emotional demands) and leisure-time physical activity was mediated by self-regulatory fatigue, and 2) if job appraisals (challenge and hindrance) moderated the indirect association between job demands and changes in leisure-time physical activity.

**Methods:** The study used a prospective survey design. Full-time working adults ( $N=461$ ;  $M_{age} = 36.29$ ; 82.2% female) completed two online surveys, one week apart. Questionnaires used to measure the constructs included the Quantitative Workload Inventory (Spector & Jex, 1998; doi:10.1037/1076-8998.3.4.356), the Emotional Demands Scale (Bakker et al., 2003; doi:10.1080/13594320344000165), the Mental Fatigue Symptom Inventory-Short Form (Stein et al., 2004; doi:10.1016/j.painsymman.2003.06.003), the Challenge and Hindrance Appraisal Scale (Searle & Auton, 2015; doi:10.1080/10615806.2014.931378) and the International Physical Activity Questionnaire (Craig et al., 2003; doi:10.1249/01MMS.0000078924.61453.FB). The moderated mediation model was tested using the PROCESS macro in SPSS (model 7), using residualised change scores.

**Results:** Workload was negatively associated with changes in leisure-time physical activity ( $b = -69.58$ ,  $t(450) = -2.35$ ,  $p = .019$ ) but results for emotional demands were not significant. Self-regulatory fatigue mediated the negative relationship between workload and changes in leisure-time physical activity (index = 11.68,  $SE = 6.13$ , 95% CI [.83, 24.98]) and between emotional demands and changes in leisure-time physical activity (index = 13.09,  $SE = 6.55$ , 95% CI [1.25, 27.02]). Moderated mediation analysis showed that job appraisals did not moderate the indirect effect of job demands and physical activity engagement, via self-regulatory fatigue.

**Conclusions:** The results provide support for a health impairment process by which high job demands exhaust employees' psychological energy resources which leads to fatigue and decreases in health-promoting behaviours. Interventions focusing on job redesign may be needed to increase leisure-time physical activity in working adults who experience high job demands.

# The experiences of night shift workers following three different dietary weight loss strategies: A qualitative study

**Ms. Corinne Davis<sup>1</sup>**, Dr. Catherine E. Huggins<sup>1,2</sup>, Dr. Sue Kleve<sup>1</sup>, Prof. Maxine P. Bonham<sup>1</sup>

<sup>1</sup>Department of Nutrition, Dietetics & Food, Monash University, Notting Hill, Australia, <sup>2</sup>Institute for Health Transformation, Global Centre for Preventive Health and Nutrition, Deakin University, Burwood, Australia

**O.2.13 - What have we learned recently on motivation and behavior change, UKK - Hall C (Level 3), June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Approximately 13-27% of the workforce are shift workers, who are at greater risk for obesity-related diseases. Despite this risk, there are limited weight-loss studies for night-shift workers, and no studies that explore their experiences during their weight-loss journey. The Shifting Weight using Intermittent Fasting in night shift workers (SWIFt) study compares three, 24-week weight-loss strategies: continuous energy restriction (CER), and 500-calorie fasting for 2-days per week; either during the day (5:2D), or the night shift (5:2N), with some food provided for all interventions. This qualitative study of a night-shift worker weight-loss intervention, aimed to explore the experiences of participants, in particular: 1) how intervention features influence engagement, and 2) how barriers/enablers at the individual, social, organisational, environmental levels, influence engagement.

**Methods:** This qualitative study forms part of a wider mixed-methods evaluation of the SWIFt study, which is underpinned by pragmatism as a theoretical perspective guiding research design. Semi-structured interviews were undertaken with a sub-set of participants who opted in at baseline and/or 24-weeks, with an additional option to complete fortnightly audio-diaries. A maximum-variation sampling approach was used to gain viewpoints across demographics and study-completion. Interviews/diaries were transcribed verbatim and analysed using a five-step thematic framework approach in NVivo.

**Results:** Out of the 250 participants randomised to the SWIFt study, 22 baseline interviews, 20 twenty-four-week interviews, 5 withdrawal/loss-to-follow up interviews, and 18 audio-diary sets, were completed totalling 43-hours. Four emerging themes and sub-themes include: 1) positive intervention features: 'convenience of provided foods', 'dietetic support/accountability', 'experiencing weight-loss', 'aiding shift-worker research', 'moderation approach' for CER, 'simplicity of approach' for 5:2; 2) negative intervention features: 'weight change not meeting expectations', 'limited focus on non-fasting days' for 5:2; 3) enablers external to intervention: 'high motivation/willpower', 'keeping busy', 'social support'; and 4) barriers external to intervention: 'fatigue', 'social eating events', 'availability of unhealthy food within/surrounding the workplace'.

**Conclusions:** Findings indicate that components of the SWIFt strategies were mostly well-tolerated. Positive intervention features including 'convenience of provided foods' and 'dietetic support/accountability' should be harnessed, and additional features such as a focus on non-weight related outcomes and changes to the workplace food environment, may further enhance engagement.



# Effectiveness of a multicomponent intervention promoting resistance training using outdoor gyms: ‘ecofit’, a cluster randomised controlled trial

**Prof. Ronald Plotnikoff**<sup>1,2</sup>, Dr. Anna Jansson<sup>1,2</sup>, Prof. Mitch Duncan<sup>2,3</sup>, Dr. Jordan Smith<sup>1,2</sup>, Prof. Adrian Bauman<sup>4</sup>, Prof. John Attia<sup>3</sup>, Prof. David Lubans<sup>1,2</sup>

<sup>1</sup>Centre for Active Living and Learning, University of Newcastle, Newcastle, Australia, <sup>2</sup>Active Living Research Program, Hunter Medical Research Institute, Newcastle, Australia, <sup>3</sup>School of Medicine and Public Health, University of Newcastle, Newcastle, Australia, <sup>4</sup>School of Public Health, University of Sydney, Sydney, Australia

**O.2.13 - What have we learned recently on motivation and behavior change, UKK - Hall C (Level 3), June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** This study aimed to determine the effectiveness of an innovative multicomponent intervention promoting resistance-based and aerobic physical activity using outdoor gyms, mHealth, and social support.

**Methods:** The effectiveness trial involved a two-arm cluster randomised controlled trial design, with assessments at baseline, 3- (primary time-point) and 9-months (follow-up). Participants were recruited from two large local government municipalities in New South Wales, Australia. Eligible participants were aged 18-80 years, had access to a smartphone, were not meeting aerobic and/or resistance-based physical activity guidelines, and passed a Pre-Exercise Screening Tool. Intervention components included: i) a purpose-built smartphone application (app) with standardised workouts linked to 12 local outdoor gyms locations, ii) social support (i.e., option to enrol as a group and join the *ecofit* Facebook group), and iii) a 90-minute introductory session. Linear mixed models were conducted with an adjusted alpha ( $p < .025$ ) to account for the two primary outcomes of upper (i.e., push-up test) and lower body (sit-to-stand test) muscular fitness.

**Results:** Participants ( $N=245$ ; mean age 53.4 yrs [ $SD=13.9$ ]; 72% female) were recruited. There were no statistically significant group-by-time effects for the primary outcomes at 3-months. There were however, statistically significant intervention effects in self-reported resistance training [RT] (0.8 times/week, 95%CI=0.5, 1.2,  $p < .001$ ), RT self-efficacy (0.5 units, 95%CI=0.2, 0.8) and implementation intentions for RT (0.9 units, 95%CI=0.5, 1.3) at 3-months. At follow-up (9-months), there were statistically significant intervention effects for both upper (1.42 repetitions, 95%CI=0.25, 2.59) and lower body (2.6 repetitions, 95%CI=0.41, 4.82) muscular fitness, self-reported RT (0.7 times/week, 95%CI=0.3, 1.1,  $p = .002$ ), RT self-efficacy (0.6 units, 95%CI=0.2, 0.9) and implementation intentions for RT (0.8 units, 95%CI=0.3, 1.3).

**Conclusions:** This appears one of the first community-based RT intervention employing a scalable, affordable approach targeting the general population. Beneficial effects on several outcomes were encouraging, particularly given the disruption caused by the COVID-19 pandemic. The positive findings warrant further examination of this scalable intervention for dissemination to other local government municipalities.

# Does a nutritional intervention aiming at improving diet quality and initiated in early pregnancy improve glucose homeostasis in pregnant individuals at risk for gestational diabetes? A randomized controlled trial

**Miss Emilie Bernier**<sup>1,2,3</sup>, Prof. Julie Robitaille<sup>1,2,3</sup>, Prof. Simone Lemieux<sup>1,3</sup>, Dr. Patricia Lemieux<sup>2,4</sup>, Mrs. Ariane Bélanger-Gravel<sup>3,5,6</sup>, Dr. John Weisagel<sup>2,4</sup>, Dr. Suzanne Demers<sup>4</sup>, Mr. Félix Camirand Lemyre<sup>7</sup>, Mrs. Mélanie Boulet<sup>8</sup>, Dr. Jean-Patrice Baillargeon<sup>9,10</sup>, Dr. Sophie Desroches<sup>1,3</sup>, Mrs. Anne-Sophie Morisset<sup>1,2,3</sup>

<sup>1</sup>École de nutrition, Université Laval, Québec, Canada, <sup>2</sup>Axe endocrinologie et néphrologie, Centre de recherche du CHU de Québec-Université Laval, Québec, Canada, <sup>3</sup>Centre de recherche Nutrition Santé et Société (NUTRISS) de l'Institut sur la nutrition et des aliments fonctionnels (INAF), Université Laval, Québec, Canada, <sup>4</sup>Département de médecine, Université Laval, Québec, Canada, <sup>5</sup>Département de communication, Université Laval, Québec, Canada, <sup>6</sup>Centre de recherche de l'Institut Universitaire de cardiologie de pneumologie de Québec, Québec, Canada, <sup>7</sup>Département de mathématiques, Université de Sherbrooke, Sherbrooke, Canada, <sup>8</sup>Hôtel-Dieu de Sherbrooke, CHU de Sherbrooke, Sherbrooke, Canada, <sup>9</sup>Département de médecine, Sherbrooke, Canada, <sup>10</sup>Centre de recherche du CHU de Sherbrooke, Sherbrooke, Canada

**O.2.13 - What have we learned recently on motivation and behavior change, UKK - Hall C (Level 3), June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** A healthy diet during pregnancy has favorable effects on glycemic control and is associated with a lower risk of gestational diabetes (GDM). According to Diabetes Canada, there is a need for an effective and acceptable intervention that could improve glucose homeostasis and support pregnant individuals at risk for GDM. This unicentric randomized controlled trial aims to evaluate the effects of a nutritional intervention initiated early in pregnancy, based on Canada's Food Guide (CFG), on glucose homeostasis in 150 pregnant individuals at risk for GDM, compared to usual care.

**Methods:** Population: Participants are currently being recruited (n=5 intervention; n=5 control). They are ≥18 years old, at ≤14 weeks of pregnancy, and have ≥1 risk factor for GDM according to Diabetes Canada Guidelines. Intervention: The nutritional intervention provided is based on a conceptual model based on health behavior change theory during pregnancy and on CFG recommendations and begins in the first trimester. The intervention consists of 4 individualized counseling sessions with a registered dietitian using motivational interviewing (12, 18, 24, and 30 weeks), with in-between phone call follow-ups, aiming to develop and achieve S.M.A.R.T. nutritional objectives (specific, measurable, attainable, relevant, and time-bound). Participants also have access to 10 informative web capsules on healthy eating during pregnancy developed by our team and based on CFG and other national guidelines, and to a virtual support community via a Facebook group. Control: Usual care (no nutritional intervention). Protocol: They participate in 3 on-site visits (12-14, 24-26, and 34-36 weeks) during which a 2-h oral glucose tolerance test and blood samples are taken. At every trimester and 3 months postpartum, participants complete web-based questionnaires, including 3 validated 24-hour dietary recalls to assess their diet quality using the Healthy Eating Food Index 2019, which measures one's adherence to CFG recommendations. Primary outcomes: Change in fasting blood glucose and other glucose homeostasis markers (first to third trimester) will be compared between groups.

**(Anticipated) Results:** This ongoing study will allow us to determine if a nutritional intervention initiated early in pregnancy can improve glucose homeostasis of individuals at risk for GDM, compared to usual care.

# Development and validation of a scale to evaluate the level of mindful eating in the general French population

**Miss Marion Van Beekum<sup>1</sup>**, Prof. Rebecca Shankland<sup>2</sup>, Dr. Angélique Rodhain<sup>3</sup>, Dr. Margaux Robert<sup>1</sup>, Miss Camille Marchand<sup>1</sup>, Miss Athéna Herry<sup>1</sup>, Miss Clémentine Prioux<sup>1</sup>, Miss Marie Barday<sup>1</sup>, Dr. Roxane Turgon<sup>2</sup>, Prof. Antoine Avignon<sup>4</sup>, Dr. Christophe Leys<sup>5</sup>, Dr. Sandrine Péneau<sup>1</sup>

<sup>1</sup>Université Sorbonne Paris Nord, Inserm U1153, Inrae U1125, Cnam, Equipe de recherche en Epidémiologie Nutritionnelle (EREN), Centre de Recherche en Epidémiologie et Statistiques – Université de Paris (CRESS), Bobigny, France, <sup>2</sup>Université Grenoble Alpes, LIP/PC2S, Grenoble, France, <sup>3</sup>Montpellier Research in Management (MRM), Place Eugène Bataillon – CC 19001 – bâtiment 19, Montpellier, France, <sup>4</sup>Desbrest Institute of Epidemiology and Public Health, IDESP UMR UA11 INSERM, Université Montpellier, Montpellier, France, <sup>5</sup>Faculty of Psychological Sciences, Université Libre de Bruxelles, Avenue Franklin Roosevelt, 50 - CP191, Bruxelles, Belgium

**O.2.13 - What have we learned recently on motivation and behavior change, UKK - Hall C (Level 3), June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose :** Mindful eating defines a non-judgmental awareness of physical and emotional sensations experienced while eating. Studies show promising evidence of an association with healthier eating behavior and lower weight status. However, existing scales assessing the level of mindful eating are not exhaustive (e.g. environment or emotions aspects are lacking) or have specific methodological limits. Our objective was therefore to develop and validate a scale assessing the level of mindful eating in the general French population.

**Methods :** Items were created and administered to a representative sample of the general population of the NutriNet-Santé cohort. The construct validity was assessed with exploratory (EFA) and confirmatory (CFA) factor analyses. Goodness of fit was assessed by chi-square index by degrees of freedom ( $\chi^2/df$ ); comparative fit index (CFI); Tucker-Lewis index (TLI); root mean square error of approximation (RMSEA); and standardized mean square residual (SRMR). Convergent validity was estimated by correlation with other closely related scales. Discriminant validity was assessed in groups of individuals with varied sociodemographic and lifestyle profiles. Internal consistency and test-retest reliability were also examined.

**Results :** An EFA was performed on a subsample of 1302 individuals and highlighted seven dimensions: attention, hunger/satiety, non-reactivity, emotions, non-judgment, openness, connectedness with four items per dimension. A CFA was performed on 1302 individuals and the results suggested a good fit of the model:  $\chi^2/df = 3$ ; CFI = 0.97; TLI = 0.96; and RMSEA = 0.04; SRMR = 0.06. Mindful eating scores were higher for men and older individuals. A higher mindfulness eating score was associated with a lower score of cognitive restriction (TFEQ-R21) and depression (CES-D), and with a higher score of nutritional quality (mPNNS-GS), mindfulness (FFMQ), self-esteem (RSES), satisfaction with life (SWLS), optimism (LOT-R), gratitude (GQ-6) and resilience (BRS). The internal consistency of the questionnaire was satisfactory (McDonald's  $\omega = 0.82$ ) and the test-retest reliability was good (ICC = 0.86).

**Conclusions :** This study validated the first tool for assessing the level of mindful eating in general French population. This work opens the way to clinical and epidemiological research on this subject in the coming years.

# Effects of Interpersonal and Intrapersonal Behavior Change Strategies on Physical Activity among Older Adults with Fall Risks: A Factorial Randomized Trial (Ready Steady 3.0)

**Associate Professor Siobhan K McMahon<sup>1</sup>**, Prof. Beth Lewis<sup>1</sup>, Ms. Qi Wang<sup>1</sup>, Prof. Jean F Wyman<sup>1</sup>, Associate Professor Weihua Guan<sup>1</sup>, Prof. Alexander J Rothman<sup>1</sup>  
<sup>1</sup>University of Minnesota, Minneapolis, USA

**O.2.13 - What have we learned recently on motivation and behavior change, UKK - Hall C (Level 3), June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Despite evidence that physical activity (PA) targeting leg strength and balance reduces the serious public health problem of falls among older adults, most do not regularly perform these activities. Research examining the effects of intervention strategies targeting older adults' motivation for PA is limited and inconclusive, underscoring the need to optimize behavior change content within existing interventions. Thus, the purpose of this trial was to assess the main and interactive effects of two sets of behavioral change strategies based on empirical evidence and theory --interpersonal (e.g., social support, social comparison) and intrapersonal (e.g., goal setting, action planning) – on older adults' PA quantity.

**Methods:** Community-dwelling older adults (N=309, mean age=77, SD=5) were randomized in a 2 × 2 factorial experiment (clinicaltrials.gov NCT03326141). The two factors represented receipt (No, Yes) of interpersonal or intrapersonal behavior change strategy sets. All participants also received two core intervention components: the Otago Exercise Program adapted for small groups and a PA monitor (Fitbit Charge 2). All interventions were delivered to small groups (4 to 6 participants) in community settings over 8 weekly meetings, 90 minutes each. Average daily minutes of total PA (light, moderate, vigorous) was the primary outcome, assessed at baseline and post-intervention (1 week, 12 months) via accelerometers within the PA monitors. Main and interactive effects at each post-intervention time point were examined using ANCOVA general linear models, with baseline PA as covariates.

**Results:** Trial retention and course attendance were high. Participants who received interpersonal behavior change strategies, compared to those who did not, significantly increased their average daily minutes of total PA at post-intervention: one week (+29 min/day, SE = 7,  $p = .0035$ ,  $d = .43$ ) and 12 months (+23 min/day, SE = 8,  $p = .0031$ ,  $d = .43$ ). Intrapersonal strategies did not elicit significant changes in PA. There were no statistically significant interactions between the strategy sets.

**Conclusions:** A set of interpersonally oriented behavior change strategies is promising for increasing and sustaining PA among older adults with fall risk(s) when combined with the Otago Exercise Program, adapted for small groups, and a PA monitor.

# Reallocating sedentary time to physical activity may have beneficial effects on fatigue in patients with breast cancer: findings from the Phys-Can project

**Dr. Anne-Sophie Mazzoni (corresponding author)**<sup>1</sup>, Dr. Emelie Strandberg<sup>1</sup>, Prof. Susanne Börjeson<sup>2</sup>, Dr. Katarina Sjövall<sup>3</sup>, Prof. Sveinung Berntsen<sup>1, 4</sup>, Associate Professor Ingrid Demmelmaier<sup>1, 4</sup>, Prof. Karin Nordin<sup>1, 4</sup>

<sup>1</sup>Uppsala University, Uppsala, Sweden, <sup>2</sup>Linköping University, Linköping, Sweden, <sup>3</sup>Kristianstad University, Kristianstad, Sweden, <sup>4</sup>University of Agder, Kristiansand, Norway

**O.2.14 - What have we learned recently on cancer prevention and management, UKK - Hall D (Level 2 - main floor), June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** C. Cancer prevention and management

**Purpose:** The health benefits of physical activity in patients with cancer is well documented, but less is known about the replacing effects of sedentary time with physical activity of different intensity. We aimed 1) to investigate the effects of reallocating sedentary time to light (LPA) or moderate-to-vigorous intensity physical activity (MVPA) on cancer-related fatigue and health-related quality of life (HRQoL) in patients with breast cancer, and 2) to determine the daily amount of sedentary time needed to be reallocated to produce minimal clinically important changes in these outcomes.

**Methods:** Pooled baseline data from the Physical training and Cancer (Phys-Can) project were used. Fatigue was assessed with the Multidimensional Fatigue Inventory questionnaire (MFI, five dimensions, 4-20 scale), and HRQoL with the European Organisation for Research and Treatment of Cancer quality of life questionnaire (EORTC QLQ-C30, 0-100 scale). Sedentary time and physical activity were measured with accelerometry. Isotemporal substitution modelling was used for the analyses.

**Results:** Overall, 436 participants with breast cancer (mean age 56 years, fatigue 11 [MFI], HRQoL 66 [EORTC QLQ-C30], LPA 254 minutes/day, MVPA 71 minutes/day) were included. Fatigue significantly decreased in two MFI dimensions when reallocating 30 minutes/day of sedentary time to LPA: reduced motivation and reduced activity ( $\beta=-0.21$ ). Fatigue significantly decreased in three MFI dimensions when reallocating 30 minutes/day of sedentary time to MVPA: general fatigue ( $\beta=-0.34$ ), physical fatigue ( $\beta=-0.47$ ) and reduced activity ( $\beta=-0.48$ ). To produce minimal clinically important changes in fatigue (-2 points on MFI), the amount of sedentary time needed to be reallocated to LPA was  $\approx 290$  minutes/day and to MVPA was  $\geq 125$  minutes/day. No effects were observed on HRQoL when reallocating sedentary time to LPA or MVPA.

**Conclusions:** Reallocating sedentary time to LPA or MVPA may have beneficial effects on cancer-related fatigue in patients with breast cancer, with MVPA having the greatest impact. Our study highlights the health benefits of replacing sedentary time with LPA, which may be a more feasible alternative than MVPA in less physically active breast cancer populations. However, in relatively healthy and physically active breast cancer populations, a large amount of time reallocation is needed to produce clinically important changes.



# Application of a Bayesian adaptive decision-theoretic approach to a multi-arm exercise oncology trial

**Associate Professor Laurien Buffart**<sup>1</sup>, Mr. Andrea Bassi<sup>2</sup>, Dr. Martijn Stuiver<sup>3</sup>, Prof. Neil Aaronson<sup>3</sup>, Prof. Gabe Sonke<sup>3</sup>, Prof. Johannes Berkhof<sup>2</sup>, Dr. Peter van de Ven<sup>4</sup>

<sup>1</sup>Radboudumc, Nijmegen, Netherlands, <sup>2</sup>Amsterdam UMC, Amsterdam, Netherlands, <sup>3</sup>Netherlands Cancer Institute, Amsterdam, Netherlands, <sup>4</sup>UMC Utrecht, Utrecht, Netherlands

**O.2.14 - What have we learned recently on cancer prevention and management, UKK - Hall D (Level 2 - main floor), June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** C. Cancer prevention and management

**Purpose:** Multiple randomized controlled trials have shown benefits of exercise during cancer treatment for physical fitness, fatigue, and quality of life. However, the effect on disease outcomes and the optimal exercise prescriptions are unclear. Efficient designs are needed to reduce sample sizes and costs of trials comparing multiple complex treatments. We performed present re-analyses of the data from a multi-arm exercise oncology trial using a Bayesian adaptive decision-theoretic approach to illustrate the methods and as proof-of-concept for this approach.

**Methods:** In the PACES trial, 230 breast cancer patients receiving adjuvant chemotherapy were randomized to supervised resistance and aerobic exercise (OnTrack), homebased physical activity (OncoMove) or usual care. Data were re-analyzed as an adaptive trial using a frequentist and Bayesian decision-theoretic approach incorporating interim analyses for trial continuation after every 36 patients. Endpoint was chemotherapy treatment modifications (any versus none). For Bayesian analyses, we considered a symmetric (pick-the-winner) setting, and an asymmetric setting using a superior margin. For both, settings with and without early dropping of arms were considered. Interim decisions for continuation were based on the expected decrease in the probability of an incorrect decision in the next stage, for which thresholds of 0.01 and 0.001 were considered. For frequentist analyses, we used the Pocock alpha-spending function, a maximum trial size of 218 and interim analyses after each 36 patients.

**Results:** Treatment modifications occurred in 34% of patients in the usual care and OncoMove arms versus 12% in the OnTrack arm ( $p=0.002$ ). Using a Bayesian adaptive decision-theoretic design and a continuation threshold of 0.001, 72 patients were needed to identify OnTrack as the most effective arm in the symmetric setting and 144 patients in the asymmetric setting. Using frequentist analyses, the trial would have been stopped after 180 patients, with OnTrack being superior to usual care.

**Conclusions:** A Bayesian adaptive decision-theoretic approach was shown to substantially reduce the sample size required for this three-arm exercise trial. Future trials that use this approach for continuation decisions should confirm its value. Therefore, we now apply this design to a three-arm exercise oncology trial in patients with metastatic colorectal cancer receiving chemotherapy.

# Demographics and health characteristics are associated with self-reported likelihood of participating in digitally-delivered exercise rehabilitation for improving heart health among breast cancer survivors: an observational study.

**Dr. Tamara Jones<sup>1</sup>**, Dr. Lara Edbrooke<sup>1,2</sup>, Dr. Jonathan Rawstorn<sup>3</sup>, Prof. Linda Denehy<sup>1,2</sup>, Prof. Sandra Hayes<sup>4</sup>, Prof. Ralph Maddison<sup>3</sup>, Associate Professor Aaron Sverdlow<sup>5</sup>, Prof. Bogda Koczwara<sup>6</sup>, Associate Professor Nicole Kiss<sup>3</sup>, Associate Professor Camille Short<sup>1</sup>

<sup>1</sup>The University of Melbourne, Melbourne, Australia, <sup>2</sup>The Peter MacCallum Cancer Centre, Melbourne, Australia, <sup>3</sup>Deakin University, Melbourne, Australia, <sup>4</sup>Griffith University, Brisbane, Australia, <sup>5</sup>University of Newcastle, Newcastle, Australia, <sup>6</sup>Flinders University, Adelaide, Australia

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**Purpose:** This study aimed to identify demographic and health characteristics associated with perceived likelihood of uptake of digitally-delivered cardiac exercise rehabilitation among breast cancer survivors, and to explore other intervention topics of interest and service fee capabilities.

**Methods:** A sample of 208 breast cancer survivors completed a cross-sectional survey collecting likelihood of uptake of digitally-delivered cardiac exercise rehabilitation, demographic and health characteristics, knowledge of treatment side-effects, exercise behaviour, other intervention interests (e.g., diet, fatigue), and service fees. Descriptive statistics were calculated for outcomes of interest and patient characteristics. Ordered logistic regression models were used to examine associations between demographic and health characteristics and self-reported likelihood of intervention uptake (1) generally, (2) before, (3) during, and (4) after treatment.

**Results:** Participants had a mean age of 57(11) years and BMI of 27(6) kg/m<sup>2</sup>. Participants were generally representative of the Australian breast cancer population, however those meeting exercise guidelines were oversampled (44% meeting both aerobic and resistance training guidelines). Living in an outer regional area was consistently identified as the strongest predictor of self-reported likelihood of uptake across all stages of the care continuum (OR=3.86-8.57). Receiving a high number of cardiotoxic treatments was also associated with higher uptake generally (OR=1.4). In comparison, those with a higher BMI (OR=0.93-0.95) and lower education levels (OR=0.30-0.48) were less likely to uptake a digitally-delivered intervention during various treatment phases. More comorbid conditions were also associated with lower odds of uptake during treatment (OR=0.66). Secondary outcomes highlighted the need for better education about cardiotoxic treatment effects, and the desire for multifaceted rehabilitation interventions that are free or low cost for patients (median, IQR=10, 10-15AUD).

**Conclusions:** A digitally-delivered cardiac rehabilitation model may help address equity of access issues for those living regionally, and also may help reach those at high risk of cardiotoxicity due to treatment. However, those with a high BMI, low education and comorbidities may be at risk of falling through the gaps with this model. This information can inform future research and the development of intervention techniques that are critical to improve the delivery of a digital service model that is effective, equitable, and accessible.

# The role of long-term physical activity in relation to cancer-related health outcomes: a 12-month follow-up of an exercise intervention

**Dr. Anne-Sophie Mazzoni (corresponding author)**<sup>1</sup>, Dr. Ann Christin Helgesen Bjørke<sup>2</sup>, Associate Professor Andreas Stenling<sup>2,3</sup>, Prof. Sussanne Börjeson<sup>4</sup>, Dr. Katarina Sjövall<sup>5</sup>, Prof. Sveinung Berntsen<sup>1,2</sup>, Prof. Karin Nordin<sup>1,2</sup>, Associate Professor Ingrid Demmelmaier<sup>1,2</sup>

<sup>1</sup>Uppsala University, Uppsala, Sweden, <sup>2</sup>University of Agder, Kristiansand, Norway, <sup>3</sup>Umeå University, Umeå, Sweden, <sup>4</sup>Linköping University, Linköping, Sweden, <sup>5</sup>Kristianstad University, Kristianstad, Sweden

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**Purpose:** While moderate-to-vigorous intensity physical activity (MVPA) is associated with various health improvements shortly after completion of exercise interventions, it remains unclear which health benefits can be expected when MVPA level is maintained in the long term in cancer survivors. We aimed to assess the associations of 1) MVPA level at 12-month follow-up and 2) long-term MVPA patterns (from post-intervention to 12-month follow-up) with cancer-related health outcomes.

**Methods:** In the Physical training and Cancer RCT, 577 participants diagnosed with breast, colorectal or prostate cancer were randomised to six months of exercise. Accelerometer-assessed physical activity and outcome data (e.g. cancer-related fatigue, health-related quality of life [HRQoL], anxiety, depression, functioning in daily life, cardiorespiratory fitness, sedentary time and sleep) were collected at post-intervention and at 12-month follow-up. Based on the sample's median of MVPA at post-intervention (i.e. high level  $\geq 65$  minutes/day or low level  $< 65$  minutes/day) and the changes between the two measurement points (i.e. increased or decreased), four categories with different long-term MVPA patterns were created: High & Increasing, High & Decreasing, Low & Increasing and Low & Decreasing. Multiple linear regression analyses were performed for the analyses.

**Results:** A total of 353 participants were included in the analyses. At 12-month follow-up, a higher MVPA level was significantly associated with lower fatigue in three dimensions (general fatigue [ $\beta=-0.33$ ], physical fatigue [ $\beta=-0.53$ ] and reduced activity [ $\beta=-0.37$ ]), higher cardiorespiratory fitness ( $\beta=0.34$ ) and less sedentary time ( $\beta=-0.35$ ). For long-term MVPA patterns, compared to participants in the "Low & Decreasing" category, those in the "High & Increasing" category reported significantly lower fatigue in three dimensions (general fatigue [ $\beta=-1.77$ ], physical fatigue [ $\beta=-3.36$ ] and reduced activity [ $\beta=-1.58$ ]), higher HRQoL ( $\beta=6.84$ ) and had less sedentary time ( $\beta=-1.23$ ).

**Conclusions:** Our results suggest that long-term physical activity is essential for improving health outcomes post-intervention in cancer survivors, even among those with high MVPA level. Cancer survivors should therefore be encouraged to maintain or increase MVPA post-intervention for additional health benefits. Our findings highlight the importance of interventions targeting physical activity maintenance in cancer survivors.

# Correlates of physical activity and dietary intake in women with ovarian cancer

**Dr. Marlou-Floor Kenkhuis<sup>1</sup>**, Dr. Yvonne Hartman<sup>1</sup>, Ms. Stephanie Stelten<sup>1</sup>, Dr. Luc van Lonkhuijzen<sup>2</sup>, Prof. Gemma Kenter<sup>2</sup>, Dr. Willemien van Driel<sup>3</sup>, Associate Professor Renate Winkels<sup>4</sup>, Dr. Nelleke Ottevanger<sup>1</sup>, Dr. Meeke Hoedjes<sup>5</sup>, Associate Professor Laurien Buffart<sup>1</sup>

<sup>1</sup>RadboudUMC, Nijmegen, Netherlands, <sup>2</sup>AmsterdamUMC, Amsterdam, Netherlands, <sup>3</sup>Nederlands Kanker Instituut, Amsterdam, Netherlands, <sup>4</sup>Wageningen University & Research, Wageningen, Netherlands, <sup>5</sup>Tilburg University, Tilburg, Netherlands

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**Purpose:** Studies in patients with cancer have shown that exercise and dietary interventions help to improve physical fitness and limit side effects. Knowledge of the correlates of physical activity (PA) and dietary intake can inform the design of health promotion interventions. Few studies have been performed in patients with ovarian cancer and therefore, we aimed to study levels of PA and dietary intake among patients with ovarian cancer and we investigated the correlates of these behaviors.

**Methods:** In total, 139 women who were scheduled to undergo (neo)adjuvant chemotherapy for ovarian cancer participated in this cross-sectional study. PA was measured with the Physical Activity Scale for the Elderly questionnaire and dietary intake by a Food Frequency Questionnaire specifically developed to assess adherence to the World Cancer Research Fund (WCRF) lifestyle recommendations. Correlates of PA and dietary intake included knowledge on recommendations, self-efficacy, outcome expectations, and socio-structural factors, all assessed by (self-composed) questionnaires. Backward linear regression analyses were used to examine which correlates were associated with PA or dietary intake.

**Results:** Participants reported low levels of PA with a median (range) PASE score of 50 (24-94) and dietary intake of 1902±693 kcal/day and 78±30 gram protein/day. On average, patients adhered to WCRF recommendations on 3 out of 5 components. Lower age ( $\beta=-1.2$ , 95%CI=-2.2;-0.1), lower physical outcome expectations ( $\beta=-5.1$ , 95%CI=-9.6;-0.7), higher cancer specific outcome expectations ( $\beta=10.2$ , 95%CI=4.6;15.8) and less barriers for PA change ( $\beta=-1.5$ , 95%CI=-2.7;-0.2) were independently associated with higher PA levels. A higher age ( $\beta=0.02$ , 95%CI=0.00;0.03), higher education level ( $\beta=0.3$ , 95%CI=0.08;0.48), and a higher diet related self-efficacy ( $\beta=0.06$ , 95%CI=0.03;0.09) was significantly associated with adhering to more WCRF lifestyle recommendations, whilst no correlates were found for total caloric intake or protein intake.

**Conclusion:** Patients with ovarian cancer patients are physically inactive, also when compared to patients with other cancer types, in addition they reported a suboptimal diet. Accordingly, interventions should be developed to improve PA and dietary intake, while self-efficacy, outcome expectations, and reduction of barriers could be used as targets for these interventions. The PADOVA trial examines the effect of a combined exercise and dietary intervention in ovarian cancer patients.

# Physical activity maintenance among young adult cancer survivors in an mHealth intervention: Twelve-month outcomes from the IMPACT randomized controlled trial

**Dr. Carmina G. Valle**<sup>1,2</sup>, Ms. Molly A. Diamond<sup>2</sup>, Ms. Hillary M. Heiling<sup>1,2</sup>, Ms. Allison M. Deal<sup>2</sup>, Dr. Derek P. Hales<sup>1</sup>, Dr. Brooke T. Nezami<sup>1</sup>, Dr. Jessica Gokee LaRose<sup>3</sup>, Dr. Christine M. Rini<sup>4</sup>, Dr. Bernardine M. Pinto<sup>5</sup>, Dr. Deborah F. Tate<sup>1,2</sup>

<sup>1</sup>Gillings School of Global Public Health, University of North Carolina at Chapel Hill, Chapel Hill, NC, USA,

<sup>2</sup>Lineberger Comprehensive Cancer Center, University of North Carolina at Chapel Hill, Chapel Hill, NC, USA,

<sup>3</sup>Department of Health Behavior and Policy, School of Medicine, Virginia Commonwealth University, Richmond, VA, USA, <sup>4</sup>Department of Medical Social Sciences, Feinberg School of Medicine, Northwestern University, Chicago, IL, USA, <sup>5</sup>College of Nursing, University of South Carolina, Columbia, SC, USA

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**Purpose:** Most physical activity (PA) interventions in young adult cancer survivors (YACS) have focused on short-term outcomes, and few have evaluated PA maintenance. This study examined the effects of an mHealth PA intervention at 12 months on total PA (primary) and moderate-to-vigorous PA (MVPA) relative to a self-help group among 280 YACS.

**Methods:** YACS participated in a 12-month randomized trial that compared self-help and intervention groups. All participants received activity trackers, wireless scales, an individual videochat session, and access to a Facebook group. Intervention participants also received lessons, tailored feedback, adaptive goal setting, text messages, and Facebook prompts for 6 months, followed by tapered contacts (i.e., bimonthly lessons and tailored feedback, weekly text message, Facebook prompts). PA was measured with accelerometry and a self-report questionnaire (Godin Leisure Time Exercise Questionnaire) at baseline, 6, and 12 months. Generalized estimating equation analyses estimated intervention effects on PA outcomes from baseline to 12 months and 6 to 12 months.

**Results:** From baseline to 12 months, there were no between- or within-group differences in accelerometer-measured total PA minutes/week ( $p=.25-.57$ ). Both groups increased MVPA (intervention: +22.5 minutes/week [95% CI, 8.8-36.2],  $p=.001$  versus self-help: +13.9 minutes/week [95% CI, 3.0-24.9],  $p=.013$ ; between-group  $p=.34$ ). Over 12 months, increases in self-reported total PA were greater in the intervention versus self-help group (mean difference= +55.8 minutes/week [95% CI, 6.0-105.6],  $p=.028$ ), and between-group differences in self-reported MVPA increases approached significance (mean difference= +29.9 minutes/week [95% CI, -0.7, 60.4],  $p=.055$ ). Both groups maintained accelerometer-measured and self-reported PA (total, MVPA) from 6 to 12 months. At 12 months, 47.9% of intervention participants reported meeting national PA guidelines compared with 33.1% of self-help participants (RR, 1.45 [95% CI, 1.06-1.98];  $p=.02$ ).

**Conclusions:** The intervention was more effective than the self-help group at increasing self-reported, but not accelerometer-measured, total PA over 12 months. Both groups maintained increases in total PA and MVPA from 6 to 12 months. Overall, both digital approaches could be promising for promoting sustained PA participation and long-term health benefits in YACS, but additional research is needed to identify what strategies work for whom, and under what conditions.



# Validity and feasibility of cognitive tests in older adults' daily lives

**Ms. Fien De Block<sup>1</sup>**, Prof. Delfien Van Dyck<sup>1</sup>, Prof. Benedicte Deforche<sup>1</sup>, Prof. Geert Crombez<sup>1</sup>, Dr. Louise Poppe<sup>1</sup>

<sup>1</sup>Ghent University, Ghent, Belgium

**O.2.15 - Cognitive function and ageing - predictors to interventions, UKK - K1 (+K2) (Level 3), June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** The positive effects of physical activity (PA) on cognition are widely recognized. However, research that takes into account the between-day fluctuations in cognition is still limited. This research is especially important for older adults, since large fluctuations appear to be linked with the development of dementia. To detect between-day fluctuations, validated cognitive tests that can be easily incorporated into daily life are much needed. Therefore, this study aimed to assess the validity and feasibility of three short cognitive tests assessing cognition on a daily basis.

**Methods:** For this within-subject study, thirty older adults ( $\geq 65$ y) were given a tablet on which three cognitive tests (Stroop Task (ST)), Visual Search Task (VST), Sternberg Memory Task (SMT)) and the Patient Reported Outcomes Measurement Information System (PROMIS) questionnaire, which assessed subjective cognition, were programmed. The tests assessed inhibition, attention and working memory respectively, and were completed together with the PROMIS, every evening for 14 days. Construct validity was assessed by Pearson correlations, comparing the first-day outcomes of the daily tests with (1) three tests from the validated CANTAB software assessing the same domains (MTT, MTS, PRM), and (2) the first-day total PROMIS score. Feasibility was examined by semi-structured interviews, conducted after the testing period, in which participants' experiences with the daily tests were questioned. These data were analyzed using deductive thematic analyses.

**Results:** Preliminary validity analyses showed that ST, VST and SMT reaction times, and SMT accuracy had moderate to strong correlations with their respective CANTAB outcomes ( $r=0.314-0.720$ ), and almost all daily test outcomes correlated moderately to strongly with subjective cognition ( $r=0.399-0.683$ ), except for VST reaction time. The interviews indicated that performing the daily tests for 14 days was feasible. Most participants reported no problems and found the tests easy to use, with appropriate difficulty. Further analyses will be conducted and results will be presented at the conference.

**Conclusion:** The three cognitive tests showed potential for validly measuring daily cognition. Because of the good feasibility, the tests could possibly be used to assess cognition in people's daily lives, which will have important implications for assessing the effect of PA on daily cognition.

# The daily associations between physical activity and cognitive functioning

**Dr. Tiia Kekäläinen**<sup>1</sup>, Assistant Professor Martina Luchetti<sup>2</sup>, Prof. Antonio Terracciano<sup>2</sup>, Prof. Angelina Sutin<sup>2</sup>  
<sup>1</sup>University of Jyväskylä, Jyväskylä, Finland, <sup>2</sup>Florida State University, Tallahassee, USA

**O.2.15 - Cognitive function and ageing - predictors to interventions, UKK - K1 (+K2) (Level 3), June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** Physical activity is consistently linked to better cognitive functioning. However, these associations are rarely studied in the context of everyday life taking into account the fluctuating nature of both physical activity and cognitive functioning. This study investigated whether physical activity is associated with cognitive functioning at a daily level.

**Methods:** Participants (N = 289) from the Couples Healthy Aging Project (CHAP) were 40–70 years old cognitively intact adults living in Florida (USA) who completed a battery of cognitive tests at three random times per day for eight consecutive days using smartphones. The cognitive tests included the Symbol Search Task (processing speed) and the Dot Memory test (visual memory). Self-reported cognition (memory, speed of thinking, and sharpness of mind) from each day was asked in an additional evening survey. Physical activity was assessed with wrist-worn accelerometers during the same eight days period. The analyses were conducted with a multilevel modeling approach with two levels (days nested within individuals). Both between-person and within-person associations were included in the models.

**Results:** Between-person differences accounted for 72% (intraclass correlation) in processing speed, 42% in visual memory, 54% in self-reported memory, 54% in self-reported thinking, and 55% in self-reported mind sharpness. Thus, considerable within-person variance (28–58%) was available for further analysis. In the preliminary analysis, participants who were more physically active had faster processing speed than less physically active participants ( $B=-0.66$ ,  $SE=0.27$ ,  $p=0.016$ ). Physical activity was not associated with visual memory at the between-person or within-person level. Physical activity was associated with all self-reported cognition assessments only at the within-person level. On days when participants were more physically active than they usually were, they reported in the evening that they had better memory ( $B=0.008$ ,  $SE=0.004$ ,  $p=.041$ ), faster thinking ( $B=0.011$ ,  $SE=0.006$ ,  $p=0.006$ ), and better sharpness of mind ( $B=0.016$ ,  $SE=0.004$ ,  $p<0.001$ ) in the current day.

**Conclusions:** Daily variation in physical activity was not associated with test-based cognitive performance among cognitively intact adults. However, participants experienced better cognition on days when they were more physically active than usual. More research is needed to understand the causal pathways and daily associations between physical activity and cognition.

# From parks to cognitive health: the roles of physical activity, sedentary behaviours and metabolic risk factors

**Prof. Ester Cerin**<sup>1</sup>, Prof. Anthony Barnett<sup>1</sup>, Prof. Jonathan E. Shaw<sup>2</sup>, Ms. Erika Martino<sup>3</sup>, Associate Professor Luke D. Knibbs<sup>4</sup>, Prof. Kaarin J. Anstey<sup>5</sup>

<sup>1</sup>Australian Catholic University, Melbourne, Australia, <sup>2</sup>Baker Heart and Diabetes Institute, Melbourne, Australia, <sup>3</sup>University of Melbourne, Melbourne, Australia, <sup>4</sup>The University of Sydney, Camperdown, Australia, <sup>5</sup>University of New South Wales, Randwick, Australia

**O.2.15 - Cognitive function and ageing - predictors to interventions, UKK - K1 (+K2) (Level 3), June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** Access to greenspace has been linked to better cognitive health. However, most studies did not account for potential environmental confounders. Also, the behavioural and biological mechanisms underpinning the observed associations are unclear. We examined the total cross-sectional effects of neighbourhood parkland on cognitive function in mid-aged and older adults and the extent to which these were explained by physical activity, sedentary behaviours and metabolic risk factors.

**Methods:** We used data from the Australian Diabetes, Obesity and Lifestyle study (N = 4141). Geographic Information Systems data were used to characterise the participants' neighbourhood environment defined as a 1-km radius street-network area around their homes. Percentage of parkland was the exposure and scores on memory, processing speed and verbal skills tests were the outcomes. Population density, percentage of commercial land, non-commercial land use mix and area level socio-economic status were included as confounders. Measures of physical activity (walking for transport, walking for recreation, vigorous gardening and resistance training), sedentary behaviours (sitting for transport, sitting for leisure) and metabolic risk factors (e.g., waist circumference (WC), HDL-cholesterol, glycated haemoglobin) were examined as potential mediators. Generalised additive mixed models accounting for spatial clustering were used to estimate the total, direct and indirect effects (through behaviours and metabolic risk factors) of parkland on cognitive functions.

**Results:** Percentage of parkland was positively associated with all cognitive function measures. The association with memory was in part mediated by walking for transport (directly and via sitting for leisure, WC and HDL-cholesterol) and resistance training (via sitting for leisure, WC and HDL cholesterol). The 'pathways' for processing speed were similar with the addition of glycated haemoglobin. The relationship between parkland and verbal skills was fully explained by resistance training and walking for transport (directly and through their effects on sitting for leisure, WC, HDL-cholesterol and dyslipidaemia).

**Conclusions:** Access to parks may benefit cognitive function in mid-to-late life by promoting some forms of physical activity that displace sitting for leisure and contribute to metabolic health, and through other mechanisms, such as socialising and stress reduction. City planning policies should ensure that residents have access to parks within walking distance.

# Effects of a motor-cognitive exercise program for seniors 65+ in urban outdoor environments

**Mrs. Katharina Zwingmann<sup>1</sup>**, Prof. Torsten Schlesinger<sup>1</sup>, Dr. Katrin Müller<sup>1</sup>

<sup>1</sup>Chemnitz University of Technology, Chemnitz, Germany

**O.2.15 - Cognitive function and ageing - predictors to interventions, UKK - K1 (+K2) (Level 3), June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** Physical and cognitive activities can promote physical performance of several functions in everyday life in old age (e.g., dual tasking) and prevent or alleviate symptoms of diseases (e.g., depression). However, most seniors do not reach WHO physical activity recommendations. Among other things, physical limitations, lack of mobility, or financial effort act as barriers for implementation of physical activity in older age. The aim of the “MoKo-Fit” project is to promote and maintain physical and cognitive performance among seniors with a motor-cognitive exercise program (close to home, low-threshold, age-related, free).

**Methods:** For this quasi-randomized intervention study 131 subjects aged 65+ were recruited (IG: n=63; age: 72.71 years  $\pm$ 6.90; 41 female; KG: age: 75.35 years  $\pm$ 7.56; 41 female) in cooperation with community centres. The motor-cognitive exercise program included exercises to train coordination, strength, endurance, and cognition while considering individual load normative. The program was implemented by trained exercise instructors in outdoor areas (e.g., public parks) over 12 weeks (2x/week á 45-60min). By means of a comprehensive test battery before (T1) and after (T2) completion of the exercise program in the intervention (IG) and control group (CG, no intervention), motor (e.g., 6MWT) and cognitive abilities (e.g., TMT B) were recorded. Data were analysed by paired t-Tests and ANOVA (n=90 for current results).

**Results:** At T2 IG improved walking distance significantly in 6MWT (mean  $\Delta$  = 34.77m;  $p$  = .009), while CG decreased in their physical performance level (mean  $\Delta$  = -17.72m;  $p$  = .151). A Time  $\times$  Group interaction effect was revealed ( $F(1,97)$  = 5.120,  $p$  = .026,  $n2p$  = .050). Furthermore, the improvement in cognitive performance speed (TMT B) was significantly higher in the IG (mean  $\Delta$  = 21.26s;  $p$  = .005) compared to CG (mean  $\Delta$  = 3.49s;  $p$  = .449) at T2, but no significant Time  $\times$  Group interaction effect was confirmed ( $F(1,90)$  = 3.033,  $p$  = .085,  $n2p$  = .033).

**Conclusion:** Due to the improvement in motor and cognitive performance in the IG, the exercise program can be considered as successful. All measurements will be repeated six months after T2 to examine sustainable effects of the intervention.

# Increases in preschoolers' digital media use is linked with small but significant decreases in same-day physical activity: An intensive longitudinal data analysis

**Dr. Bridget Armstrong**<sup>1</sup>, Ms. Hannah Parker<sup>1</sup>, Dr. Sarah Burkart<sup>1</sup>, Dr. Layton Reesor-Oyer<sup>1</sup>, Dr. Beets Michael<sup>1</sup>, Dr. R. Glenn Weaver<sup>1</sup>, Ms. Olivia Finnegan<sup>1</sup>, Ms. Meghan Bastyr<sup>1</sup>, Ms. Lauren Von Klingraeff<sup>1</sup>, Mr. James White<sup>1</sup>, Mr. Roddrick Dugger<sup>1</sup>, Dr. Elizabeth Adams<sup>1</sup>

<sup>1</sup>University of South Carolina, Columbia, USA

**O.2.16 - Predictors of children's and families' nutrition and movement behaviors, UKK - K3+4 (Level 3), June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Excessive screen use is linked with negative health outcomes including disrupted sleep, inactivity and poor mental health; however, much of this research is based upon measures requiring parents to estimate their child's usual screen use over long stretches of time (e.g., 6 months). This method flattens day-to-day variability and prevents us from answering the question "*on any given day is screen use replacing children's physical activity?*" This study aims to answer this question using intensive longitudinal data collected from preschoolers and their caregivers.

**Methods:** Participants included 94 parent-child dyads (child age  $M = 4.4$  years;  $SD = 0.8$ ). For 14 days, children wore an Axivity accelerometer on their non-dominant wrist to measure moderate to vigorous physical activity (MVPA). Parents were texted nightly surveys to report the number of hours their child used digital media (i.e., tablet, computer) and watched TV that day. We used mixed effects models with person-mean centering to predict day-level (level-1) MVPA from both digital media use and TV time each day. Covariates included accelerometer non-wear time, weekend/weekday, and time spent with child.

**Results:** Within-person effects showed that for every extra hour of digital media use, MVPA decreased by 2.3 minutes (95% CI -4.06 to -0.57). On days when children had more TV time than usual, they had small, non-significant decreases in MVPA ( $B = -0.76$ , 95%CI -3.2 to 1.69). However, random effects revealed significant variance around the association between TV and MVPA (Estimate = 42.64, 95%CI 18.32 to 99.24). This means that for 95% of the population, the association between TV and MVPA could vary by up to 26 minutes.

**Conclusions:** While increases in digital media use were linked with significant within-person decreases in MVPA, the magnitude of these effects were small. Thus, it is not clear that digital media use is directly replacing time that might otherwise be spent in physical activity. Yet, the significant variability around the effect of TV on physical activity indicates that, for some children, screen use may be directly supplanting activity. Identifying children for whom screen use has detrimental health effects can help guide targeted and personalized intervention strategies.



# What type of motor skills are important for physical activity intensity across childhood for boys and girls?

**Prof. Lisa Barnett**<sup>1</sup>, Dr. Gavin Abbott<sup>1</sup>, Dr. Simone Verswijveren<sup>1</sup>, Miss Brooke Colvin<sup>1</sup>, Prof. David Lubans<sup>2</sup>, Dr. Kristen Cohen<sup>2</sup>, Prof. Kylie Hesketh<sup>1</sup>, Dr. Katherine Downing<sup>1</sup>, Prof. Richard Telford<sup>3</sup>, Dr. Rohan Telford<sup>3</sup>, Dr. Trina Hinkley<sup>1</sup>, Dr. Natalie Lander<sup>1</sup>, Prof. Maïke Tietjens<sup>4</sup>, Prof. Nadja Schott<sup>5</sup>, Prof. Philip Morgan<sup>2</sup>, Associate Professor Nicola Ridgers<sup>6</sup>

<sup>1</sup>Deakin University, Geelong, Australia, <sup>2</sup>University of Newcastle, Newcastle, Australia, <sup>3</sup>University of Canberra, Canberra, Australia, <sup>4</sup>University of Muenster, Muenster, Germany, <sup>5</sup>University of Stuttgart, Stuttgart, Germany, <sup>6</sup>University of South Australia, Adelaide, Australia

**O.2.16 - Predictors of children's and families' nutrition and movement behaviors, UKK - K3+4 (Level 3), June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Boys are typically more physically active than girls. Motor skill competence is considered an important determinant of physical activity. Review evidence reports that boys have better object control competence than girls, but locomotor skills do not show this pattern. Little is known about how these types of skills are associated with moderate (MPA) and vigorous (VPA) physical activity for boys and girls.

**Methods:** Data on 988 children (50.8% boys) aged 3-11 years from the Australian Physical Activity and Motor Skills Study (data pooled from eight studies; 2009-2016) were included. The aim was to examine associations of object control and locomotor motor skill competence with physical activity across childhood for boys and girls. Linear models were fitted to examine associations between motor competency (Test of Gross Motor Skill Development [TGMD]) and physical activity (MPA and VPA; ActiGraph accelerometers), and then compared to non-linear restricted cubic spline models. Sex interactions were assessed.

**Results:** We found evidence of positive linear associations with object control skills for MPA ( $\beta$  [95% CI] = 0.35 [0.24, 0.46],  $p < 0.0005$ ) and VPA (0.39 [0.29, 0.49],  $p < 0.0005$ ). However, a non-linear restricted cubic spline model indicated that associations are positive but relatively weak in the low/mid ranges of object control scores, but at high ranges ( $>38/50$ ) the associations get stronger and more positive. There were no sex interactions for the object control scores. There was also evidence of positive linear associations with locomotor skills for MPA ( $\beta$  [95% CI] = 0.36 [0.22, 0.50],  $p < 0.0005$ ) and VPA (0.43 [0.31, 0.55],  $p < 0.0005$ ) activity, and no evidence of better fit with the non-linear approach. Boys and girls with low locomotor scores ( $<20/50$ ) have similar VPA, but males display greater increases in VPA with increasing locomotor scores. There was no sex interaction for MPA.

**Conclusions:** Locomotor skill mastery appears to assist boys to be more vigorously active, whereas both boys and girls benefit from increases in both MPA and VPA when reaching a certain threshold of object control skill. From an equity perspective, physical activity interventions are encouraged to focus on object control motor skill development.

# Kids to the Front: Children's perspectives of their food practices

**Ms. Sophie Wright-Pedersen<sup>1</sup>**, Dr. Foluké Abigail Badejo<sup>1</sup>, Associate Professor Helen Vidgen<sup>1</sup>, Prof. Danielle Gallegos<sup>1</sup>

<sup>1</sup>Queensland University of Technology, Brisbane, Australia

**O.2.16 - Predictors of children's and families' nutrition and movement behaviors, UKK - K3+4 (Level 3), June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Children are the subject of many investigations into their food practices. However, they are rarely active participants within food and nutrition related research. This study therefore aimed to explore children's food practices from their perspective using qualitative participatory methods to amplify their voice within this space.

**Methods:** Using a practice theoretical approach, 42 Australian children aged 8-12 years old (from 28 families) participated in community-based draw-and-tell interviews (n=28), Photovoice (n=15) and video ethnographic activities (n=6). Data is being thematically analysed deductively through a social practice theory lens to extract the elements, dimensions and contexts of children's food practices. In the context of public health nutrition, this is the first study to actively consider children's perspectives of their food through a practice theory lens, whilst using innovative developmentally appropriate digital methods complementary to traditional interview methods.

**Results:** Preliminary findings demonstrate that children participate and have varying degrees of agency within a range of everyday food practices across planning, procuring, preparing and consumption phases. These practices are complex with interwoven meanings, competences and materials accessible to and articulated by children. Temporal and spatial settings as well as the social worlds that children occupy are diverse and influence and shape their food practices. Children themselves also act back on and shape their own food worlds and those of others around them.

**Conclusion:** This study highlights the importance of amplifying children's perspectives and recognising their agency and influence when considering how their food practices are enacted and shaped. This is particularly significant when making decisions that aim to change the way these practices are performed. In recognising how children engage within food practices, we as practitioners may begin to understand how to shape our approaches in more meaningful and realistic ways, rather than trying to mould children to fit within our food worlds.

# Goals, facilitators, and barriers identified by caregivers in an in-home intervention to improve feeding practices and child diet quality

Ms. Andrea Ramirez<sup>1</sup>, Dr. Katelyn Fox<sup>1</sup>, Ms. Yarisbel Melo Herrera<sup>2</sup>, **Dr. Kim Gans**<sup>3</sup>, Dr. Patricia Risica<sup>1</sup>, Dr. Karen Mccurdy<sup>2</sup>, Dr. Ernestine Jennings<sup>1</sup>, Dr. Alison Tovar<sup>1</sup>

<sup>1</sup>Brown University, Providence, USA, <sup>2</sup>University of Rhode Island, Kingston, USA, <sup>3</sup>University of Connecticut, Storrs, USA

**O.2.16 - Predictors of children's and families' nutrition and movement behaviors, UKK - K3+4 (Level 3), June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** To explore caregivers' goals, facilitators, and barriers, as part of the Strong Families Start at Home (SFSH) study, a home-based pilot intervention aimed to improve preschool-aged children's diet by targeting feeding practices and household food environments in predominately ethnically diverse low-income families.

**Methods:** Low-income, diverse caregivers and their 2–5-year-old child were randomized into intervention (positive feeding practices/ nutrition) or control (reading readiness) groups. Caregivers received 6 visits with a community health worker (CHW) trained in motivational interviewing (3 home visits; 3 phone calls); an in-home cooking demonstration or reading activity; personalized feedback on a recorded family meal or reading activity; text-messages; and tailored printed materials. Collaboratively, the CHW and caregiver developed a feeding and nutrition plan that included specific goal(s), reasons for the plan, potential barriers to completing the plan, and some possible solutions (including social supports). A thematic analysis of the goal sheets (n=143 sheets from 33 participants) completed by CHW was used to identify patterns in goal content and anticipated facilitators and barriers with a mixed inductive-deductive approach using MAXQDA.

**Results:** Most goals selected by caregivers were to increase the home availability of healthy foods through food shopping and meal planning. Other goals were to increase structure by establishing meal and snack routines and decrease distractions at meals (i.e., screens), while others wanted to involve their children in cooking and grocery shopping. Caregivers' perceived barriers encompassed individual (i.e., stress, lack of time, child behavior), family (unplanned grocery shopping), and environmental (i.e., food availability) factors. However, caregivers only identified facilitators at the individual level (i.e., motivation).

**Conclusion:** Understanding caregivers' goals, barriers, and facilitators can help future interventions by tailoring key messages to improve feeding practices and preschool children's diets. Ethnically diverse low-income families could benefit from efforts to effectively involve the family, and by considering their socioeconomic and cultural contexts. Future interventions should provide tools to overcome common barriers (i.e., improving access to healthy food) while increasing awareness of not only individual-level but also family and environmental-level facilitators.

# Lifestyle patterns in European preschoolers: associations with socio-demographic factors and BMI

**Ms. Alexandra Descarpentrie**<sup>1</sup>, Ms. Lucinda Calas<sup>1</sup>, Dr. Maxime Cornet<sup>2</sup>, Dr. Barbara Heude<sup>1</sup>, Dr. Marie-Aline Charles<sup>1</sup>, Dr. Sonia Brescianini<sup>3</sup>, Dr. Tim Cadman<sup>4</sup>, Dr. Ahmed Elhakeem<sup>5,6</sup>, Dr. Sílvia Fernández-Barrés<sup>7,8</sup>, Dr. Jennifer R. Harris<sup>9</sup>, Dr. Hazel Inskip<sup>10,11</sup>, Dr. Jordi Julvez<sup>7,12</sup>, Dr. Sabrina Llop<sup>13,14</sup>, Dr. Katerina Margetaki<sup>15</sup>, Dr. Silvia Maritano<sup>16,17</sup>, Dr. Johanna Lucia Thorbjørnsrud Nader<sup>18</sup>, Dr. Theano Roumeliotaki<sup>15</sup>, Dr. Theodosia Salika<sup>10</sup>, Dr. Mikel Subiza Pérez<sup>13,19,20,21</sup>, Dr. Marina Vafeiadi<sup>15</sup>, Dr. Martine Vrijheid<sup>7,13,22</sup>, Dr. John Wrigh<sup>21</sup>, Dr. Tiffany Yang<sup>21</sup>, Dr. Patricia Dargent-Molina<sup>1</sup>, Dr. Sandrine Lioret<sup>1</sup>

<sup>1</sup>Université Paris Cité and Université Sorbonne Paris Nord, Inserm, INRAE, Centre for Research in Epidemiology and Statistics (CRESS), Paris, France, <sup>2</sup>Télécom-Paris, Département SES, Institut Polytechnique de Paris, I3, Palaiseau Cedex, France, <sup>3</sup>Centre of Behavioral Science and Mental Health, Istituto Superiore di Sanità, Rome, Italy, <sup>4</sup>Section of Epidemiology, Department of Public Health, University of Copenhagen, Copenhagen, Denmark, <sup>5</sup>MRC Integrative Epidemiology Unit at the University of Bristol, Bristol, United Kingdom, <sup>6</sup>Population Health Science, Bristol Medical School, University of Bristol, Bristol, United Kingdom, <sup>7</sup>Barcelona Institute for Global Health (ISGlobal), Barcelona, Spain, <sup>8</sup>Agència de Salut Pública de Barcelona, Barcelona, Spain, <sup>9</sup>Centre for Fertility and Health The Norwegian Institute of Public Health Oslo, Oslo, Norway, <sup>10</sup>MRC Lifecourse Epidemiology Centre, University of Southampton, Southampton General Hospital, Southampton, United Kingdom, <sup>11</sup>NIHR Southampton Biomedical Research Centre, University of Southampton and University Hospital Southampton NHS Foundation Trust, Southampton, United Kingdom, <sup>12</sup>Clinical and Epidemiological Neuroscience Group (NeuroEpi), Institut d'Investigació Sanitària Pere Virgili (IISPV), Reus, Spain, <sup>13</sup>CIBER Epidemiología y Salud Pública (CIBERESP), Madrid, Spain, <sup>14</sup>Epidemiology and Environmental Health Joint Research Unit, FISABIO–Universitat Jaume I–Universitat de Valencia, Valencia, Spain, <sup>15</sup>Department of Social Medicine, School of Medicine, University of Crete, Crete, Greece, <sup>16</sup>Cancer Epidemiology Unit– Department of Medical Sciences, University of Turin, Via Santena 7, Turin, Italy, <sup>17</sup>University School for Advanced Studies IUSS Pavia, Palazzo del Broletto–Piazza della Vittoria 15, Pavia PV, Italy, <sup>18</sup>Department of Genetics and Bioinformatics, Division of Health Data and Digitalization, Norwegian Institute of Public Health, Oslo, Norway, <sup>19</sup>Department of Clinical and Health Psychology and Research Methods, University of the Basque Country UPV/EHU, Donostia-San Sebastián, Spain, <sup>20</sup>Biodonostia Health Research Institute, Group of Environmental Epidemiology and Child Development, Donostia-San Sebastián, Spain, <sup>21</sup>Bradford Institute for Health Research, Bradford Teaching Hospitals NHS Foundation Trust, Bradford, United Kingdom, <sup>22</sup>Universitat Pompeu Fabra (UPF), Barcelona, Spain

**O.2.16 - Predictors of children's and families' nutrition and movement behaviors, UKK - K3+4 (Level 3), June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** G. Children and families

**Background:** Suboptimal energy balance-related behaviors (EBRBs) have established at different paces across the world and within countries, depending on where (sub)populations stand regarding their nutrition transition phase. EBRBs tend to combine into the so-called 'lifestyle patterns', with a potential synergistic influence on health. This study aimed at investigating variations in lifestyle patterns among preschool-aged children across Europe, their associations with different socio-demographic factors, and their links with body mass index (BMI).

**Methods:** Study sample included preschoolers (aged between 2 and 5 years) participating in nine European birth cohorts (England, France, Greece, Italy, Norway, and Spain) from the EU LifeCycle project. Child EBRBs, i.e., dietary intake, screen use, outdoor play and sleep time, and socio-demographic factors, were assessed by parental questionnaires. Trained professionals or parents measured or reported child weight and height. Based on parent-reported child EBRBs, principal component analysis was first conducted to identify cohort-specific lifestyle patterns. Multivariable linear and logistic regressions were used to investigate cross-sectional associations of sociodemographic factors with lifestyle patterns, and of lifestyle patterns with both BMI z-scores (WHO standards) and overweight status.

**Results:** The most consistent lifestyle pattern identified across datasets was distinctly unhealthy, given its characterization by at least three of the following EBRBs: suboptimal dietary intake (mainly, discretionary consumption), high screen time, low outdoor play and low sleep duration. Across cohorts, children from low-income households and born to mothers with low educational level had consistently higher scores on the unhealthy lifestyle pattern, as compared to their counterparts whose parents had higher socio-economic position. Children born to younger and multiparous mothers, and boys, adhered more to this pattern in most of the cohorts. Higher scores on this pattern were related to higher BMI in the Spanish and Italian cohorts only.

**Conclusion:** The identification of similar unhealthy lifestyle patterns, their socio-economic patterning and links to BMI as early as preschool age provides new evidence regarding the nutrition transition dynamic across different European high-income countries. These findings may assist in informing early multi-behavioral interventions aimed at reducing social inequalities in obesity-related behaviors and health outcomes across the European landscape.

# Physical Activity and Menstruation: A Scoping Review of Adolescents' Experiences

**Ms. Jessica Harvey<sup>1</sup>**, Dr. Emma Solomon-Moore<sup>1</sup>, Dr. Nick Townsend<sup>2</sup>, Dr. Jessica Francombe-Webb<sup>1</sup>, Dr. Simon Sebire<sup>2</sup>

<sup>1</sup>University of Bath, Bath, United Kingdom, <sup>2</sup>University of Bristol, Bristol, United Kingdom

**O.2.16 - Predictors of children's and families' nutrition and movement behaviors, UKK - K3+4 (Level 3), June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Physical activity (PA) levels tend to decline throughout adolescence with 81% of adolescents deemed insufficiently active globally. Furthermore, girls' PA levels decline more than boys during this time, which coincides with the onset of puberty. Menstruation is an important aspect of puberty and disengagement in PA, due to menstruation, may contribute to the declining levels of girls' activity. However, there is no existing published synthesis on how menstruation impacts PA in adolescents. The objectives of this review were to determine what is known from existing literature about adolescents' experiences of menstruation and PA, summarise methodological approaches used in this field and identify any gaps in the literature.

**Methods:** A scoping review was conducted using Arksey and O'Malley's five step scoping review methodology. On 3<sup>rd</sup> March 2022, PubMed, Web of Science, APA PsycNET, Scopus and SportDiscus were searched for relevant literature. Quantitative, qualitative and mixed-methods studies were eligible for inclusion. The studies were screened against inclusion criteria by a team of four reviewers and consensus was reached through discussion. Data were analysed using descriptive statistics, followed by a narrative synthesis. The review reporting adhered to the PRISMA-ScR checklist.

**Results:** Seventy-one studies were included in the final review. The results demonstrated a relationship between menstruation and PA in adolescents through several mechanisms a) PA may be effective in reducing dysmenorrhea severity, b) menstruation may lead to avoidance of PA due to menstrual symptoms, stigma or inadequate knowledge, c) PA may be used as a self-care technique for menstrual management and d) PA may be associated with menstrual symptoms where less active girls are more likely to have increased severity of symptoms. However, no objective measurements of PA were used across all studies, no studies were conducted in the UK and PA was not the primary focus or outcome in studies exploring menstrual experiences.

**Conclusions:** The findings indicate that menstruation influences adolescent' PA behaviour and also that PA may impact menstrual symptoms. However, studies using objective measures of PA and exploring experiences in more depth are needed to further understand this relationship in adolescents to identify strategies for girls' PA promotion.



# Scale-up of the Internet-based Professional Learning to help teachers to support Activity in Youth (iPLAY) intervention: A hybrid type 3 implementation-effectiveness trial

**Prof. David Lubans**<sup>1,2,3</sup>, Dr. Taren Sanders<sup>4</sup>, Dr. Michael Noetel<sup>5</sup>, Prof. Philip Parker<sup>4</sup>, Prof. Heather McKay<sup>6</sup>, Prof. Philip Morgan<sup>1,2</sup>, Prof. Jo Salmon<sup>7</sup>, Dr. Morwenna Kirwan<sup>8</sup>, Associate Professor Andrew Bennie<sup>9</sup>, Dr. Louisa Peralta<sup>10</sup>, Dr. Renata Cinelli<sup>11</sup>, Prof. Marj Moodie<sup>12</sup>, Dr. Timothy Hartwig<sup>13</sup>, Mr. James Boyer<sup>14</sup>, Dr. Sarah Kennedy<sup>9</sup>, Prof. Ronald Plotnikoff<sup>1</sup>, Prof. Ronald Plotnikoff<sup>2</sup>, Ms. Vibeke Hansen<sup>15</sup>, Dr. Diego Vasconcellos<sup>4</sup>, Dr. Jane Lee<sup>16</sup>, Dr. Devan Antczak<sup>17</sup>, Prof. Chris Lonsdale<sup>4</sup>

<sup>1</sup>University of Newcastle, Centre for Active Living and Learning, College of Human and Social Futures, Newcastle, Australia, <sup>2</sup>Hunter Medical Research Institute, New Lambton, Australia, <sup>3</sup>University of Jyväskylä, Faculty of Sport and Health Sciences, Jyväskylä, Finland, <sup>4</sup>Australian Catholic University, Institute for Positive Psychology and Education, North Sydney, Australia, <sup>5</sup>University of Queensland, School of Psychology, Brisbane, Australia, <sup>6</sup>University of British Columbia, Centre for Hip Health and Mobility, Vancouver, Canada, <sup>7</sup>Deakin University, Institute for Physical Activity and Nutrition (IPAN), School of Exercise and Nutrition Sciences, Geelong, Australia, <sup>8</sup>Macquarie University, Faculty of Medicine, Health and Human Sciences, Macquarie Park, Australia, <sup>9</sup>Western Sydney University, School of Health Sciences, Western Sydney, Australia, <sup>10</sup>University of Sydney, School of Education and Social Work, Camperdown, Australia, <sup>11</sup>Australian Catholic University, School of Education, Strathfield, Australia, <sup>12</sup>Deakin University, Deakin Health Economics, Burwood, Australia, <sup>13</sup>Australian Catholic University, School of Behavioural and Health Sciences, Strathfield, Australia, <sup>14</sup>NSW Department of Education, Turrella, Australia, <sup>15</sup>Southern Cross University, East Lismore, Australia, <sup>16</sup>Global Centre for Modern Ageing, Tonsley, Australia, <sup>17</sup>University of Wollongong, Wollongong, Australia

**O.2.17 - Translating evidence into practice - with focus on school setting, Clarion Hotel Gillet - Room Gillesalen, June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** The purpose of this study was to evaluate the scale-up of the 'Internet-based Professional Learning to help teachers support Activity in Youth' (iPLAY) intervention in primary schools using the RE-AIM framework.

**Methods:** We conducted a type 3 hybrid implementation-effectiveness study and collected data between April 2016 and June 2021, in New South Wales (NSW), Australia. RE-AIM was operationalised as: (i) Reach: Number and representativeness of students exposed to iPLAY; (ii) Effectiveness: Impact of iPLAY in a sub-sample of students (n = 5,959); (iii) Adoption: Number and representativeness of schools that received iPLAY; (iv) Implementation: Extent to which the three curricular and three non-curricular components of iPLAY were delivered as intended; (v) Maintenance: Extent to which iPLAY was sustained in schools. We conducted 43 semi-structured interviews with teachers (n = 14), leaders (n = 19), and principals (n = 10) from 18 schools (11 from urban and 7 from rural locations) to determine program maintenance.

**Results:** Reach: iPLAY reached ~31,000 students from a variety of socio-economic strata (35% of students were in the bottom quartile, almost half in the middle two quartiles, and 20% in the top quartile). Effectiveness: We observed small positive intervention effects for enjoyment of PE/sport (0.12 units, 95% CI: 0.05 to 0.20, d = 0.17), perceptions of need support from teachers (0.26 units, 95% CI: 0.16 to 0.53, d = 0.40), physical activity participation (0.28 units, 95% CI: 0.10 to 0.47, d = 0.14), and subjective well-being (0.82 units, 95% CI: 0.32 to 1.32, d = 0.12) at 24-months. Adoption: 115 schools received iPLAY. Implementation: Most schools implemented the curricular (59%) and non-curricular (55%) strategies as intended. Maintenance: Based on our qualitative data, changes in teacher practices and school culture resulting from iPLAY were sustained.

**Conclusions:** iPLAY had extensive reach and adoption in NSW primary schools. Most of the schools implemented iPLAY as intended and effectiveness data suggest the positive effects observed in our cluster RCT were sustained when the intervention was delivered at-scale.

**Conflict of interest statement:**

The authors have no relevant conflicts of interest to declare.

**Trial registration:** ACTRN12621001132831.

# Do teachers sustain scheduling of physical activity after cessation of implementation support? A long term follow-up of a randomised and controlled trial

**Dr. Cassandra Lane**<sup>1,2,3</sup>, Dr. Alix Hall<sup>1,2,3</sup>, Mr. Adam Shoesmith<sup>1,2,3</sup>, Prof. Luke Wolfenden<sup>1,2,3</sup>, Dr. Rachel Sutherland<sup>1,2,3</sup>, Dr. Nicole Nathan<sup>1,2,3</sup>

<sup>1</sup>University of Newcastle, Newcastle, Australia, <sup>2</sup>Hunter Medical Research Institute, New Lambton Heights, Australia, <sup>3</sup>Hunter New England Population Health, Newcastle, Australia

**O.2.17 - Translating evidence into practice - with focus on school setting, Clarion Hotel Gillet - Room Gillesalen, June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** The *Physically Active Children in Education* (PACE) intervention has consistently shown to effectively improve schools' implementation of a physical activity policy. However, sustained implementation is required for the policy to reach its full public health potential and to ensure the initial investment in PACE is not wasted. Using data from a pilot randomised and controlled trial\*, we explored: (1) whether teachers sustained their scheduled weekly minutes of physical activity 18-months following delivery of PACE; (2) the odds of teacher's policy compliance being sustained; and (3) teacher's perceptions of the usefulness of strategies supporting sustainment.

**Methods:** We conducted surveys of teachers from the six intervention schools post-intervention and 18-months later. Teachers recorded their minutes of scheduled physical activity during a five-day school week in a daily log book. The main outcomes reflected the components of physical activity where a significant increase was observed during the main trial: total minutes of physical activity and energisers (short classroom physical activity breaks). Teachers also rated the usefulness (on a 5-point Likert scale) of 14 proposed strategies to support sustainment. Generalised linear mixed models assessed the difference in minutes of physical activity scheduled from post-intervention to 18-month follow-up, as well as the difference in the proportion complying with the policy requirements. Descriptive statistics explored teacher's preferences for proposed sustainment strategies.

**Results:** Valid survey responses were received from 50 teachers post-intervention and 30 teachers at 18-months. There was a significant decrease between time points for teacher's scheduled minutes of total physical activity (33 minutes; 95% confidence interval= -59.99, -6.91; p=0.014); and energisers (21 minutes; 95% confidence interval= -35.17, -7.55; p=0.003). The proportion of teacher's meeting the policy guidelines also significantly reduced (-19%; odds ratio=0.34; 0.17, 0.67; p=0.002). Strategies perceived 'most useful' in supporting sustainment were provision of physical activity equipment packs, professional learning modules delivered online or in-person, and a handover package for new staff.

**Conclusion:** Physical activity scheduling was not sustained in the long-term, corresponding to a reduction in the proportion of teachers meeting policy guidelines. These findings have informed our subsequent preparation to address this and ensure the full public health impact of PACE is realised.

# Complexities and context in scale-up: A qualitative study of academic, practitioner and policymaker experiences

Dr. Harriet Koorts<sup>1</sup>, Dr. Jaimie-Lee Maple<sup>1</sup>, Prof. Elizabeth Eakin<sup>2</sup>, Prof. Mark Lawrence<sup>1</sup>, **Prof. Jo Salmon<sup>1</sup>**

<sup>1</sup>School of Exercise and Nutrition Sciences, Institute for Physical Activity and Nutrition (IPAN), Deakin University, Geelong, Australia, <sup>2</sup>School of Public Health, The University of Queensland, Herston, Australia

**O.2.17 - Translating evidence into practice - with focus on school setting, Clarion Hotel Gillet - Room Gillesalen, June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** Scaling up population health interventions is a context-orientated, complex and dynamic process. In public health, scale-up is typically transdisciplinary, involving multiple diverse stakeholders across many sectors. Understanding the influences on effective scale-up and how they differ from multidisciplinary perspectives is essential to enhance future scaling efforts. The aim of this presentation is to present key influences on the successful scale-up of state and nationally delivered physical activity and nutrition interventions in Australia, identifying ways of improving the future scale-up of public health interventions.

**Methods:** A qualitative study involving semi-structured telephone interviews with individuals working in academic, government and non-government organisations involved in the scaling up of state and national physical activity and nutrition interventions in Australia. The WHO ExpandNet framework for scaling up provided the theoretical framework, as it contains the key elements for influencing scale-up in health. Scaled up interventions were identified via online searches, grey literature and subject matter expert recommendation. Interview questions were mapped against key principles and core areas in the WHO ExpandNet framework. Data were analysed thematically.

**Results:** Nineteen interviews with participants in government (n=3) non-government (n=5) and academic (n=11) organisations. Participants represented eight scaled up interventions targeting nutrition (n=2), physical activity (n=1) or a combination (n=5). Corresponding to the ExpandNet framework, majority of themes aligned to 'environmental attributes', including (i) political (e.g., personal agendas), (ii) social (e.g., lack of urgency) and (iii) sector/workforce (e.g., scale up accountability) factors. Influences relating to 'scale up strategy' (e.g., transparency in evaluations) were the next most commonly occurring. Themes were consistent across participants, leading to eight recommendations for future scale up research and practice.

**Conclusions:** Drawing on the WHO ExpandNet framework, we address an important gap in scale up research; identifying how elements known to impact scaling are interrelated and where hierarchies of influence exist. Attributes of the "Environment" and "Scale up strategy" consistently featured as major influences on successful outcomes. The role and transparency of evidence differed greatly between participant groups. A multisector scale up strategy for future interventions may enable the complexities of environmental and political contexts to be incorporated into scale up planning.

# Factors that influence the implementation of the DAGIS-intervention to improve self-regulation, healthy eating habits, physical activity and screen use in 3-6-year-old children in Finland

**Miss Josefine Björkqvist<sup>1</sup>**, Miss Henna Launistola<sup>1</sup>, Dr. Reetta Lehto<sup>1</sup>, Miss Hanna Paasio<sup>1</sup>, Miss Jenna Rahkola<sup>1</sup>, Dr. Henna Vepsäläinen<sup>2</sup>, Prof. Nina Sajaniemi<sup>3</sup>, Prof. Maijaliisa Erkkola<sup>2</sup>, Prof. Eva Roos<sup>1</sup>, Associate Professor Carola Ray<sup>1</sup>

<sup>1</sup>Folkhalsan Research Centre, Helsinki, Finland, <sup>2</sup>University of Helsinki, Helsinki, Finland, <sup>3</sup>University of Eastern Finland, Joensuu, Finland

**O.2.17 - Translating evidence into practice - with focus on school setting, Clarion Hotel Gillet - Room Gillesalen, June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** Early childhood education and care (ECEC) is an important setting for interventions to improve children's health; however, evidence for effective health promotion interventions in ECEC is varied and more research is needed into factors influencing implementation. The Consolidated Framework for Implementation Research (CFIR) is one of the most widely used frameworks in implementation science. This study examines determinants (barriers and facilitators) perceived by ECEC educators when implementing the DAGIS-intervention using CFIR and compares determinants across ECEC groups with low and high confidence to implement the intervention.

**Methods:** The 2017-2018 DAGIS intervention (clustered randomised controlled trial) aimed to promote healthy energy balance-related behaviours (EBRBs) and self-regulation skills among Finnish children in ECEC. The intervention included five themes: self-regulation skills, physical activity, fruit/vegetable consumption, screen time, and sugary foods/beverage consumption. Thirty-two ECEC centres participated; 13 intervention centres, 19 controls. Early educators (n=90) completed a questionnaire at baseline. Based on a motivational index formed, the most confident (n=3) and the least confident ECEC centres (n=3), were selected to participate in focus group interviews to evaluate implementation of the DAGIS intervention. Interviews were coded using CFIR and scored between -2 and 2 to indicate negative or positive influence.

**Results:** Influential constructs covered all five CFIR domains and there were distinguishing factors between highly confident and less confident ECEC centres. Implementation facilitators included design quality and access to training, whereas networks, communication and adaptability were additional facilitators for highly confident ECEC centres. Barriers, including complexity, were more influential for ECEC centres with low confidence. Lack of planning time and relative priority were barriers across ECEC centres. Educators expressed high engagement with children across intervention themes relating to self-regulation and fruit/vegetable consumption, whereas educators expressed low engagement with parents regarding intervention themes focused on home environment, including screen time. Physical activity was perceived as compatible with existing ECEC centre initiatives.

**Conclusion:** This study gives valuable insights into facilitators and barriers for implementation of interventions in ECECs. Tailoring intervention implementation and support to ECECs by implementation readiness can help improve implementation within ECECs with low confidence in running programs promoting healthy EBRBs and self-regulation among children.



# Implementation and scaling up of the Swedish Healthy School Start family support programme – a hybrid type 3 evaluation study

**Prof. Liselotte Schäfer Elinder<sup>1,2</sup>**, Associate Professor Kristy Sidney Annerstedt<sup>1</sup>

<sup>1</sup>Karolinska Institutet, Stockholm, Sweden, <sup>2</sup>Center for Epidemiology and Community Medicine, Region Stockholm, Sweden

**O.2.17 - Translating evidence into practice - with focus on school setting, Clarion Hotel Gillet - Room Gillesalen, June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** A comparative effectiveness study (IMPROVE) of implementing the universal Healthy School Start family support programme in two relatively disadvantaged municipalities. The primary outcome is fidelity to the intervention, while effects on clinical outcomes in children and parents are monitored in a hybrid type 3 evaluation study. This 1-year programme has previously shown moderate beneficial effects on diet, physical activity, and on BMI z-score in children with obesity.

Research questions:

1. What is the fidelity to the programme at year 1 when scaled up?
2. Is there a change in school personnel's perception of acceptability, feasibility and appropriateness after completing the first year of the intervention?

**Methods:** The IMPROVE study is ongoing in all public schools (n=28) in 2 municipalities during 2021-2024. Fidelity (adherence (score 0-4) and parent's responsiveness (0-16)) to the 4 components (parent: health information, motivational interviewing, risk test for type 2 diabetes; child: 9 classroom sessions) is assessed by questionnaires to school staff (n=87) and parents (n=173). Acceptability, appropriateness, and feasibility of the programme as perceived by principals (n=22), teachers (n=43) and school nurses (n=22) is measured by a validated questionnaire (score 0-16). T-tests and linear regressions were performed.

**Results:** The average adherence score to the intervention at year 1 was high, only lowered by the motivational interviewing component performed by school nurses ( $3.6 \pm 0.57$  SD). Responsiveness was positive among parents with an average score of  $12 \pm 3.3$  SD. The average acceptability, appropriateness and feasibility scores among school personnel were higher at baseline (range 10-11) than at year 1 (range 9-10). This decrease was significant for acceptability and appropriateness ( $p=0.002$  and  $0.02$ ). However, when controlling for type of school staff and municipality there was no difference in acceptability. When controlling for the different types of school staff, the feasibility score was significantly lower in one municipality ( $p=0.009$ ), which will be discussed.

**Conclusions:** This study adds important methodological knowledge to the scaling up of evidence-based programmes in the school context. Acceptability, appropriateness, and feasibility are important indicators of implementation climate and should be investigated well ahead of implementation start and attended to.

# Teams, policies, or champions? Exploring potential pathways of implementation success for wellness initiatives in schools using the Quality Implementation Framework

**Dr. Hannah Lane**<sup>1</sup>, Dr. Hannah Calvert<sup>2</sup>, Ms. Michaela McQuilkin<sup>2</sup>, Dr. Erin Hager<sup>3</sup>, Dr. Lindsey Turner<sup>2</sup>

<sup>1</sup>Duke University School of Medicine, Durham, USA, <sup>2</sup>Boise State University, Boise, USA, <sup>3</sup>Johns Hopkins Bloomberg School of Public Health, Baltimore, USA

**O.2.17 - Translating evidence into practice - with focus on school setting, Clarion Hotel Gillet - Room Gillesalen, June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** Local wellness policies (LWPs) are federally-mandated policies that promote healthy eating and physical activity practices (e.g., classroom breaks, limited unhealthy foods access) in U.S. schools. Achieving quality implementation of LWPs is challenging, particularly in under-resourced schools. We describe implementation strategies reported among a national sample of U.S. schools using SISTER (a compilation of evidence-informed strategies to implement innovations in schools), then explore contextual considerations across 4 implementation phases using the Quality Implementation Framework (QIF).

**Methods:** We conducted a convergent mixed methods analysis of data from 559 schools. Informants (e.g., principals, nurses, teachers) completed 66-item surveys (e.g., 6 Likert-type items assessing Climate for Wellness). A subsample (n=50) from 39 urban and rural schools completed semi-structured interviews. Interview data were analyzed deductively using 4 QIF phases: (1) preparing for implementation; (2) creating implementation structure; (3) maintaining structure throughout implementation; (4) assessing future needs. Survey data are described through descriptives and Poisson logistic regression (adjusted for district clustering, stratification, weighting) to support interview findings across phases.

**Results:** Sixty percent of survey respondents endorsed the SISTER strategy, “Preparing a wellness champion”, 59% endorsed “Having a school-level policy representative”, and 37% endorsed “Having an implementation team.” Unique contextual considerations were identified for these strategies within each QIF phase. In Phase 1, schools with higher Climate for Wellness scores had higher odds of having an implementation team (OR=1.18; CI [1.09,1.29]; p<0.001). Myriad other supportive and hindering contextual factors were qualitatively identified. In Phase 2, we identified key attributes (e.g., intrinsic motivation) and recruitment strategies for wellness teams/champions, and described facilitators of (e.g., external partners, parent engagement) and threats to (e.g., lack of incentives, staff resistance) quality implementation. In Phases 3-4, we identified differences in monitoring approaches by SISTER strategy (e.g., 74% of policy representatives monitored implementation, 43% of teams tracked goals) and gaps in assessing future needs (e.g., 25% integrated wellness goals into school improvement plans).

**Conclusions:** Findings provide detailed understanding of how LWP implementation strategies form and are sustained, and identify key knowledge gaps across phases. Findings inform tailored support for under-resourced schools to initiate and carry out evidence-informed implementation strategies.

# The co-design of a food waste resource prototype for Australian childcare centres.

**Mrs. Audrey Elford<sup>1</sup>**, Dr. Alison Spence<sup>1</sup>, Ms. Margaret Rozman<sup>2</sup>, Prof. Karen Campbell<sup>1</sup>, Dr. Penelope Love<sup>1</sup>

<sup>1</sup>Institute for Physical Activity and Nutrition, Deakin University, Melbourne, Australia, <sup>2</sup>Healthy Eating Advisory Service, Nutrition Australia, Melbourne, Australia

**O.2.18 - Changing behaviors in early care and education settings, Clarion Hotel Gillet - Room Akademien, June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** To co-design a resource for childcare centres to increase awareness and management strategies regarding food waste.

**Methods:** To inform the development of the support tool, researchers utilized the first seven steps of the IDEAS co-design framework (integrate, specify, ground, ideate, prototype, gather & build), involving childcare centres who provide food onsite in Victoria, Australia, and the Victorian government-funded support organisation (Healthy Eating Advisory Service). Centre data were collected through a survey (n=129 centres) followed by weighed food/waste audits and semi-structured interviews in a subgroup of centres (n=12 centres). Focus groups are being conducted in November 2022. Surveys collected food waste awareness and management data with statistical tests applied to determine differences by centre type (for-profit, not-for-profit), location and socioeconomic position. The semi-structured interviews aimed to understand the barriers/facilitators to food waste awareness/management and resources that may assist. Survey, audit, and interview data informed the development of a prototype of a food waste awareness tool for childcare centres which will be refined in the focus groups.

**Results:** Survey results found low food waste awareness (8%), and changes to practices in centres who had conducted food waste audits in the past with no differences by location, type or socioeconomic status. Audits identified a range in total food waste (9%-64%), with less plate waste occurring in centres who had previously conducted food waste audits (7%) compared to those who had not (17%) (p=0.04). Interview themes related to Awareness (*need focus on food waste*), Knowledge (*need to know how to reduce and manage food waste*), Skills (*educators modeling eating, cooks preparing the right amounts of food*), Beliefs about consequences (*children being involved has positive results*), and Environmental context (*a whole-centre approach*). These findings resulted in the development of a food waste awareness/management resource prototype, refined in focus groups in preparation for future pilot testing to assess acceptability and effectiveness.

## **Conclusions:**

Food waste awareness appears to influence food waste practices in childcare services, reducing food waste. A co-designed food waste resource, embedded into the childcare educational program, could be a feasible solution.

# Australian Childcare Nutrition Policies – Do they align with best practice?

**Miss Ganna Aristova<sup>1</sup>**, Miss Laura Graham<sup>1</sup>, Mrs. Audrey Elford<sup>2</sup>, Mrs. Alison Spence<sup>1,2</sup>, Mrs. Penelope Love<sup>1,2</sup>

<sup>1</sup>School of Exercise and Nutrition Science (SENS), Deakin University, Geelong, Victoria, Australia, <sup>2</sup>Institute of Physical Activity and Nutrition (IPAN), SENS, Deakin University, Geelong, Victoria, Australia

**O.2.18 - Changing behaviors in early care and education settings, Clarion Hotel Gillet - Room Akademien, June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** F. Early care and education

**Purpose:** Childcare centres are an important nutrition setting with high attendance rates and significant daily dietary needs being met, however research indicates suboptimal food provision and consumption in these settings. While the use of centre-based nutrition policy is an identified strategy to improve food provision and consumption, evidence is limited regarding effectiveness in guiding best practice. This study assessed centre-based nutrition policies of childcare services in Victoria, Australia to explore the comprehensiveness of content and strength of written language to guide the implementation of best practice guidelines. The applicability of a tool validated in the United States (US) as an instrument for the Australian context was also investigated.

**Methods:** Survey and web-based data of childcare services with on-site food provision (n=1068) listed on the Australian Children's Education and Care Quality Authority website, June 2021 was utilised. Policies were analysed using the Wellness Child Care Assessment Tool (WellCCAT) focusing on the 4 healthy eating domains – Nutrition Education (provision of education for children, staff and parents), Nutrition Standards (food group serving requirements and limitation of high sugar, fat and sodium foods), Promotion of Healthy Eating (the feeding environment) and Communication/Evaluation (of healthy eating practices). Policies were assessed independently by two scorers and moderated by a third. Content analysis assessed the applicability of the WellCCAT tool for the Australian context.

**Results:** Included policies (n=122) were predominantly from metropolitan centres (57.4%) and low-medium socioeconomic areas (78.2%). Policies had low overall WellCCAT scores, particularly strength scores which were low across all four domains. Nutrition Standards had the lowest strength score. Communication/Evaluation had the lowest comprehensiveness score. Content analysis indicated that underperformance may be related to the applicability of the WellCCAT assessment tool for the Australian context, due to differences in national nutrition standards.

**Conclusion:** This study provides unique insights as to where quality improvement of Australian childcare nutrition policies could be made. Further research is recommended to determine whether WellCCAT is an applicable tool for the Australian context, therefore highlighting the possible need for country-specific policy assessment tools.

# Social media and website-supported child feeding intervention improves feeding practices and children's diet quality

**Mr. Richard Ball**<sup>1,2</sup>, Dr. Kerith Duncanson<sup>2,3</sup>, Prof. Tracy Burrows<sup>2</sup>, Dr. Lee Ashton<sup>2</sup>, Dr. Maria Henstrom<sup>4</sup>, Dr. Elena Jansen<sup>5</sup>, Prof. Clare Collins<sup>2</sup>

<sup>1</sup>Mid North Coast Local Health District, Port Macquarie, Australia, <sup>2</sup>Priority Research Centre for Physical Activity and Nutrition, University of Newcastle, Newcastle, Australia, <sup>3</sup>Health Education and Training Institute (HETI) NSW Health, Sydney, Australia, <sup>4</sup>Karolinska Institutet, Huddinge, Sweden, <sup>5</sup>John Hopkins School of Medicine, Baltimore, USA

**O.2.18 - Changing behaviors in early care and education settings, Clarion Hotel Gillet - Room Akademien, June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** F. Early care and education

**Purpose:** The Parents In Child Nutrition Informing Community (PICNIC) intervention was established in 2018 as a peer-led healthy child weight initiative in regional Australia. The aims were to determine how PICNIC influenced feeding practices of parents/carers with a child aged up to three years and impact on infant/child's diet quality.

**Methods:** Parents of an infant aged zero to two years (n=307, mean age 8.4 months) were recruited into the 12-month, single-arm pre-post intervention, which included a dietitian-delivered workshop, online meetings, project specific website, Facebook and Instagram pages and support within a Facebook closed group. Parent feeding practices were measured at baseline, 6 and 12-months using the validated 34-item, six-construct Feeding Practices and Structure Questionnaire. Feeding construct mean scores were calculated and change over time measured in Stata using regression analysis. Feeding practice mean scores at 12 months were compared with age-matched population data. Diet quality was measured 24-months post intervention using the Australian Recommended Food Score for Pre-schoolers and compared with age-matched population data.

**Results:** PICNIC parents (n=199) feeding construct mean scores significantly improved over 12 months for 'Parent-led feeding' (-0.57(-0.74,-0.43) P<0.001), 'Family Meal Environment' (0.38(0.40,1.59) P<0.001), 'Persuasive Feeding' (-0.19(-0.33,-0.46) P=0.010) and 'Food to Calm' (-0.37(-0.53,-0.22) P<0.001). Feeding construct mean scores were significantly improved after 12-months intervention compared to age-matched normative data for 'Feeding on Demand' (P<0.001), 'Family Meal Environment' (P<0.010), 'Parent-led feeding' (P<0.001), 'Persuasive Feeding' (P<0.001), 'Food to Calm' (P=0.028) and 'Food Rewards' (P<0.001). At 12 months post-intervention (mean age 34 months) PICNIC participants' mean vegetable diet quality score was significantly higher (P=0.02) than age-matched population data.

**Conclusions:** A co-designed multi-strategy, peer-led intervention supported by a dietitian-administered website and social media positively influences community parents feeding practices and young children's diet quality. This confirms the efficacy of a dietitian-led intervention using contemporary health communication strategies to disseminate nutrition and feeding messages to, and between, new parents in a community setting. Future research will explore whether these changes to parents feeding practices and children's dietary intake influence child health up to age five.



# Intervention effects of a kindergarten-based health promotion programme on health-related quality of life and child sick days

**Dr. Susanne Kobel<sup>1</sup>**, Dr. Olivia Wartha<sup>1</sup>, Prof. Jürgen Steinacker<sup>1</sup>

<sup>1</sup>Ulm University Hospital, Ulm, Germany

**O.2.18 - Changing behaviors in early care and education settings, Clarion Hotel Gillet - Room Akademien, June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** F. Early care and education

**Purpose:** Good health is considered a prerequisite for coping with numerous developmental tasks. However, the change in children's everyday behaviour has obesity as a possible consequence. The health promotion programme "Join the Healthy Boat" promotes a healthy lifestyle at an early age in order to improve the health of children holistically. The aim of this work was to find out whether the programme affects children's health and health-related quality of life (HRQoL).

**Methods:** Data from 401 children ( $3.65 \pm 0.56$  years; 54.1% boys) from 57 kindergartens throughout south-west Germany were included in the analysis. Of these, 223 children were in the intervention group (IG) and 178 children in the control group (CG). Children in the IG carried out a yearlong programme on healthy eating, physical activity and leisure activities. The CG followed the normal kindergarten routine. Anthropometric data were collected objectively at the beginning and end of the year. Information on sociodemographic background, HRQoL, the number of sick days and visits to the doctor by the child, and the number of childcare-related absences from work by the parents were collected using parent questionnaires. Intervention effects were analyzed using difference measures ( $T2 - T1$ ),  $\chi^2$  tests and binary logistic regressions.

**Results:** Over the study year, the IG showed a tendency towards a greater increase in the average HRQoL than the CG ( $1.09 \pm 5.65$  vs.  $0.43 \pm 5.67$ ,  $p = 0.40$ ) and a tendency toward a greater reduction in sick days ( $-1.25 \pm 5.30$  vs.  $-0.50 \pm 5.52$ ,  $p = 0.38$ ) and doctor visits ( $-0.79 \pm 3.16$  vs.  $-0.39 \pm 2.95$ ,  $p = 0.75$ ).

**Conclusions:** The health promotion programme "Join the Healthy Boat" did not achieve any significant intervention effects on HRQoL, sick days and doctor visits of the children or on the mother's days absent from care. Nevertheless, a positive trend towards improvement in subjective and objective health can be identified. The intervention is therefore aimed in the right direction and the tendential effects have the potential to become factual if the program is operated for a longer period of time.

# Identification of on-site breakfast provision and quality in Early Care and Education (ECE) services across Victoria, Australia

**Ms. Seon Park<sup>1</sup>**, Dr. Miaobing Zheng<sup>1</sup>, Dr. Kathleen E Lacy<sup>1</sup>, Prof. Karen J Campbell<sup>1</sup>, Dr. Penelope Love<sup>1</sup>

<sup>1</sup>Institute for Physical Activity and Nutrition (IPAN), Deakin University, Geelong, Australia

**O.2.18 - Changing behaviors in early care and education settings, Clarion Hotel Gillet - Room Akademien, June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** F. Early care and education

**Purpose:** In Australia, 1.3 million children attend government-approved centre-based Early Care and Education (ECE) services, many of which provide meals and snacks on-site for children. While previous research has investigated the quality of lunches/snacks provided at ECE services and found some associations between service characteristics and quality of on-site lunch/snacks provision, the quality of breakfast provision and its association have not been examined across ECE services in Victoria, Australia. Therefore, this study aims to evaluate the breakfast provision quality in ECE services, determining associations with service characteristics.

**Methods:** Victorian ECE services participated in an online survey of 20 items that collected information on several characteristics of ECE services (location (metro vs regional), service management type (for-profit vs not-for-profit), area-level socio-economic advantage (low (1-3 SEIFA), medium (4-7 SEIFA), high (8-10 SEIFA)), National Quality Standard benchmarks (NQS; working forward, meeting, exceeding) and breakfast food items offered (i.e., breakfast cereal, bread, milk, vegetables, fruits, etc). The quality of breakfast provision was calculated based on the Victorian Health Eating Advisory Service (HEAS) breakfast guidelines (cereals, wholegrains, dairy, fruits, vegetables) and the Healthy Choices System (green, amber, red food classification). Associations between breakfast quality and service characteristics were analysed.

**Results:** A total of 50 ECE services participated. Of which, about two-thirds were in a metropolitan area, had a for-profit management type, with medium or high area-level socio-economic advantage and were meeting NQS benchmarks. Breakfast cereal, bread, and milk were more likely to be “always” provided at breakfast, but vegetables or fruits were more likely to be “Never” offered at breakfast. Only 10% and 16.7% of ECE services met the criteria for high-quality breakfasts according to HEAS and the Healthy Choices System, respectively. Providing a high-quality breakfast according to HEAS was associated with high area-level socio-economic advantage (OR: 3.04, 95%CI: 0.96, 9.19).

**Conclusions:** This study highlights that on-site breakfast provision within Victorian ECE services did not meet current nutrition guidelines. Early intervention for breakfast provision in ECE services, particularly in areas of socio-economic disadvantage is needed, given the majority of ECE services with high area-level socio-economic advantage provide high-quality of on-site breakfast provision to children.

# Barriers, facilitators and strategies to improve water access and young children's water intake in family childcare homes: Results from the Drink Well/Bebe Bien study

**Dr. Kim Gans**<sup>1</sup>, Dr. Alison Tovar<sup>2</sup>, Ms. Vanessa Esquivel<sup>1</sup>, Ms. Sarah Warykas<sup>1</sup>, Ms. Viviana Zambrano<sup>1</sup>, Ms. Michelle Miller<sup>1</sup>, Dr. Patricia Risica<sup>2</sup>, Dr. Shira Dunsiger<sup>2</sup>

<sup>1</sup>University of Connecticut, Storrs, USA, <sup>2</sup>Brown University School of Public Health, Providence, USA

**O.2.18 - Changing behaviors in early care and education settings, Clarion Hotel Gillet - Room Akademien, June 16, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** F. Early care and education

**Purpose:** Beverage access in childcare plays an important role in child diet quality. Little research has been done in family childcare homes (FCCH), which may be higher risk settings. Water is often not accessible or offered to children in FCCH. Research is needed to determine barriers and feasible strategies to improve water access and children's intake in FCCH. The Drink Well project is examining how to increase water availability/accessibility in FCCH and improve young children's beverage intake.

**Methods:** Phase 1: Formative, qualitative interviews with FCCH providers (FCCP) in low income communities to determine barriers and strategies to improve water availability and children's intake. Phase 2: Intervention pilot to increase water availability/accessibility in the FCCH (e.g. providing water stations, water filters, technical assistance, etc.) with 40 FCCP (50% Latina) operating FCCH in low income neighborhoods in RI, MA & CT that care for children aged 6-60 months. Pre-post surveys and post qualitative interviews will assess feasibility, acceptability and efficacy of the intervention.

**Results:** We completed 20 Phase 1 formative interviews with FCCP (100% female; 50% Latina; mean age 49 years; 70% < college education; care for mean of 7 children). Interviews found these barriers: children don't like taste of water; parents don't role model drinking water or provide water for children; other beverages are prioritized by parents & FCCP; perceived poor water quality/safety; worry about mess if children self-serve water; fear that if children drink too much water they won't eat meal/milk or have "accidents"; lack of supplies/equipment (e.g. filters); lack of structure in FCCH; confusion about federal food program rules for water. The pilot intervention study will occur from Dec. to June 2023. Study data to be presented will include use and acceptability of the intervention, and pre-post changes in: serving of water/beverages, water availability/accessibility, factors influencing water provision, attitudes about and challenges to water access/consumption, knowledge about beverage guidelines, FCCP own beverage intake, etc.

**Conclusion:** Drink Well/Bebe Bien addresses research gaps re. water/beverage access and intake in FCCH, and can inform future research & policies to impact low-income/ethnic minority children at highest risk for poor diet & weight-related health disparities.

# A prospective analysis of physical activity and mental health in children: the GECKO Drenthe Cohort

**Ms. Lu Yang<sup>1</sup>**, Associate Professor Eva Corpeleijn<sup>2</sup>, Associate Professor Esther Hartman<sup>1</sup>

<sup>1</sup>University of Groningen, University Medical Center Groningen, Department of Human Movement Sciences, Groningen, Netherlands, <sup>2</sup>University of Groningen, University Medical Center Groningen, Department of Epidemiology, Groningen, Netherlands

**O.3.19 - How mental and physical health is associated with nutrition and movement, UKK - Main Hall (Level 6), June 17, 2023, 2:00 PM - 3:30 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Mental health problems in young people have become a global health burden. The effects of physical activity (PA) on mental health in adults are well known but are still not clear in children. The aim of this study was to investigate to what extent PA in early childhood is related to mental health in late childhood. The main innovations of this study were the objectively measured PA at very young age and longitudinal study design.

**Methods:** 846 children from the Dutch GECKO Drenthe birth cohort (51.7% boys) were enrolled in this analysis. PA was objectively measured at age 5 using ActiGraph GT3X. Mental health was assessed using the Strengths and Difficulties Questionnaire (SDQ) at age 5 and age 11. PA and SDQ data were ln-transformed. Multiple linear regression models were used to estimate the associations between physical activity volume, different PA intensities and SDQ subscales, stratified by gender, and adjusting for age, maternal education level, family size, BMI and SDQ at age 5.

**Results:** Increased moderate-to-vigorous PA (MVPA) at age 5 was significantly associated with lower peer problem scores in 11-year-old boys ( $B=-0.053$ , 95%CI -0.085 to 0.022) and girls ( $B=-0.033$ , 95%CI -0.062 to -0.003). Physical activity volume at age 5 is also inversely associated with peer problem scores in boys ( $B=-0.080$ , 95%CI -0.133 to -0.026) and girls ( $B=-0.051$ , 95%CI -0.1 to -0.002) aged 11. In contrast, increased sedentary time was associated with higher peer problem scores at age 11, but this was only significant in boys ( $B=0.100$ , 95%CI 0.024 to 0.177). With respect to hyperactivity, for boys, higher levels of MVPA and lower levels of sedentariness at age 5 were related with higher hyperactivity scores at age 11 in a partially adjusted model, and the associations became non-significant after adjusting for hyperactivity scores measured at age 5. No significant association between PA and other SDQ subscales or total difficulties scores was observed, neither in boys nor girls.

**Conclusions:** In general, children who are more physically active at age 5 have less peer problems at age 11, and more active boys have higher hyperactivity scores at age 11.

# The impact of enabling Risky Play on physical activity and wellbeing in New Zealand primary schools: The Puketāpapa Play Project

**Dr. Charlotte Jelleyman<sup>1</sup>**, Dr. Tom Stewart<sup>1</sup>, Mr. Tobias Cox<sup>1</sup>, Prof. Scott Duncan<sup>1</sup>

<sup>1</sup>School of Sport and Recreation, AUT, Auckland, New Zealand

**O.3.19 - How mental and physical health is associated with nutrition and movement, UKK - Main Hall (Level 6), June 17, 2023, 2:00 PM - 3:30 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Risky play – play that is thrilling, exciting and involves potential for physical injury – is associated with positive developmental benefits, yet quality play opportunities are declining. While schools play an important role in the provision of play opportunities, investigations of risky play interventions in primary (elementary) schools are limited. This study sought to examine the efficacy of a school-based risky play intervention for increasing children's physical activity, and understand the barriers and facilitators for intervention adoption.

**Methods:** The Puketāpapa Play Project was a risky play intervention implemented in 11 Auckland primary schools. It comprised of three workshops for school staff that focused on: (1) the importance of risky play for child development, (2) strategies to facilitate risky play, and (3) mapping opportunities for risky play. Rule changes and play equipment were introduced in each school, and support and activations were provided throughout.

Wrist-worn accelerometers (Axivity AX3) were used to assess baseline 24-hour activity patterns (follow-up data collection currently underway). Focus groups and interviews with children and staff were conducted before and after the intervention. Accelerometer data were analysed using compositional data analysis, while the focus group and interview data were synthesised using thematic analysis.

**Results:** At the time of writing, baseline data were available for 147 children. Initial analysis revealed the mean activity composition was; sedentary = 10.5 hours/day, light intensity = 4.9 h, MVPA = 1 h, sleep = 7.5 h. Compositional MANOVA showed the daily activity compositions at baseline were different between boys and girls ( $F(3, 88) = 6.3$ ,  $p < 0.01$ ,  $\eta^2 = 0.18$ ) where boys had 38% (95% CI 16.6, 65.2%) more MVPA than girls. Staff interviews revealed teachers were enthusiastic towards risky play in the school environment, but lacked confidence implementing and sustaining any changes. They suggested at least one year was needed to transform the play environment. Themes arising from the children's focus groups included respecting school rules whilst also desiring more freedom.

**Conclusion:** Preliminary results revealed several barriers/facilitations to intervention adoption. Physical activity follow-up measurement is ongoing and the efficacy of the intervention will be presented at the conference.



# COVID-19 restrictions and objectively measured movement behaviors in Singaporean children

**Ms. Claire Marie Jie Lin Goh<sup>1</sup>**, Ms. Natarajan Padmapriya<sup>1,2</sup>, Dr. Jonathan Y. Bernard<sup>3,4</sup>, Prof. Lynette Pei Chi Shek<sup>4,5,6</sup>, Prof. Yap Seng Chong<sup>2,4</sup>, Prof. Kok Hian Tan<sup>7,8</sup>, Associate Professor Shiao-Yng Chan<sup>2,4</sup>, Dr. Fabian Yap<sup>7,8,9</sup>, Prof. Keith M. Godfrey<sup>10,11</sup>, Prof. Yung Seng Lee<sup>4,5,6</sup>, Prof. Johan G. Eriksson<sup>2,4,12</sup>, Assistant Professor Chuen Seng Tan<sup>1</sup>, Dr. Falk Müller-Riemenschneider<sup>1,13</sup>

<sup>1</sup>Saw Swee Hock School of Public Health, National University of Singapore, Singapore, Singapore,

<sup>2</sup>Department of Obstetrics & Gynaecology and Human Potential Translational Research Programme, Yong Loo Lin School of Medicine, National University of Singapore, Singapore, Singapore, <sup>3</sup>Université Paris Cité, Centre for Research in Epidemiology and Statistics (CRESS), Inserm, Inrae, F-75004 Paris, Singapore, <sup>4</sup>Singapore Institute for Clinical Sciences, Agency for Science, Technology and Research (A\*STAR), Singapore, Singapore, <sup>5</sup>Department of Paediatrics, Yong Loo Lin School of Medicine, National University of Singapore, Singapore, Singapore, <sup>6</sup>Khoo Teck Puat-National University Children's Medical Institute, National University Health System, Singapore, Singapore, <sup>7</sup>Division of Medicine, KK Women's and Children's Hospital, Singapore, Singapore, <sup>8</sup>Duke-National University of Singapore, Singapore, Singapore, <sup>9</sup>Lee Kong Chian School of Medicine, Nanyang Technological University, Singapore, Singapore, <sup>10</sup>Medical Research Council Lifecourse Epidemiology Centre, University of Southampton, Southampton, United Kingdom, <sup>11</sup>NIHR Southampton Biomedical Research Centre, University of Southampton and University Hospital Southampton NHS Foundation Trust, Southampton, United Kingdom, <sup>12</sup>Department of General Practice and Primary Health Care, University of Helsinki and Folkhälsan Research Center, Helsinki, Finland, <sup>13</sup>Berlin Institute of Health, Charité University Medical Centre, Berlin, Germany

**O.3.19 - How mental and physical health is associated with nutrition and movement, UKK - Main Hall (Level 6), June 17, 2023, 2:00 PM - 3:30 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** COVID-19 restrictions have affected populations around the world. We aim to investigate 24-hour movement behaviors of children aged 10 years during different phases of the pandemic in Singapore.

**Methods:** Children from the Growing Up in Singapore Towards healthy Outcomes (GUSTO) cohort were asked to wear an accelerometer (Actigraph-GT3X+) to measure their movement behaviors. Time spent in inactivity, light physical activity (LPA), moderate physical activity (MPA), vigorous physical activity (VPA) and sleep were generated using the R-package GGIR version 2.0. According to the timepoint of their assessment, children were assigned to three COVID-19 restriction groups: Pre-COVID (no restrictions), COVID1 (severe restrictions), COVID2 (moderate restrictions). Linear regression analysis was conducted to examine the associations of movement behaviors and levels of COVID-19 restrictions, with adjustment for sociodemographic factors (e.g. sex and BMI) and the respective movement behaviors at age 8.

**Results:** Of all children (n=447), those in the Pre-COVID group had an average of 585.8, 293.8, 49.9, 6.4 and 504.1 min/day of inactivity, LPA, MPA, VPA and sleep, respectively. We found that children from the COVID1 group spent the most amount of time in inactivity and the least amount of time engaging in LPA, MPA, and VPA. Compared to the children in the COVID1 group, children in the COVID2 group spent more time in LPA (22.3 min/day (CI: 10.6 - 34.2)), while children in the Pre-COVID group spent more time in VPA (1.9 min/day (CI: 0.3 - 3.6)). COVID restriction groups were strongly associated with LPA ( $p < 0.001$ ) and borderline with VPA ( $p = 0.064$ ). The other remaining movement behaviours (inactivity, MPA, sleep) had non-significant associations with COVID restriction groups.

**Conclusions:** During the severe COVID-19 restrictions, children spent more time in inactivity and less time in movement behaviors. It suggests that the COVID-19 restrictions in Singapore may have substantially changed children's movement behavior.

# Is breastfeeding duration related to health of migrant mother-child dyads experiencing homelessness? The ENFAMS cross-sectional survey.

**Ms. Alexandra Descarpentrie**<sup>1</sup>, Dr. Delphine Pocquet<sup>1</sup>, Dr. Pauline Brugailleres<sup>2</sup>, Dr. Priscille Sauvegrain<sup>1,3,4</sup>, Dr. Pauline Frenoy<sup>5</sup>, Dr. Jonathan Y. Bernard<sup>1</sup>, Dr. Blandine de Lauzon-Guillain<sup>1</sup>, Dr. Stéphanie Vandentorren<sup>2,4,6</sup>

<sup>1</sup>Université Paris Cité and Université Sorbonne Paris Nord, Inserm, INRAE, Centre for Research in Epidemiology and Statistics (CRESS), 75004 Paris, France, <sup>2</sup>Université Bordeaux, Inserm, UMR1219, PHARes team, 33000 Bordeaux, France, <sup>3</sup>Sorbonne Université, Midwifery Unit, 75013 Paris, France, <sup>4</sup>Institut convergences migrations/CNRS, Aubervilliers, France, <sup>5</sup>Université Paris Saclay, UVSQ, Université Paris-Sud, Inserm, Gustave Roussy, "Exposome and Heredity" team, CESP, 94805, Villejuif, France, <sup>6</sup>Santé publique France, French national public health agency, 94415 Saint-Maurice, France

**O.3.19 - How mental and physical health is associated with nutrition and movement, UKK - Main Hall (Level 6), June 17, 2023, 2:00 PM - 3:30 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Breastfeeding has been associated with various health benefits both for the mother and her child. However, there are critical gaps in the knowledge of such relations in extremely underserved populations, such as families experiencing homelessness. Yet, breastfeeding could mitigate stress and buffer adverse health outcomes in mother-child dyads in this population. Our objective was to examine these relations in the French context.

**Methods:** Data were collected among sheltered and mainly foreign-born mothers experiencing homelessness, and their children aged 0.5-5 years, from the ENFAMS cross-sectional survey (n=481, 2013 - Great Paris area). Any breastfeeding duration, along with various health outcomes of both the mother and her child were ascertained by face to face questionnaires by trained bilingual interviewers to mothers (symptoms of depression and perceived physical and emotional health) or by trained bilingual psychologist to her child (adaptive behaviors). Other health outcomes were measured by nurses: body mass index, haemoglobin concentration (dyad) and blood pressure (mothers). Multivariable linear and modified Poisson regression analyses were performed to examine outcome-wide associations between any breastfeeding duration  $\geq 6$  months and mother-child outcomes.

**Results:** Overall, 61.6% (95% CI [54.7 to 68.4]) of the children had been (or were being) breastfed  $\geq 6$  months. Children mean age was 2.8 years [2.5 to 3.0]. Mothers' regions of birth were Africa for 63.8% [57.1 to 70.1] and outside Africa for 36.2% [29.4 to 42.9]. Proportion of food insecurity was 84.6% [79.1 to 90.0]. Multivariable analyses underlined that any breastfeeding duration  $\geq 6$  months was associated with lower systolic blood pressure (B=-0.40, 95% CI [-0.68 to -0.13]). No other relevant association was observed with the other outcomes in both mothers and children.

**Conclusions:** The importance of supporting breastfeeding to improve mothers' health holds true in the context of migration and homelessness. Such interventions should, however, account for mothers' socio-cultural heritage and structural barriers. Regarding the associations of breastfeeding duration with measures of child health and development in this population, the jury is still out and further research is recommended to overcome potential residual confounding.

# Acute effects of nitrate and breakfast on working memory and cerebral blood flow in adolescents: a randomized crossover trial

**Dr. Emerald G. Heiland**<sup>1,2</sup>, Prof. Örjan Ekblom<sup>1</sup>, Ms. Olga Tarassova<sup>3</sup>, Ms. Karin Kjellenberg<sup>1</sup>, Associate Professor Gisela Nyberg<sup>1,4</sup>, Prof. Maria M. Ekblom<sup>1,5</sup>, Dr. Björg Helgadóttir<sup>1,6</sup>

<sup>1</sup>Department of Physical Activity and Health, The Swedish School of Sport and Health Sciences (GIH), Stockholm, Sweden, <sup>2</sup>Department of Surgical Sciences, Medical Epidemiology, Uppsala University, Uppsala, Sweden, <sup>3</sup>Department of Physiology, Nutrition, and Biomechanics, The Swedish School of Sport and Health Sciences (GIH), Stockholm, Sweden, <sup>4</sup>Department of Global Public Health, Karolinska Institutet, Solna, Sweden, <sup>5</sup>Department of Neuroscience, Karolinska Institutet, Solna, Sweden, <sup>6</sup>Division of Insurance Medicine, Department of Clinical Neuroscience, Karolinska Institutet, Solna, Sweden

**O.3.19 - How mental and physical health is associated with nutrition and movement, UKK - Main Hall (Level 6), June 17, 2023, 2:00 PM - 3:30 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Beneficial acute effects of dietary nitrate have been demonstrated on working memory in adults, with changes in cerebral blood flow (CBF) being a potential mechanism. However, these effects have not been studied in adolescents. Moreover, having breakfast compared to skipping may also exhibit positive effects on working memory. Therefore, this randomized crossover trial investigated the acute effects of nitrate and breakfast on working memory and changes in task-related CBF in adolescents.

**Methods:** This trial will recruit at least 43 adolescents (13–15 years old). There were three experimental breakfast conditions: (1) none, (2) regular, and (3) regular breakfast with high nitrate in the form of concentrated beetroot juice. Working memory (1-, 2-, 3-back tests) and task-related CBF (prefrontal cortex oxygenated and deoxygenated-hemoglobin changes estimated using functional near-infrared spectroscopy) were measured immediately after breakfast and 130 min later. The data collection for this study is ongoing, thus results for 35 adolescents are presented here and due to blinding of the researcher we are unable to report at this time in which condition these effects occurred, but will be revealed by the time of the conference, as well as for the results on changes in CBF.

**Results:** Preliminary results from the ongoing study showed that from pretest to posttest there was a statistically significant improvement in reaction time in all three conditions for all three n-back tests, but no intervention effects. Accuracy, however, improved from pretest to posttest in only one condition, for all three n-back tests ( $\beta$  [95% confidence interval] from linear mixed-effects models with subject as random effect: 1-back 2.8[1.2-4.3], 2-back 2.6[0.9-4.2], 3-back 3.6[2.2-5.0]), and there was a tendency towards an intervention effect between this breakfast condition and another on the accuracy of the 3-back test ( $P$  for time-by-condition interaction 0.07).

**Conclusions:** The results from this study will increase our understanding into the effects of breakfast and its composition (i.e., nitrate-rich) on acutely improving working memory in adolescents and the potential mechanisms. In turn, the results will inform on whether policies on providing breakfast in schools should be considered to improve students' cognitive performance.

# Systems dynamics for healthy and sustainable local food environments

**Ms. Tamika M Wopereis<sup>1</sup>**, Assistant Professor Coosje Dijkstra<sup>2</sup>, Ms. Frederique Rongen<sup>1</sup>, Ms. Joline J Wierda<sup>1</sup>, Prof. Emely de Vet<sup>1</sup>, Associate Professor Maartje P Poelman<sup>1</sup>

<sup>1</sup>Chair Group Consumption and Healthy Lifestyles, Wageningen University & Research, Wageningen, Netherlands, <sup>2</sup>Department of Health Sciences, Faculty of Science, Vrije Universiteit Amsterdam, Amsterdam Public Health research institute, Amsterdam, Netherlands

**O.3.20 - Sustainable food and active environments, UKK - Level 6 Foyer, June 17, 2023, 2:00 - 3:30 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** To identify factors and leverage points that influence the neighbourhood food environment and understand through which systemic actions these factors can be adapted to trigger the transition towards healthy and sustainable food environments.

**Methods:** Three co-creation sessions were held in 2022 in a Dutch municipality using a community-based system dynamics approach. During the two first sessions, a variety of stakeholders (n=11-18), including policy makers, retailers, health coaches, chefs, citizens, conducted group model building exercises to identify factors influencing their local food environment. The exercises were based on pre-defined scripts: behaviour-over-time graphs, connection circles and drawing the causal loop diagram (CLD). Based on this first exercise, the research team identified the feedback loops and presented, discussed and fine-tuned these with the stakeholders. Also, member checks with policy advisors from other municipalities and external researchers were organised to review the CLD and to extend the model to more municipalities in the Netherlands. During the second session, based on the CLD, leverage points were identified and actions for systems change were formulated. The actions were developed by the stakeholders, taking into account their interests and capacity, the levels for change outlined in the Action Scales Model (ASM) and the previously identified leverage points.

**Results:** A total of 46 factors that influence the local food environment were identified by the stakeholders, including 7 leverage points. These factors were categorised into four larger themes: consumer- (e.g, social norms), government- (e.g, food policy), food industry (e.g., profit)- and global trend-related (e.g., digitalization) factors. The participants developed 20 actions based on the CLD: 50% targeted the events level of the ASM, 30% the structures level, 15% the goals level and 5% system beliefs.

**Conclusions:** This research yielded one of the first CLDs showing the multiple and varied factors influencing the local food environment. It underlines the importance of using a systems approach to adapt food environments. The exercises conducted initiated dialogues and collaborations between the participating stakeholders to adapt their local food environment. Yet, it was challenging for stakeholders to think in systems. More work is needed to translate systems approaches for use by non-academics.

# Current state and developments in physical activity monitoring, policy, and research in 217 countries: Global Observatory for Physical Activity - GoPA! surveys

**Dr. Andrea Ramirez Varela**<sup>1,2</sup>, Miss Juliana Mejia Grueso<sup>1,2</sup>, Prof. Michael Pratt<sup>3,5</sup>, Dr. Pedro Hallal<sup>4,5</sup>

<sup>1</sup>Universidad de los Andes, Bogota, Colombia, <sup>2</sup>Global Observatory for Physical Activity, Latin American Office, Bogota, Colombia, <sup>3</sup>University of California San Diego, San Diego, USA, <sup>4</sup>University of Illinois, Champaign/Urbana, USA, <sup>5</sup>Global Observatory for Physical Activity, USA Office, San Diego/Champaign/Urbana, USA

**O.3.20 - Sustainable food and active environments, UKK - Level 6 Foyer, June 17, 2023, 2:00 - 3:30 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** It is necessary to do regular evaluations of the global surveillance, policy, and research capacities in the field of physical activity and public health, in order to evaluate national capacity for promotion and advocacy. The purpose of this study was to evaluate the current state of physical activity surveillance, policy, and research throughout the world, and identify emerging trends.

**Methods:** We used data from the Global Observatory for Physical Activity (GoPA!) 2015 and 2020 surveys. The data collected throughout both phases were used to evaluate the degree of progress of national surveillance, policy, and research. The findings were reviewed and approved by GoPA! official country representatives.

**Results:** The worldwide 5-year progress in surveillance, policy, and research indicators was moderate, with the majority of countries either making improvements or maintaining the same level from 2015. The total physical activity promotion capacity was found to be highest in Europe, while it was determined to be the lowest in Africa and low and middle-income nations. In particular, 48.1%, 40.6%, and 42.1% of the countries increased or remained at the highest level for surveillance, policy, and research respectively; 40.6%, 36.8%, and 18.8% continued to remain at the intermediate level for surveillance, policy, and research respectively; 8.3%, 15.8%, and 28.6% decreased or continued to remain at the lowest level for surveillance, policy, and research respectively; and data was unavailable for 3.0%, 6.8%, and 10.5% for surveillance, policy, and research respectively. Despite a large percentage of the world's population benefiting from at least some policy, surveillance, and research in physical activity, GoPA! estimates that 145 million people, or 2% of the world population, live in countries with a low capacity for physical activity promotion (equivalent to Russia's population); 49.6 million people live in a country without surveillance (equivalent to Spain's population); 629.4 million people are without policy (equivalent to Latin America's population), and 108.7 million people are without research (equivalent to Egypt's population).

**Conclusions:** Despite the fact that engaging in physical activity is an essential behavior for maintaining the population's good health, there are significant inequalities in the capacity to promote physical activity worldwide.



# Understanding the Use of Social Infrastructures to Prevent and Cope with Household Food Insecurity in the United States

**Ms. Gabby Headrick<sup>1</sup>**, Ms. Kiera Abdul<sup>1</sup>, Ms. Shireen Guru<sup>2</sup>, Ms. Allison DeHoney<sup>3</sup>, Dr. Alyssa Moran<sup>1</sup>, Dr. Pamela Surkan<sup>1</sup>, Dr. Samina Raja<sup>2</sup>, Dr. Yeeli Mui<sup>1</sup>

<sup>1</sup>Johns Hopkins Bloomberg School of Public Health, Baltimore, USA, <sup>2</sup>University at Buffalo, Buffalo, USA,

<sup>3</sup>Urban Fruits & Veggies LLC, Buffalo, USA

**O.3.20 - Sustainable food and active environments, UKK - Level 6 Foyer, June 17, 2023, 2:00 - 3:30 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Food insecurity (FI) in the United States disproportionately impacts low-income and Black (vs. White) households. COVID-19 further exacerbates this health inequity. Households cope with FI by using formal (e.g., federal nutrition assistance programs) and informal (e.g., family members) social infrastructures. Coping strategies are proactive, to avoid FI (e.g., use of nutrition programs), and reactive, to deal with FI (e.g., skipping meals). Little is known about how households use different social infrastructures synergistically to proactively and reactively cope with FI.

**Methods:** We completed in-depth, semi-structured interviews between May 2022 and July 2022 with n=40 individuals (73% experiencing FI) living in low-income and predominantly Black households in Buffalo, New York. The interview guide was informed by the Family Resilience Framework and the Social-Ecological Model and included questions about how households cope with FI by drawing on resources in their household, community, and from government programs. We transcribed interviews verbatim and used inductive and deductive coding to organize data, followed by an emergent thematic analysis.

**Results:** We identified seven themes to describe proactive and reactive strategies used across social infrastructures. Three occurred at the household level: (i) food acquisition strategies; (ii) eating pattern strategies; and (iii) individual agency. Two occurred at the community level: (iv) social connection; and (v) community food support. Finally, two related to government programs: (vi) social benefit assistance strengths; and (vii) social benefit assistance shortfalls. Proactive strategies identified included budgeting and couponing for food, home cooking, sharing meals with people outside the household, receiving transportation support to food sources, and using Supplemental Nutrition Assistance Program (SNAP) benefits. Reactive strategies identified included delaying the payment of other household expenses (e.g., car repairs), stretching food supplies and modifying eating patterns (e.g., not eating meat), wanting to maintain independence from family and friends by using charitable food supports, and receiving financial support from people outside the household to buy food.

**Conclusions:** Households predominately used formal social infrastructures proactively while they used informal social infrastructures reactively. Strengthening formal social infrastructures (e.g., increasing SNAP benefits) may proactively protect against FI while fostering interpersonal connections may provide support needed when circumstances are severe.

# A novel approach for the optimisation of heterogeneous diets can promote public health and keep diets within planetary boundaries for climate change

Dr. Patricia Eustachio Colombo<sup>1,2</sup>, **Prof. Liselotte Schäfer Elinder**<sup>1,3</sup>, Mr. Esa-Pekka Nykänen<sup>4</sup>, Dr. Emma Patterson<sup>1,5</sup>, Dr. Anna Karin Lindroos<sup>5,6</sup>, Dr. Alexandr Parlesak<sup>7,8</sup>

<sup>1</sup>Department of Global Public Health, Karolinska Institutet, Stockholm, Sweden, <sup>2</sup>MRC Epidemiology Unit, Institute of Metabolic Science, School of Clinical Medicine, University of Cambridge, Cambridge, United Kingdom, <sup>3</sup>Centre for Epidemiology and Community Medicine, Region Stockholm, Stockholm, Sweden, <sup>4</sup>Functional Foods Forum, University of Turku, Turku, Finland, <sup>5</sup>The Swedish Food Agency, Uppsala, Sweden, <sup>6</sup>Department of Internal Medicine and Clinical Nutrition, the Sahlgrenska Academy at University of Gothenburg, Gothenburg, Sweden, <sup>7</sup>Department of Nutrition, Exercise and Sports, Copenhagen University, Copenhagen, Denmark, <sup>8</sup>Personalized Nutrition, Duale Hochschule Baden-Württemberg, Heilbronn, Germany

**O.3.20 - Sustainable food and active environments, UKK - Level 6 Foyer, June 17, 2023, 2:00 - 3:30 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Current dietary habits have substantial negative impacts on the health of people and the planet. Novel approaches are needed to develop sustainable food-based recommendations that consider the diversity in diets.

**Methods:** We combined hierarchical clustering analysis with linear programming to design nutritionally adequate, health-promoting, climate-friendly and culturally acceptable diets using Swedish national dietary data. Diets were optimised for the average consumption of the total population as well as for three identified dietary clusters.

**Results:** All optimised diets had lower shares of animal-sourced foods and contained higher amounts of plant-based foods. These dietary shifts reduced climate impacts by up to 53% while leaving much of the diet unchanged. The optimised diets of the three clusters differed from the optimised diet of the total population.

**Conclusion:** Our cluster-based optimisation approach may therefore be able to generate more acceptable and realistic alternatives for a sustainable diet. All optimised diets differed considerably from the food-group pattern of the EAT-Lancet diet.

# Could targeted food subsidies improve diets and reduce carbon footprints? A simulation study of SNAP, the major US food assistance program

**Dr. Diego Rose<sup>1</sup>**, Dr. Rodrigo Aranda<sup>2, 3</sup>, Dr. Amelia Willits-Smith<sup>1, 4</sup>, Dr. Keelia O'Malley<sup>1</sup>

<sup>1</sup>Tulane University, New Orleans, USA, <sup>2</sup>University of Southern California, Los Angeles, USA, <sup>3</sup>University of Wisconsin, Milwaukee, USA, <sup>4</sup>University of North Carolina, Chapel Hill, USA

**O.3.20 - Sustainable food and active environments, UKK - Level 6 Foyer, June 17, 2023, 2:00 - 3:30 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Globally, human food systems account for a third of greenhouse gas emissions (GHGE). Can dietary behaviors be modified to address this environmental problem, while also improving nutrition? In the US, the Supplemental Nutrition Assistance Program (SNAP), serves 42 million people per month by expanding the purchasing power of low-income households. To date, there has been no large-scale effort by SNAP to subsidize plant-based foods, which have lower climate impacts, health benefits, and are under-consumed in the US. The purpose of this study is to simulate the effects of such a subsidy on the nutritional quality and associated GHGE of diets consumed by SNAP-eligible individuals.

**Methods:** Consumer response to changes in food prices was estimated using an integrated economic model, the "generalized almost ideal demand system," and data from the National Household Food Acquisition and Purchase Survey. Estimates from this model were used to simulate the purchasing behavior of SNAP-eligible individuals in the US National Health and Nutrition Examination Survey (NHANES) under various subsidy scenarios. We examined the effects of a 1%, 5%, and 10% subsidy on "fruits and vegetables," or "plant protein foods" (legumes, seeds, nuts, and soy), or both on subsequent changes in diet quality and dietary GHGE. Diet quality was measured with the US Department of Agriculture's Healthy Eating Index (HEI). Dietary GHGE was based on an existing GHGE database linked to NHANES foods.

**Results:** In all subsidy scenarios, mean HEI scores increased and mean GHGE associated with dietary changes declined. However, the simulated changes were small. Even a 10% subsidy on both fruits and vegetables and plant protein foods, resulted in <1% increase in HEI and <1% decline in GHGE.

**Conclusions:** Contributions from all economic sectors, including agriculture and food, are needed to address the urgent problem of climate change. This program strategy offers a relatively low-cost way to change the direction of emissions from food in the US, while improving diet quality, albeit in a minor way. Additional research could address whether the promotional effect of a subsidy program could increase impacts even more by drawing attention to the benefits of plant-based foods.

# Regional Cross-sector Partnerships Promoting Physical Activity and a Sustainable Food System: What They Do and How They Do It

**Dr. Kadia Saint-Onge**<sup>1,2</sup>, Ms. Jany St-Cyr<sup>3</sup>, Ms. Nathalie Bedrossian<sup>2</sup>, Ms. Jessica Lambert-De Francesch<sup>1,2</sup>, Prof. Nazeem Muhajarine<sup>4,5</sup>, Prof. Lise Gauvin<sup>1,2</sup>

<sup>1</sup>School of Public Health, Université de Montréal, Montreal, Canada, <sup>2</sup>Centre de recherche du Centre hospitalier de l'Université de Montréal (CR CHUM), Montreal, Canada, <sup>3</sup>Department of Psychology, Université du Québec à Montréal, Montreal, Canada, <sup>4</sup>Department of Community Health and Epidemiology, University of Saskatchewan, Saskatoon, Canada, <sup>5</sup>Saskatchewan Population Health Evaluation and Research Unit (SPHERU), Saskatoon, Canada

**O.3.20 - Sustainable food and active environments, UKK - Level 6 Foyer, June 17, 2023, 2:00 - 3:30 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Cross-sector partnerships are recognized as an effective strategy to successfully promote healthy lifestyles. They can be defined as collaboration between three or more economic sectors (private, public, and non-profit). Cross-sector partnerships are complex and warrant a better understanding of their processes and perceived outcomes. This study developed a model of the inner workings of two cross-sector partnerships in Montreal, Canada: Montreal Physiquement Active (MPA) and the Conseil du Système Alimentaire Montréalais (CSAM).

**Methods:** We conducted semi-structured in-depth interviews with purposefully sampled stakeholders representing diverse profiles (MPA n=10, CSAM n=12). Interviews were conducted online, recorded, transcribed, and thematically analyzed to ascertain the functioning and added value of participating in these partnerships. We then triangulated these data with documentation on the partnerships' websites (e.g., annual reports, action plans) and applied logic modeling to draft the partnerships' theory of change.

**Results:** Analysis produced a theory of change common to MPA and CSAM. Activities were: mobilizing partners (engaging present and recruiting new stakeholders), mobilizing resources (e.g., funding, best practices, and staff), and coordinating sub-activities. Sub-activities were: developing and maintaining relationships, facilitating working groups, organizing and supporting co-development workshops, and lastly, sharing knowledge. Sub-activities granted access to stakeholder networks and broader knowledge of the context as well as the development of truly integrated action plans and collaborative projects. This resulted in a unified "360° vision" of current realities and priorities in the field of physical activity and the food system in Montreal. Data show that in the medium term, participation in MPA and CSAM contributes to build stakeholders' capacity for action.

**Conclusions:** Interestingly, the main perceived outcome of the studied partnerships also happens to be a fundamental component to cross-sector partnership success: sharing a common vision. This finding highlights the dynamic and circuitous workings of cross-sector partnership in healthy lifestyle promotion. Cross-sector partnerships are essential for equitable and efficacious health promotion. Yet maintenance of stakeholder engagement is a commonly reported barrier. By illustrating the functioning and added value of participation in cross-sector partnership, this study may contribute to bolster stakeholder engagement and foster partnership development.

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# Prospective Associations of Genetic Risk and Replacement of Sedentary Time by Active Time with Incident Chronic Obstructive Pulmonary Disease (COPD): A UK Biobank study

**Ms. Haeyoon Jang<sup>1</sup>**, Ms. Mengyao Wang<sup>1</sup>, Dr. Shan Luo<sup>1</sup>, Dr. Shiu Lun Au Yeung<sup>1</sup>, Dr. Youngwon Kim<sup>1,2</sup>  
<sup>1</sup>School of Public Health, Li Ka Shing Faculty of Medicine, The University of Hong Kong, Hong Kong, Hong Kong, <sup>2</sup>MRC Epidemiology Unit, University of Cambridge School of Clinical Medicine, Cambridge, United Kingdom

**O.3.21 - From genes to physical and psychosocial health outcomes, UKK - Hall B (Level 3), June 17, 2023, 2:00 PM - 3:30 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** Regular participation in physical activity is known to be associated with lower risk of chronic obstructive pulmonary disease (COPD). However, little is known about whether the prospective associations of sedentary time (ST) replaced by active time with COPD risk differ by genetic susceptibility to COPD.

**Methods:** This study included 63,454 white British participants with valid wrist-worn accelerometry data and no prevalent COPD. Acceleration measured through wrist-worn accelerometry was used to define ST (<30 milli-g excluding self-reported sleep time), light physical activity (LPA; 30-125 milli-g), and moderate-to-vigorous physical activity (MVPA; >125 milli-g). Weighted polygenic risk scores (PRS) for COPD were derived based on 71 genome-wide significant single nucleotide polymorphisms associated with COPD. A total of 695 COPD incidence cases (defined based on hospital admission and death records) were accrued over a median 7.0-year follow-up. Cox regression using compositional isotemporal substitution modelling was fit, with adjustment for confounders (e.g., age, sex, smoking, alcohol consumption, residential air pollution and Townsend deprivation index). The associations for pairwise replacement of ST by more active time across levels of PRS and in the full sample were tested in this study.

**Results:** Greater genetic susceptibility to COPD was associated with higher COPD risk. An increase in the ratio of ST to all other behaviours was associated with a higher hazard of COPD (Hazard Ratio [HR]: 2.29, 95%CI: 1.57-3.33), after adjusting for confounders and PRS for COPD. Lower hazards of COPD were associated with higher MVPA (HR: 0.85, 95%CI: 0.81-0.89). Pairwise replacements of 30minutes/day of ST by MVPA and LPA were associated with approximately 7% and 4% lower COPD hazards in the full sample; and relatively lower hazards of COPD at low, intermediate (except by LPA) and high genetic risk. No interaction between PRS and each movement behaviour was observed (P-values: 0.806 (ST), 0.785(LPA), and 0.596(MVPA)).

**Conclusions:** Reallocation of ST into MVPA or LPA is associated with a lower risk of COPD, regardless of genetic susceptibility to COPD. Replacing ST with more physically active time should be a key lifestyle-modification strategy for prevention of COPD in the general population including those at high genetic risk.



# Association of a Physical Activity/Sedentary Time Ratio with All-Cause Mortality Risk

Dr. Roslin Botlero<sup>1</sup>, Ms. Parneet Sethi<sup>2</sup>, Associate Professor Danijela Gasevic<sup>1</sup>, Prof. Neville Owen<sup>2,4</sup>, **Prof. David Dunstan**<sup>2,3</sup>

<sup>1</sup>Monash University, Melbourne, Australia, <sup>2</sup>Baker Heart and Diabetes Institute, Melbourne, Australia, <sup>3</sup>Deakin University, Melbourne, Australia, <sup>4</sup>Swinburne University, Melbourne, Australia

**O.3.21 - From genes to physical and psychosocial health outcomes, UKK - Hall B (Level 3), June 17, 2023, 2:00 PM - 3:30 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** Achieving a healthier 'balance' between time spent in physical activity and sedentary behaviour is now widely advocated for achieving multiple health benefits. However, physical activity risk identification and counselling efforts have not accounted for the interplay of physical inactivity and sedentary behaviour. A new risk identification tool was used to calculate the ratio of daily time spent in physical activity and in sitting (physical activity/sedentary time ratio). Here, we examine the association of the physical activity/sedentary time ratio with all-cause mortality risk.

**Methods:** During 78,406 person-years of follow-up (median follow up 14.3 years), there were 885 deaths (15% of the sample) among the 5,836 participants in wave 2 in the Australian Diabetes, Obesity and Lifestyle Study (AusDiab). Self-reported daily physical activity time (Active Australia Questionnaire) and daily sitting time was used to calculate the physical activity/sedentary time ratio for each participant (with a value of 0.1 applied for those reporting zero minutes of either behaviour). Quartiles of the physical activity/sedentary time ratio in relation to all-cause mortality (reference: Q4 – high PA/low ST) were examined using the Cox proportional hazard model adjusted for age, sex, education status, marital status, smoking status, total energy intake, energy intake from alcohol, waist circumference and number of comorbidities.

**Results:** In the crude model, compared to high PA/ low ST (Quartile 4) those from Quartile 1 (low PA/high ST) were at a significantly higher risk of all-cause mortality (1.77; 95% CI, 1.46 to 2.13), as were those in the combined category of Quartiles 2 and 3 (1.24; 95% CI 1.04-1.48). In the fully adjusted model, there was a slight attenuation of the effect sizes, but the results remained statistically significant.

**Conclusions:** A less favourable 'balance' of time spent in physical activity and in sedentary behaviour (physical activity/sedentary time ratio) is associated with elevations in all-cause mortality risk. The application of a physical activity/sedentary time ratio approach may assist with risk identification in clinical and public health practice and with the tailoring of risk mitigation approaches.

# Comparative effectiveness RCT of produce prescription models to improve health outcomes in pediatric populations

**Dr. Shreela Sharma**, Ms. Mallika Mathur, Dr. Allison Marshall, Dr. Ru-Jye Chuang, Dr. Prajakta Yeragi, Dr. Vinay Prabhu, Dr. Sandra McKay, Dr. Mary Aitken, Dr. Christine Markham, Mr. Mike Pomeroy, Ms. Azar Gaminian, Ms. Megan Hall

<sup>1</sup>University Of Texas School Of Public Health, Houston, USA

**O.3.21 - From genes to physical and psychosocial health outcomes, UKK - Hall B (Level 3), June 17, 2023, 2:00 PM - 3:30 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** Food prescription programs are gaining traction in the U.S., however, the data on the impact of such approaches in pediatric populations is limited. The purpose of our comparative effectiveness randomized controlled trial (RCT) is to evaluate the effectiveness of two produce prescription strategies (at-home delivery and grocery store vouchers) in improving obesity-related health outcomes and dietary behaviors among low-income 5–12-year-olds.

**Methods:** The target sample size of this ongoing 12-month study from September 2022 to August 2023 is 150 participants. Eligible children are being recruited from two pediatric clinics in Houston, Texas. Child eligibility criteria are aged 5-12 years, Medicaid recipients/low-income uninsured, body-mass index (BMI) percentile  $\geq 85$  and living within 10 miles of a Brighter Bites distribution site. Brighter Bites is a national non-profit that provides fresh produce plus nutrition education to families proven to improve child behavioral outcomes. Following completion of baseline measures, participants are randomized into one of three study arms to receive: (1) Bi-weekly \$25 vouchers redeemable for produce at retail stores (n=50 children), (2) Bi-weekly produce delivery to participants' homes through DoorDash (n=50 children), and (3) wait-list usual care controls from the clinics (n=50 children). All participants will also receive nutrition education materials. Main outcome measures are child BMI z-scores, blood pressure, hemoglobin A1c, liver panel, and lipids panels. Secondary outcomes including child food insecurity, diet quality and home nutrition environment will be collected through parent surveys in both Spanish and English. All outcome measures are collected at baseline and post-intervention. Process evaluation will measure program dosage, reach, acceptability and feasibility used mixed methods.

**Results:** At this time, we have successfully recruited and randomized 40 participants (recruitment completion February 2023). For outcome analysis, linear or logit regression analysis will be utilized to compare change in outcomes across the two intervention arms with comparison group participants adjusting for baseline differences. We will also conduct dose-response analyses. We will present the study design, approach, study measures, baseline data and preliminary findings of this real-world evaluation.

**Conclusions:** This study will demonstrate the impact and feasibility of food prescription strategies on pediatric health and behavioral outcomes in at-risk populations.

# A novel Lifestyle-based Prediction Model for risk of type 2 diabetes mellitus: a calibration and validation study integrating polygenic risk scores and wearable indicators

**Ms. Qiaoxin SHI<sup>1</sup>**, Ms. Haeyoon Jang<sup>1</sup>, Ms. Mengyao Wang<sup>1</sup>, Miss Zhu Liduzi Jiesisibieke<sup>1</sup>, Dr. Shan Luo<sup>1</sup>, Dr. Yuk Fai Wan<sup>3,4,5</sup>, Dr. Shiu Lun Au Yeung<sup>1</sup>, Dr. Youngwon Kim<sup>1,2</sup>

<sup>1</sup>School of Public Health, Li Ka Shing Faculty of Medicine, The University of Hong Kong, Hong Kong, China,

<sup>2</sup>MRC Epidemiology Unit, University of Cambridge, School of Clinical Medicine, Cambridge, United Kingdom,

<sup>3</sup>Department of Family Medicine and Primary Care, School of Clinical Medicine, Li Ka Shing Faculty of Medicine, The University of Hong Kong, Hong Kong, China, <sup>4</sup>Centre for Safe Medication Practice and research, Department of Pharmacology and Pharmacy, Li Ka Shing Faculty of Medicine, The University of Hong Kong, Hong Kong, China, <sup>5</sup>Laboratory of Data Discovery for Health (D24H), Hong Kong Science and Technology Park, Hong Kong, China

**O.3.21 - From genes to physical and psychosocial health outcomes, UKK - Hall B (Level 3), June 17, 2023, 2:00 PM - 3:30 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** Accurate prediction of type 2 diabetes (T2D) is critical for prevention of T2D. However, the utility of polygenic risk scores (PRS) and lifestyle behaviors as predictors of T2D has yet to be fully explored. Our study aims to develop and cross-validate a novel lifestyle-based prediction model (LBPM) for T2D that integrates lifestyle predictors including wearable-device-measured physical activity (PA) and explore whether the addition of PRS to the LBPM could enhance the predictive accuracy.

**Methods:** This study included 150,437 white British individuals without diabetes at baseline from UK Biobank (Application 43528). The LBPM was established incorporating the following predictors: age, sex, body mass index, diet (0-3; generated based on self-reported food categories), smoking status (never, previous, current), alcohol consumption (never, past, current 1-2 times/week, current  $\geq 3$  times/week), and PA (wrist-worn accelerometry-derived Euclidean Norm Minus One). Weighted PRS for T2D was calculated based on 138 single-nucleotide polymorphisms associated with T2D in genome wide association studies. Cox regression was used to train and cross-validate the LBPM (with and without PRS). C-index (through a meta-analyzed 5-folds cross-validation) and net reclassification index (NRI) were used to assess models' discriminant ability. Calibration was examined by plotting mean observed Kaplan-Meier estimates against mean predicted probabilities.

**Results:** Of 150,437 participants, 6,062 incident T2D cases (derived from primary care data) were observed over a 7.5-year median follow-up. All predictors including PRS in the LBPM were associated with the risk of T2D ( $P$ -values  $< 0.01$ ). The C-index of the LBPM and LBPM with PRS added was 0.737 (95% Confidence Interval [CI]: 0.723-0.752) and 0.755 (95% CI: 0.741-0.770), respectively. The addition of PRS to the LBPM led to an overall continuous NRI of 18.8% (6.7% for cases and 12.1% for non-cases), suggesting an improvement in identifying cases against non-cases. Calibration plots of LBPM and LBPM with PRS added showed good performance, with a regression slope of 1.094 and 1.097, respectively.

**Conclusions:** Adding T2D-specific PRS to the LBPM can enhance the prediction of T2D risk. The LBPM has much potential to serve as an accurate, practical T2D prediction tool where either lifestyle indicators alone or combined with genotype information are available.

# Fit and Fabulous: Shifting the Focus from Weight to Physical Activity to Promote Cardiorespiratory Fitness among Diverse Young Adults in the United States

**Dr. Eydie Kramer-Kostecka<sup>1</sup>, Dr. Sarah Espinoza<sup>1</sup>,** Dr. Laura Hooper<sup>1</sup>, Dr. Nicole Larson<sup>1</sup>, Dr. Daheia Barr-Anderson<sup>1</sup>, Dr. Dianne Neumark-Sztainer<sup>1</sup>

<sup>1</sup>University of Minnesota, Minneapolis, USA

**O.3.21 - From genes to physical and psychosocial health outcomes, UKK - Hall B (Level 3), June 17, 2023, 2:00 PM - 3:30 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** Cardiorespiratory fitness (CRF) is an important determinant of cardiovascular disease (CVD) risk, yet it is understudied among populations diverse in weight status and ethnic and racial background. This study investigates relationships between CRF, physical activity (PA), and weight among an ethnically/racially and weight diverse sample of young adults enrolled in the EAT (Eating and Activity over Time) study.

**Methods:** Young adults (n=95; mean age=27.2±1.9 years; 64.2% female; 75.8% Black, Indigenous, or Persons of Color) from the Midwest United States completed a 3-minute submaximal exercise step test. Participants' age- and sex-normed CRF ratings (Excellent-Very Poor) were determined by post-exercise radial artery palpation heart beat counts (HBC). Sociodemographic characteristics and weekly hours of light, moderate, and vigorous PA were captured with surveys. Participants reported specific activities with the Activities Completed over Time in 24-Hours (ACT24) recall. Anthropometrics were measured by trained researchers. Stepwise multivariate regression models examined cross-sectional associations between weekly PA and post-exercise HBC, adjusting for sociodemographic characteristics and body mass index (BMI). Additionally, to determine if CRF ratings varied in ways contrary to a "weight equals health" narrative, participants were categorized to higher (n=60, ≥25.0 kg/m<sup>2</sup>, mean BMI=31.5±4.3) and lower BMI (n=35, <25.0 kg/m<sup>2</sup>, mean BMI=22.1±2.4) groups.

**Results:** In initial analyses, unadjusted models ( $\beta=-3.12$ ;  $p<0.001$ ) and models adjusted for sociodemographic factors ( $\beta=-2.51$ ;  $p=0.005$ ), weekly hours of vigorous PA (VPA) was significantly associated with lower post-exercise HBC, an indicator of greater CRF. The inverse relationship between VPA and HBC, although weakened and no longer statistically significant, remained in the same direction when BMI was added to the model ( $\beta=-1.47$ ;  $p=0.085$ ). Not all participants in the higher BMI group had lower CRF (Average-Excellent=35.0%) and not all participants in the lower BMI group had higher CRF (Below Average-Very Poor=40.6%). Future analyses will be conducted and will examine contributions of specific vigorous activities to CRF using the ACT24 recall.

**Conclusions:** Vigorous PA appears to support CRF among young adults. Further, individuals of higher weight can achieve average CRF or better. Behavioral researchers and practitioners should consider a strengths-based approach by focusing on PA, rather than weight, to support CRF among weight-diverse populations.

# The causal effects of psychosocial well-being and emotion-driven impulsiveness on food choices among European adolescents

**Ms. Stefanie Do<sup>1,2</sup>**, Prof. Vanessa Didelez<sup>1,2</sup>, Dr. Claudia Böhnhorst<sup>1</sup>, Dr. Juul M.J. Coumans<sup>3</sup>, Prof. Lucia Reisch<sup>4</sup>, Dr. Unna N. Danner<sup>5</sup>, Dr. Paola Russo<sup>6</sup>, Prof. Toomas Veidebaum<sup>7</sup>, Prof. Michael Tornaritis<sup>8</sup>, Dr. Dénes Molnár<sup>9</sup>, Associate Professor Monica Hunsberger<sup>10</sup>, Prof. Stefaan De Henauw<sup>11</sup>, Prof. Luis Moreno<sup>12</sup>, Prof. Wolfgang Ahrens<sup>2</sup>, Dr. Antje Hebestreit<sup>1</sup>

<sup>1</sup>Leibniz Institute for Prevention Research and Epidemiology - BIPS, Bremen, Germany, <sup>2</sup>University of Bremen, Bremen, Germany, <sup>3</sup>Teaching and Learning Centre, Open University of the Netherlands, Heerlen, Netherlands, <sup>4</sup>Cambridge Judge Business School, University of Cambridge, Cambridge, United Kingdom, <sup>5</sup>Altrecht Eating Disorders Rintveld, Zeist, Netherlands, <sup>6</sup>Institute of Food Sciences, National Research Council, Avellino, Italy, <sup>7</sup>Department of Chronic Diseases, National Institute for Health Development, Tallinn, Estonia, <sup>8</sup>Research and Education Institute of Child health, REF, Strovolos, Cyprus, <sup>9</sup>Department of Pediatrics, Medical School, University of Pécs, Pécs, Hungary, <sup>10</sup>University of Gothenburg, School of Public Health and Community Medicine, Institute of Medicine, Gothenburg, Sweden, <sup>11</sup>Department of Public Health, Faculty of Medicine and Health Sciences, Ghent University, Ghent, Belgium, <sup>12</sup>GENUD (Growth, Exercise, Nutrition and Development) Research Group, Instituto Agroalimentario de Aragón (IA2), Instituto de Investigación Sanitaria Aragón (IIS Aragón), Centro de Investigación Biomédica en Red Fisiopatología de la Obesidad y Nutrición (CIBEROhn), University of Zaragoza, Zaragoza, Spain

**O.3.21 - From genes to physical and psychosocial health outcomes, UKK - Hall B (Level 3), June 17, 2023, 2:00 PM - 3:30 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** Low psychosocial well-being (PWB) and high emotion-driven impulsiveness (EDI) have been found to be associated with unhealthy eating in adolescents. Yet, it is not clear whether an intervention on one or the other might be more effective in reducing unhealthy food choices. We, therefore, aimed to investigate and compare the (separate) causal effects of PWB and EDI on the propensity to consume foods high in sugar and fats among European adolescents.

**Methods:** In total, 2,065 adolescents (mean age: 13.4; 52% female) participating in the IDEFICS/I.Family cohort were included, providing data from examinations in 2009/10, 2013/14, and 2021/22. Food choices were operationalized using sweet (score range: 0 to 68.4) and fat (score range: 0 to 72.6) propensity calculated from self-reported food frequency data. Self-reported EDI was assessed using the negative urgency subscale from the Urgency, Premeditation, Perseverance, Sensation Seeking, and Positive Urgency (UPPS-P) Impulsive Behaviour Scale. PWB was assessed using the KINDLR Health-Related Quality of Life Questionnaire. We estimated, separately, the average causal effects of PWB and EDI on sweet and fat propensity applying a semi-parametric doubly robust method (targeted maximum likelihood estimation).

**Results:** We estimated that high levels of PWB, compared to low levels, decreased average sweet propensity (mean difference (MD) = -1.43 [-2.61 to -0.25]). A smaller effect was estimated for fat propensity. We further estimated that low levels of EDI, compared to high levels, decreased average sweet propensity (MD = -2.07 [-3.26 to -0.87]) and fat propensity (MD = -1.85 [-2.88 to -0.81]). The effects on sweet propensity were stronger for girls and adolescents with overweight or obesity compared to boys and thin or normal weight adolescents, respectively.

**Conclusions:** These findings advance our understanding of how psychological factors affect unhealthy food choices. Comparing both psychological factors, an intervention targeting EDI would be marginally more effective in reducing sweet and fat propensity.



# AccNet24: An open-source deep learning framework for classifying 24-hour activity behaviours from wrist-worn accelerometer data under free-living environments

**Dr. Vahid Farrahi<sup>1,2</sup>**, Mr. Muhammad Usman<sup>2</sup>, Mr. Mehrdad Rostami<sup>2</sup>, Dr. Mourad Oussalah<sup>1,2</sup>

<sup>1</sup>Research Unit of Health Sciences and Technology, University of Oulu, Oulu, Finland, <sup>2</sup>Center for Machine Vision and Signal Analysis, University of Oulu, Oulu, Finland

**O.3.22 - Improving physical activity measurements in adults, UKK - Hall C (Level 3), June 17, 2023, 2:00 PM - 3:30 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** Despite a promising paradigm shift from threshold-based approaches to using machine learning methodologies for measuring activity behaviours, there is no robust data processing methods for classifying 24-hour activity behaviour categories from accelerometry data. The present study developed and validated a deep learning-based framework for classifying 24-hour activity behaviours from wrist-worn accelerometry.

**Methods:** Using an openly available dataset with free-living wrist-based raw accelerometry data from 151 participants (aged 18–91 years), we developed and validated a deep learning framework named AccNet24 to classify 24-hour activity behaviours. The AccNet24 framework was designed to operate with two-dimensional (2D) images rather than one-dimensional raw acceleration data. Based on the recent success in medical image analysis, this aimed to transform the signal processing problem into a machine vision problem, enabling the use of advanced deep learning techniques originally proposed for image data. First, the acceleration signal (x, y, and z-axes) was segmented into 30-second nonoverlapping windows, and signal-to-image conversion was performed for each segment. Deep features were automatically extracted from the signal images using transfer learning and transformed into an uncorrelated, lower-dimensional feature space. These transformed features were then employed to classify the activity behaviours as sleep, sedentary behaviour, and light-intensity and moderate-to-vigorous physical activity using a bidirectional long short-term memory (BiLSTM) recurrent neural network. AccNet24 was trained and validated with data from 101 and 25 randomly selected participants and tested with the remaining unseen 25 participants. We also extracted 112 hand-crafted time and frequency domain features from 30-second windows and used them as inputs to five commonly used conventional machine learning classifiers, including random forest, support vector machines, artificial neural networks, decision tree, and naïve Bayes to classify the 24-hour activity behaviour categories.

**Results:** Using the same training, validation, and test data and window size, the classification accuracy of AccNet24 outperformed the accuracy of the other five machine learning classification algorithms by 16%–30% on unseen data.

**Conclusion:** Following the conceptual shift towards 24-hour accelerometry, AccNet24 appears to be a step towards more precise assessment of 24-hour activity behaviour categories. The next-generation accelerometry analytics may rely on deep learning techniques for activity prediction.

# Time-varying effects and mediation of physical activity on smoking cessation

**Dr. Donna Coffman**<sup>1</sup>, Mr. Nicholas Huffnagle<sup>2</sup>, Dr. Megan Piper<sup>3</sup>

<sup>1</sup>University Of South Carolina, Columbia, USA, <sup>2</sup>Children's Hospital of Pennsylvania, Philadelphia, USA,

<sup>3</sup>University of Wisconsin, Madison, USA

**O.3.22 - Improving physical activity measurements in adults, UKK - Hall C (Level 3), June 17, 2023, 2:00 PM - 3:30 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical

**Purpose:** The purpose of this study was to investigate the effect physical activity has on an attempt to quit smoking, and whether this effect varies over time and/or is mediated by cravings to smoke. Previous research has demonstrated that cravings to smoke are associated with higher odds of relapse, and that the strength of this effect increases throughout a quit attempt. A bout of physical activity has also been shown to reduce cravings to smoke. We hypothesized that physical activity would have a time-varying effect on smoking mediated by cravings to smoke.

**Methods:** The Wisconsin Smokers Health study was a randomized, placebo-controlled trial of five smoking cessation therapies. Each day, participants measured their steps with a pedometer and completed Ecological Momentary Assessments of their cravings to smoke. Using time-varying effect models, we analyzed data from 7-days prior to the target quit day through 7-days following quit day. Participants were grouped by their daily step count and considered “less active” if they averaged less than 10,000 steps per day.

**Results:** We found evidence among less physically active smokers that 1,000 additional steps per day on the first 1-3 days of a quit period is associated with a lower odds of smoking relapse on those days. We were also able to replicate previous findings that the effect of cravings to smoke on smoking odds increases during the first week post-quit day as time from quit day increases. Although steps per day was associated with lower relapse, and less active smokers had higher cravings and higher relapse rates, we did not find evidence for mediation.

**Conclusion:** These findings could be used to tailor smoking cessation interventions to people at high risk of relapse and failure to successfully quit. A bout of 1,000 steps is roughly a 15-minute walk. Encouraging this kind of behavior when cravings are high could lead to successful quitting for less active smokers. Future cessation research with a focus on framing physical activity as a protective tool against smoking relapse could be valuable for creating more efficient interventions.

# A method for using GPS, accelerometer and heart rate data to estimate the physical activity intensity associated with e-cycling and other modes of transport

**Dr. Jessica Bourne<sup>1</sup>**, Mr. Alex Colyer<sup>2</sup>

<sup>1</sup>University of Bristol, Bristol, United Kingdom, <sup>2</sup>Imperial College London, London, United Kingdom

**O.3.22 - Improving physical activity measurements in adults, UKK - Hall C (Level 3), June 17, 2023, 2:00 PM - 3:30 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical

**Purpose:** Active travel (AT) has the potential to increase physical activity (PA) at a population level. Policymakers need accurate data to determine the potential of AT initiatives to promote PA and compare this to other transport modes. E-bikes have the potential to increase transport related PA and may substitute for motorized vehicles. The activity associated with e-cycling in a real-world setting is unclear. Traditional devices that measure acceleration do not accurately capture cycling. This study provides a method for identifying different modes of transport and determines the PA associated with these modes.

**Methods:** As part of a pilot RCT participants wore a GPS receiver (Qstarz) and combined accelerometer and heart rate monitor (Actiheart) for seven days and completed a travel diary. Using QGIS, trip origin, destination, start- and end-time were manually identified from GPS data. Trips were matched with travel diary data using spatial and temporal trip features. Trip duration, distance and average speed were calculated from GPS data using Python. Trip mode was identified using travel diaries. Group calibrated branched equation models were used to calculate PA energy expenditure (EE) and presented as metabolic equivalents (METs). The intensity of activity attributable to different transport modes was determined by matching GPS and travel diary derived temporal trip data with Actiheart data using the Python Pandas package.

**Results:** A total of 577 trips from 19 participants were used in this analysis. Of these, 366 were made by private motorized vehicle (PMV), 27 by bus, 156 by walking, 24 by e-bike and four by bicycle. E-cycling trips were on average 9.9(SD=6.9)km in length with an average duration of 38.5(20.2)minutes. By comparison the average trip distance made by PMV was 8.2(18.0)km, walking was 0.8(1.2)km and bus was 7.2(8.4)km. E-cycling was conducted at a higher intensity than walking (4.5[SD=1.6] vs 3.1[0.8]METs respectively) and conventional cycling (3.6[0.9]METs). Driving a PMV and taking the bus were sedentary activities.

**Conclusion:** This study classified the intensity of activity associated with e-cycling in a real-world setting using GPS, acceleration, and heart rate data. This method can be applied to future intervention studies.

# Detrended fluctuation analysis using accelerometry data and cognitive and physical function in the 1970 British Cohort Study

**Dr. Jo Blodgett<sup>1</sup>**, Dr. Matthew Ahmadi<sup>2</sup>, Prof. Emmanuel Stamatakis, Prof. Mark Hamer<sup>1</sup>

<sup>1</sup>Institute of Sport Exercise & Health, Division of Surgery & Interventional Science, University College London, London, United Kingdom, <sup>2</sup>Charles Perkins Centre and Prevention Research Collaboration, Sydney School of Public Health, The University of Sydney, Sydney, Australia

**O.3.22 - Improving physical activity measurements in adults, UKK - Hall C (Level 3), June 17, 2023, 2:00 PM - 3:30 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical

**Purpose:** Detrended fluctuation analysis (DFA) is a novel technique that captures similarities in fluctuation patterns across fixed temporal periods (e.g. hours, days, wear periods). High stability across time suggests healthy fractal activity complexity, whereas greater randomness in fluctuation patterns may indicate underlying disease processes and is associated with mortality, frailty, disability and Alzheimer's disease. The importance of fractal stability in mid-life remains unexplored. We quantified fractal regulation patterns in 24-hour accelerometer data and examined associations with cognitive and physical function in midlife.

**Methods:** Up to 5,239 individuals from the 1970 British Cohort Study were included in analysis. At age 46, individuals wore thigh-mounted accelerometers for seven consecutive days and completed tests of cognitive (verbal fluency, memory, processing speed; composite z-score derived) and physical (grip strength, one-legged balance with eyes closed) function. Temporal correlations of acceleration magnitude across 25 time scales (range: 1min to 10hrs) were used to obtain DFA values. Linear regressions examined associations between standardised DFA coefficients and each outcome. Covariates included sex, education, self-reported health, disability, BMI, smoking, alcohol consumption, and daily activity.

**Results:** DFA was normally distributed (mean $\pm$ SD: 0.90 $\pm$ 0.06; range: 0.72-1.25). Males, those with higher education, better self-reported health, lower BMI and never-smokers had higher DFA, indicating greater stability. In sex-adjusted models, 1SD increase in DFA was associated with 0.10 (0.03,0.17) increase in composite cognitive z-score; associations were strongest for verbal fluency (0.33 (0.16,0.50) increase in animals named). Associations were attenuated in fully-adjusted models (0.03 (-0.05,0.09) and 0.15 (-0.02,0.32), respectively). There was no association between DFA and grip strength in females. In males, 1SD increase in DFA was associated with -0.55kg/m<sup>2</sup> (95%CI: -0.90,-0.21) lower grip strength in fully adjusted models. Higher DFA was non-linearly associated with worse balance in males and better balance in females.

**Conclusions:** Greater fractal stability was associated with better cognitive function. This could indicate potential mechanisms through which fractal physiology complexity may scale up to and contribute to cognitive clinical endpoints. Conversely, greater fractal stability was associated with poorer physical function in males; further exploration of sex differences in fractal physiology may improve understanding of underlying mechanisms of the sex-ageing paradox.

# Within- and between-person associations of psychological factors that influence healthy or unhealthy dietary intake in Ecological Momentary Assessment studies: A systematic review and meta-analysis

**Prof. Ann DeSmet<sup>1</sup>**, Mr. Bernard Asare<sup>2</sup>, Dr. Dominika Kwasnicka<sup>3</sup>, Prof. Daniel Powell<sup>4</sup>, Prof. Felix Naughton<sup>5</sup>, Dr. Verena Schneider<sup>6</sup>, Dr. Jan Keller<sup>7</sup>, Assistant Professor Gill ten Hoor<sup>8</sup>, Associate Professor Peter Verboon<sup>9</sup>, Dr. Olga Perski<sup>10</sup>, Dr. Dimitra Kale<sup>6</sup>, Dr. Pierre G rain<sup>1</sup>

<sup>1</sup>Universit  libre de Bruxelles, Brussels, Belgium, <sup>2</sup>Curtin University, Perth, Australia, <sup>3</sup>University of Melbourne, Melbourne, Australia, <sup>4</sup>University of Aberdeen, Aberdeen, United Kingdom, <sup>5</sup>University of East Anglia, Norwich, United Kingdom, <sup>6</sup>University College London, London, United Kingdom, <sup>7</sup>Freie Universit t Berlin, Berlin, Germany, <sup>8</sup>Maastricht University, Maastricht, Netherlands, <sup>9</sup>Open University of the Netherlands, Heerlen, Netherlands, <sup>10</sup>University of California, San Diego, San Diego, USA

**O.3.22 - Improving physical activity measurements in adults, UKK - Hall C (Level 3), June 17, 2023, 2:00 PM - 3:30 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical

**Purpose:** Dietary behaviors and their correlates can fluctuate from moment-to-moment. Ecological Momentary Assessment (EMA) appears well-suited to study these fluctuations. This research aims to present a comprehensive review and meta-analysis of EMA studies that examine associations of psychological constructs (including cognitions, emotions and the processes operating on these) and (un)healthy dietary intake at the within- and/or between-person level

**Methods:** This systematic review focused on studies targeting healthy adults who report any healthy (e.g., fruit and vegetable intake, healthy snacking, homemade food) or unhealthy (e.g., unhealthy snacking, sugar-sweetened beverages, fast food) dietary intake. To be included in the review, studies needed to include multiple (i.e., two or more) within-day, daily or weekly assessments of at least one psychological predictor and diet and to have reported either (or both) within- or between-person predictor-behavior associations. We searched Ovid MEDLINE, Embase, PsycINFO, and Web of Science. Electronic and hand searches were conducted in January 2020 and updated in 2021. The search was restricted to human studies in English, published in peer-reviewed journals. Multilevel, random-effects meta-analyses of within- and between-person associations are conducted in RStudio with the metafor and robumeta packages.

**Results:** The search yielded 119 studies on diet, of which 48 were included in the review (combined n=6820; mean age=31.4y; 74.6% female) and 34 in the meta-analysis (combined n=5664). Most studies examined unhealthy snacking (n=29) and/or fruit and vegetable consumption (n=16) as outcomes, and negative affect (n=20), positive affect (n=16) and/or daily hassles and stress (n=12) as psychological correlates. EMA was most often performed with mobile devices (n=26), online/website (n=7) or combining sources (n=7). Average study duration was 18.0 days ( $\pm 36.6$ ). Most studies prompted several times per day (n=29), four used burst designs. Meta-analyses on associations between correlates and (un)healthy diet are currently ongoing and will be finalized in March 2023.

**Conclusion:** EMA research on diet is heavily focused on snacking and affect and could be expanded to other domains. Meta-analytic findings will highlight how psychological correlates and (un)healthy diet are associated at within-and between levels, providing input for, e.g., just-in-time adaptive dietary interventions.



# Four-year follow-up of metabolic risk factors in children treated for obesity in the preschool age: Pooled secondary outcomes from a Randomized Controlled trial

Ms. Stella Wennborg<sup>1</sup>, Dr. Anna Ek<sup>1</sup>, Dr. Karin Eli<sup>2,3</sup>, Prof. Paulina Nowicka<sup>1,4</sup>, **Dr. Markus Brissman<sup>1,5</sup>**

<sup>1</sup>Karolinska Institutet, Department of Clinical Science, Intervention and Technology (CLINTEC), Division of Pediatrics, Stockholm, Sweden, <sup>2</sup>Unit for Biocultural Variation and Obesity, School of Anthropology and Museum Ethnography, University of Oxford, Oxford, United Kingdom, <sup>3</sup>Warwick Medical School, University of Warwick, Coventry, United Kingdom, <sup>4</sup>Department of Food Studies, Nutrition and Dietetics, Uppsala University, Uppsala, Sweden, <sup>5</sup>Allied Health Professionals Function, Occupational Therapy & Physiotherapy, Karolinska University Hospital, Stockholm, Sweden

**O.3.23 - Latest findings on metabolic health outcomes, UKK - Hall D (Level 2 - main floor), June 17, 2023, 2:00 PM - 3:30 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** To assess long-term metabolic health in preschool children with obesity and the association to change in child weight status.

**Methods:** A total of 177 families with 4- to 6-year-old children with obesity were recruited to the randomized controlled More and Less Study (ML). ML aimed to compare the effect of a parent support program on child weight status to standard treatment. In addition, metabolic risk factors, fasting insulin, HbA1c, HDL, LDL, triglycerides, were collected. The association between metabolic risk factors and weight status (body mass index standard deviation score, BMI-SDS) were assessed outside of randomization at baseline and at follow-up after 12 and 48 months by linear mixed models.

**Results:** A total of 92 children had blood samples collected, age 5.3, 61% female, 2.9 BMI-SDS. Overall, there was a positive association between BMI-SDS over time (per unit) and HbA1c 1.5 (95%CI 1.48 – 3.96,  $p<0.001$ ), fasting insulin 2.72 (1.48 – 3.96,  $p<0.001$ ) and HDL -0.16 (-0.23 to -0.09,  $p<0.001$ ). Importantly, a reduction of BMI-SDS by  $\geq 0.25$  was associated with improvement of HbA1c -1.37 (95%CI -0.28 to -2.46,  $p=0.015$ ) and triglycerides -0.19 (-0.36 to -0.03,  $p=0.02$ ) at 12-month follow-up. At 48-month follow-up, reduced BMI-SDS by  $\geq 0.5$  was associated with improved levels of total cholesterol -0.3 (95%CI -0.57 to -0.03,  $p=0.03$ ).

**Conclusions:** Metabolic risk factors can be seen already in preschool children with obesity. However, early initiated treatment interventions resulting in a clinically relevant reduction of weight status can lead to long-term improvement on metabolic risk factors and thus lower the negative effects on future health.

The protocol for the study is registered with the clinical trials registry [clinicaltrials.gov](https://clinicaltrials.gov) (ID: NCT01792531)

# Impact of an unhealthy lifestyle on risk of incident hospitalisation for cardiovascular disease in people with diabetes

**Dr. Alice Gibson**<sup>1,2</sup>, Miss Emma Sainsbury<sup>1</sup>, Prof. Emmanuel Stamatakis<sup>2</sup>, Dr. Joanne Gale<sup>1</sup>, Prof. Stephen Colagiuri<sup>2</sup>, Prof. Peter Cistulli<sup>2</sup>, Prof. Clara Chow<sup>4</sup>, Prof. Natasha Nassar<sup>1,3</sup>

<sup>1</sup>Menzies Centre for Health Policy and Economics, Sydney, Australia, <sup>2</sup>Charles Perkins Centre, Sydney, Australia, <sup>3</sup>Childrens Hospital at Westmead, Sydney, Australia, <sup>4</sup>Westmead Applied Research Centre, Sydney, Australia

**O.3.23 - Latest findings on metabolic health outcomes, UKK - Hall D (Level 2 - main floor), June 17, 2023, 2:00 PM - 3:30 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** Lifestyle is the cornerstone of diabetes management. However, few large-scale studies have investigated the relationship between a healthy lifestyle and the risk of non-fatal cardiovascular disease (CVD) outcomes in people with diabetes. The aim of this study was to investigate the association between lifestyle risk factors, individually and in combination, and incident hospitalisation for CVD in people with diabetes.

**Methods:** This prospective cohort study linked data from the 45 and Up Study, Australia, to administrative health records. The study participants were 25,713 men and women, aged  $\geq 45$  years, with diabetes at baseline. Lifestyle behaviours were assessed by a self-report questionnaire, and a healthy lifestyle score was used to categorise participants into three risk groups based on five equally contributing risk factors: physical activity, sedentary behaviour, sleep duration, diet quality and smoking status. Incident CVD complications were ascertained using linked hospitalisation data up until 2019. Cox proportional hazards models were used to investigate the association between lifestyle and incident hospitalisation for CVD.

**Results:** Sixteen percent of the participants were in the low-risk, 62% were in the medium-risk, and 22% in the high-risk (least healthy) lifestyle group. During 177,851 person-years of follow-up, there were 6,519 incident hospitalisations for CVD. Compared with the low-risk lifestyle group, risk of incident CVD complications was 50% higher among participants in the high-risk lifestyle group (aHR 1.50; 95% CI 1.38, 1.64), and 17% higher among the medium-risk group (aHR 1.17; 1.09, 1.26). Current smoking was the lifestyle variable most strongly associated with the risk of incident CVD complications (aHR 1.58; 95% CI 1.43, 1.75), followed by sleep ( $<5$  or  $>11$  hours per day, aHR 1.24; 95% CI 1.11, 1.39), physical activity ( $< 150$  mins/week, aHR 1.21; 95% CI 1.14, 1.28), and sitting ( $> 9$  hours per day, aHR 1.21; 95% CI 1.12, 1.31). There was no consistent association between diet quality and risk of incident CVD complications.

**Conclusions** A large proportion of adults with diabetes are not adhering to healthy lifestyle recommendations, and this was associated with an increased risk of hospitalisation for CVD. Our findings highlight the importance of lifestyle behaviour change for reducing the burden of CVD in adults with diabetes.

# Dietary quality, physical activity and cardiovascular disease: A causal inference inquiry

**Associate Professor Ding (Melody) Ding<sup>1</sup>**, Mr. Joseph van Buskirk<sup>1</sup>, Dr. Philip Clare<sup>1</sup>, Prof. Adrian Bauman<sup>1</sup>, Dr. Binh Nguyen<sup>1</sup>

<sup>1</sup>The University of Sydney, Sydney, Australia

**O.3.23 - Latest findings on metabolic health outcomes, UKK - Hall D (Level 2 - main floor), June 17, 2023, 2:00 PM - 3:30 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** A high-quality diet and sufficient physical activity (PA) are both cornerstones of a healthy lifestyle. While evidence supports the importance of both behaviours in the prevention of chronic diseases, such as cardiovascular disease (CVD), studies on their joint effects are scarce. Furthermore, observational studies are inherent to confounding bias. Despite the advancement of causal inference methods, they are rarely applied to PA and nutritional epidemiology research. Therefore, we aim to examine independent and joint associations of diet and PA with CVD using causal inference modelling.

**Methods:** We used data from Australia's 45 and Up study, a large population-based cohort study of adults aged 45+ years. Participants filled out baseline (2006-09) and follow-up (2012-15) questionnaires, which were linked to hospital and mortality records (until Dec 2019). PA was measured using the validated Active Australia Questionnaire and was further categorised into quartiles. Diet was measured using a modified validated dietary quality index comprising items regarding the consumption of fruit, vegetable, fish, processed meats and red meats and was further categorised into low, medium, and high. Primary outcomes were CVD hospitalisation and mortality (defined using ICD-10 codes I00-99) and the secondary outcome was all-cause mortality. An inverse probability weighting approach was adopted. Individual exposure trajectories are weighted to approximate random assignment to exposure groups, adjusting for time-dependent confounding, and confounding due to other covariates, selected based on a directed acyclic graph.

**Results:** During a median follow-up of 12 years (n=204,542), 32,947 participants had a CVD hospitalisation, 3,226 died from CVD, and 17,380 died from any causes. Both diet and PA had non-significant associations with CVD admission and strong and significant associations with CVD mortality (HR: 0.57-0.75 for PA and 0.63-0.71 for diet). PA has a significant association with all-cause mortality (HR: 0.56-0.78) and diet did not (HR: 0.90-0.97). There was no multiplicative or additive interaction between diet and PA, and the group with the highest quality diet and PA levels consistently had the lowest risk for all outcomes.

**Conclusions:** Middle-aged and older adults should adhere to both quality diet and PA recommendations to minimise the risk of CVD and all-cause mortality.

# Physical activity and sedentary behaviour compositions within 24-h cycle in women with PCOS – associations with cardiometabolic health.

**Ms. Emilia Pesonen<sup>1,5</sup>**, Dr. Vahid Farrahi<sup>2,5</sup>, Dr. Meri-Maija Ollila<sup>1,5</sup>, Prof. Raija Korpelainen<sup>3,4,5</sup>, Prof. Terhi Pilttonen<sup>1,5</sup>, Dr. Maisa Niemelä<sup>2,4,5</sup>

<sup>1</sup>Department of Obstetrics and Gynecology, Research Unit of Clinical Medicine, University of Oulu and Oulu University Hospital, Oulu, Finland, <sup>2</sup>Research Unit of Health Sciences and Technology, University of Oulu, Oulu, Finland, <sup>3</sup>Research Unit of Population Health, University of Oulu, Oulu, Finland, <sup>4</sup>Department of Sports and Exercise Medicine, Oulu Deaconess Institute Foundation sr., Oulu, Finland, <sup>5</sup>Medical Research Center, Oulu University Hospital and University of Oulu, Oulu, Finland

**O.3.23 - Latest findings on metabolic health outcomes, UKK - Hall D (Level 2 - main floor), June 17, 2023, 2:00 PM - 3:30 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** Polycystic ovary syndrome (PCOS) is the most common endocrine disorder in reproductive-aged women (prevalence 13–16%). Up to 70% of women with PCOS have pre-obesity/obesity and there is 2–3-fold risk for metabolic comorbidities compared to non-PCOS women. Lifestyle modification, including increasing physical activity (PA), is recommended as first-line treatment for PCOS. However, it is not known if affected women need more tailored physical activity guidelines compared to other women. Given this, our aim was to determine for the first time, the association of 24-hour composition of sleep, sedentary behaviour (SB), light PA (LPA), and moderate-to-vigorous PA (MVPA) with cardiometabolic health in women with PCOS.

**Methods:** The study is part of the 46-year follow-up of the Northern Finland Birth Cohort 1966. In addition to questionnaires about health and socioeconomic status, the follow-up included clinical examinations: tissue composition (bioimpedance measurement), waist circumference, fasting blood sample, and 120-min oral glucose tolerance test (OGTT). Participants wore a Hookie-accelerometer for 14 days, from which time spent in SB, LPA, and MVPA were determined. Sleep time was self-reported. 24-hour activity composition was composed and transformed to isometric log coordinates (ilr). The PCOS population (n=192) consisted of women with two of the following criteria: irregular menstrual cycle, clinical or biochemical hyperandrogenism, anti-müllerian hormone level  $\geq 3.2$  ng/ml (surrogate for polycystic ovarian morphology). Association between daily activity composition and cardiometabolic health was analysed with multivariate linear regression using ilr-coordinates and confounders (sociodemographic factors, smoking, alcohol consumption, and waist circumference). Unstandardized betas with 95% confidence intervals (CI) and *p*-values are reported.

**Results:** In women with PCOS, more time in MVPA relative to other behaviours was associated with lower visceral fat area ( $\beta = -0.11$ , 95%CI -0.19 to -0.03,  $p=0.006$ ) and lower insulin at 0min ( $\beta = -0.15$ , 95%CI -0.30 to -0.004,  $p=0.045$ ) and at 60min ( $\beta = -0.26$ , 95%CI -0.45 to -0.07,  $p=0.009$ ) in OGTT. More time in LPA relative to other behaviours was associated with lower fasting glucose ( $\beta = -0.09$ , 95%CI -0.181 to -0.005,  $p=0.038$ ).

**Conclusion:** More MVPA and LPA was associated with better cardiometabolic health in women with PCOS after accounting for the 24-hour activity composition and confounders including waist circumference.

# Mediation analysis to identify mechanisms responsible for weight loss in the Strong Hearts, Healthy Communities 2.0 community-randomized trial

**Dr. Chad Rethorst<sup>1</sup>**, Ms. Margaret Demment<sup>1</sup>, Dr. Alexandra MacMillan Uribe<sup>1</sup>, Dr. Jacob Szeszulski<sup>1</sup>, Dr. Phrashiah Githinji<sup>1</sup>, Dr. Miriam Nelson<sup>3</sup>, Dr. David Strogatz<sup>4</sup>, Dr. Sara Folta<sup>5</sup>, Dr. Regan Bailey<sup>2</sup>, Dr. Rebecca Seguin-Fowler<sup>2</sup>

<sup>1</sup>Texas A&M Agrilife Research - Institute for Advancing Health Through Agriculture, Dallas, TX, USA, <sup>2</sup>Texas A&M Agrilife Research - Institute for Advancing Health Through Agriculture, College Station, TX, USA,

<sup>3</sup>Hampshire College, Amherst, MA, USA, <sup>4</sup>Tufts University - Friedman School of Nutrition, Boston, MA, USA,

<sup>5</sup>Bassett Research Institute, Cooperstown, NY, USA

**O.3.23 - Latest findings on metabolic health outcomes, UKK - Hall D (Level 2 - main floor), June 17, 2023, 2:00 PM - 3:30 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** Behavioral intervention development is an iterative process that ideally involves using data at each stage to inform intervention refinements for subsequent evaluation, with implementation and dissemination as the end-goal. One approach to behavioral interventions optimization is to evaluate the mechanisms by which an intervention improves health outcomes. As previously reported, the Strong Heart, Healthy Communities-2.0 (SHHC-2.0) intervention resulted in significant weight loss compared to control. This study used mediation analysis to identify mechanisms by which the SHHC-2.0 intervention reduced body weight.

**Methods:** SHHC-2.0 was a community-randomized trial conducted in 11 rural, medically underserved communities with women, age  $\geq 40$  years, who had obesity (BMI  $>30$ ) or were physically inactive and overweight (BMI  $>25$ ). Five communities were randomized to intervention (87 women) and six communities to control (95 women). Psychosocial (attitudes, self-efficacy, social support) and behavioral (diet and physical activity) measures were evaluated as potential mediators. Sobel test was used to derive the indirect effect and standard error of the intervention through mediators. Separate regression models were used to determine 1) the intervention effects on the mediator and, 2) intervention and mediator effects on weight. Models were adjusted for community site (random effect), age, and education.

**Results:** SHHC-2.0 had significant direct effects on Rapid Eating Assessment for Participants-Short (REAP-S), Healthy Eating Attitudes (HEA), uncontrolled eating score, cognitive restraint score, emotional eating score, self-reported and objectively-measured physical activity, family participation in exercise, and attitude toward exercise. For weight loss, REAP-S [ $z = 1.097(0.636)$ ,  $p = 0.042$ ], HEA [ $z = 1.095(0.588)$ ,  $p = 0.03$ ], and cognitive restraint [ $z = -1.099(0.640)$ ,  $p = 0.043$ ] were identified as significant mediators.

**Conclusions:** Changes in dietary behaviors, attitudes, and cognitive restraint are mechanisms by which SHHC-2.0 reduced weight. Physical activity was not a significant mediator, which is consistent with previous findings on the role of physical activity in weight loss. Self-efficacy and social support, though conceptualized as intervention mechanisms, were not identified as significant mediators. Intervention refinements that target these conceptualized mechanisms hold potential to bolster effectiveness.



# Seaweed supplementation for metabolic and cardiovascular health: a double-blind RCT in women with metabolic syndrome

**Dr. Catherine Elliot<sup>1</sup>**, Dr. Michael Hamlin<sup>1</sup>, Dr. Marie Magnusson<sup>2</sup>, Dr. Christopher Glasson<sup>2</sup>, Dr. Greg Jacobson<sup>2</sup>, Dr. Christopher Battershill<sup>2</sup>

<sup>1</sup>Lincoln University, Christchurch, New Zealand, <sup>2</sup>University of Waikato, Hamilton, New Zealand

**O.3.23 - Latest findings on metabolic health outcomes, UKK - Hall D (Level 2 - main floor), June 17, 2023, 2:00 PM - 3:30 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** The purpose of this 8-week double blind RCT was to investigate the effects of a seaweed capsule (2g/day) on chronic metabolic and cardiovascular profiles compared to a control (placebo) capsule. The seaweed was a New Zealand-grown green macroalgae (*Ulva* sp. B) which has only been investigated in rat trials.

**Methods:** Criteria for participation was female adults over 18 y.o. with  $\geq 2$  indicators of metabolic syndrome (MS), including waist circumference greater  $>88$  cm; fasting triglycerides  $\geq 150$  mg/dL, high density lipoprotein cholesterol  $<50$  mg/dL; systolic blood pressure  $\geq 130$  mmHg and/or diastolic  $\geq 85$ ; and fasting glucose  $>110$  mg/dL. Forty-four participants (55 y.o.  $\pm 11$ , BMI  $35.3 \pm 9.2$ , number of MS indicators  $3.5 \pm 1.0$ ) self-selected through online advertisements (23 in experimental group). Body composition, waist/hip ratio, brachial blood pressure, pulse wave velocity (applanation tonometry), central augmentation and pulse pressure (both at aorta), blood glucose, Haemoglobin A1c, and blood lipids were collected in a laboratory pre and post supplementation. In SPSS, a repeated measures ANOVA, with Bonferroni correction, was conducted to assess pre-post differences for groups.

**Results:** A seaweed dosage variable (by body mass,  $n=19$ ) was investigated through regression on the above health predictor variables after controlling for diet and exercise. Tests of between-subjects effects showed no significant group X time effect of the seaweed supplement, although there were beneficial trends. Seaweed dosage was predicted best by waist:hip ratio, HbA1c, systolic BP, LDL ( $p=.001$ ,  $R^2 = .825$ ).

**Conclusions:** A 2g seaweed dosage per day did not illicit significant differences. Future studies should address the limitation of this study, such as increasing the seaweed dosage overall, increasing the dosage with increased body mass, increasing the duration of dosage and increasing the sample size. Significant differences did not appear in this dataset as was found with improved body composition and lipids in a rat trial. With correct dosage, green seaweed may significantly lower the risk factors for chronic health condition and benefit those with metabolic syndrome.

# The Dutch Obesogenic Built environment CharacterisTics (OBCT) Index: Validation and Improvement

**Msc. Thao Minh Lam**<sup>1,2,3</sup>, Ms. Haykanush Ohanyan<sup>1,2,3,4</sup>, Dr. Nicolette R den Braver<sup>1,2,3</sup>, Associate Professor Ilonca Vaartjes<sup>5</sup>, Prof. Derek Karssenbergh<sup>6</sup>, Mr. Alfred J Wagtendonk<sup>3,4</sup>, Prof. Joline WJ Beulens<sup>1,2,5</sup>, Dr. Jeroen Lakerveld<sup>1,2,3,4</sup>

<sup>1</sup>Amsterdam University Medical Centers location Vrije Universiteit, Epidemiology and Data Science, Amsterdam, Netherlands, <sup>2</sup>Amsterdam Public Health, Health Behaviours and Chronic Diseases, Amsterdam, Netherlands, <sup>3</sup>Upstream Team, Amsterdam UMC, VU University Amsterdam, Amsterdam, Netherlands, <sup>4</sup>Institute for Risk Assessment Sciences, Utrecht University, Utrecht, Netherlands, <sup>5</sup>Julius Center for Health Sciences and Primary Care, University Medical Center Utrecht, Utrecht University, Utrecht, Netherlands, <sup>6</sup>Department of Physical Geography, Faculty of Geosciences, Utrecht University, Utrecht, Netherlands

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**SIG - Primary Choice:** H. Policies and environments

**Purpose:** A composite indicator is a potentially useful tool to characterize the multifactorial obesogenic environment. However, such indices are subjective to choices made during the development process, especially in weighting components. This study aimed to (1) describe the novel Obesogenic Built environment CharacterisTics (OBCT) index, (2) validate this index using a large population health monitor, (3) improve this index with variable selection and rescaling approaches.

**Methods:** The OBCT index was constructed for 12,821 Dutch administrative neighborhoods and consists of 17 components from both food (densities of five food outlet types) and physical activity (PA) environments (walkability, drivability, bikeability and sports facilities). We linked the index to residential addresses of 253,604 adult participants of the 2016 Dutch Health Monitor, a nationwide cross-sectional survey; split the data randomly into a training (two-thirds; n=169,064) and a testing subset (one-third; n=84,540). In the training set, we used non-parametric cubic regression spline to assess index association with body mass index (BMI), adjusted for individual demographic characteristics. Effect modification by age, sex and urbanicity was examined. As improvement, we adopted two reweighting strategies: (1) variable selection using BMI as outcome (2) rescaling the food environment components by neighborhood address density.

**Results:** The original OBCT index ranges from 0 (leptogenic) to 100 (obesogenic) and was only moderately correlated to the food (Spearman's  $\rho=0.55$ ) and the PA environmental scores ( $\rho=0.39$ ). In the training set, mean BMI was 25.4 (SD=5.10) kg/m<sup>2</sup> with oversampling of adults >65 years old (50.9%), mean OBCT index was 40.3 (SD=11.2). The index had a significant non-linear association with BMI in a fully-adjusted model ( $p<0.05$ ) though explained variance was low ( $R^2=0.0662$ ). Effect modification by age, sex and urbanicity was significant. Variable selection only increased model fit slightly ( $R^2=0.0686$ ). Rescaling improved the index correlation with the PA environment considerably ( $\rho=0.80$ ) and food environment slightly ( $\rho=0.59$ ); however, index association with BMI remained limited ( $R^2=0.0658$ ).

**Conclusion:** The association between the original OBCT index and BMI is non-linear. Variable selection and rescaling only slightly improved the index's explanatory power. Reweighting using random forest might further improve model fit, the results of will be presented at the conference.

# Effects of a school-based randomized control trial on the mode and intensity of commuting to/from school among Spanish adolescents; the PACO study

Miss Patricia Gálvez-Fernández<sup>1</sup>, Mr. Pablo Campos-Garzón<sup>1</sup>, Dr. Daniel Molina-Soberanes<sup>1</sup>, Dr. Manuel Herrador-Colmenero<sup>1, 2</sup>, **Dr. Palma Chillón<sup>1</sup>**

<sup>1</sup>PROFITH "PROmoting FITness and Health through physical activity" Research Group, Sport and Health University Research Institute (iMUDS), Department of Physical Education and Sports, Faculty of Sport Sciences, University of Granada, Granada, Spain, <sup>2</sup>La Inmaculada Teacher Training Centre, University of Granada, Granada, Spain

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**Purpose:** The first aim was to analyze the effectiveness of a school-based cycling intervention on the usual and daily mode of commuting to/from school, among Spanish adolescents. The second aim was to examine the effectiveness of the same intervention on commuting sedentary time and commuting physical activity levels, during the trip to/from school.

**Methods:** A total of 161 adolescents (n=76 cycling group) for aim-1 and 131 adolescents (n=64 cycling group) for aim-2, from Almería, Granada, Jaén, and Valencia (Spain) participated in the PACO study, a randomized controlled trial in the school. Adolescents self-reported their usual and daily mode of commuting to/from school (last week) through a questionnaire. Moreover, they wore an accelerometer (seven days) to record their sedentary time and physical activity levels (light and moderate-to-vigorous) during the trip to/from school (i.e., 30 min before and 30 min after school). The cycling intervention included four sessions during one month (120 min/session, except 60 min/first session). The control group was asked to maintain usual lifestyle. Binary logistic regression models were used to analyze the changes in the usual mode of commuting to/from school (active vs. passive) between baseline and follow up separately for both groups. The effects of the school-based cycling intervention on daily mode of commuting, commuting sedentary time and commuting physical activity were conducted according to the per-protocol principle (i.e., attending at least 75% of the sessions) using an analysis of covariance.

**Results:** The school-based cycling intervention had a statistically significant effect on commuting sedentary time (-6.55 min/day, -0.61 standard deviations,  $p < 0.01$ ). No other effects were observed on usual and daily mode of commuting to/from school and commuting physical activity outcomes (all,  $p > 0.05$ ).

**Conclusions:** A 4-week school-based cycling intervention reduced commuting sedentary time in comparison with control group peers in Spanish adolescents, yet we did not observe effects on usual and daily mode of commuting to/from school and commuting physical activity. School-based interventions may be feasibly effective strategies to modify the commuting behavior to/from school and physical activity. Nevertheless, it might be necessary to implement a longer period of cycling intervention and to continue testing further school-based cycling interventions.

# Quantifying area-level physical activity offerings in social context: a novel concept that goes beyond walkability and greenspace

**Prof. Dafna Merom**<sup>1</sup>, Miss Drew Meehan<sup>1</sup>, Prof. Philayrath Phongsavan<sup>2</sup>, Dr. Ori Gudes<sup>3</sup>

<sup>1</sup>Western Sydney University, Penrith, Australia, <sup>2</sup>The University of Sydney, Camperdown, Australia, <sup>3</sup>University of New South Wales, Randwick, Australia

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**Purpose:** Studies have consistently found that greenspace and the built environment can support active living. However, there is no systematic quantification of physical activity (PA) opportunities in social context at the area level, despite the critical role that social support has on sustaining individual's participation in PA. This study aimed to: 1) create a social physical activity index for area (SPAIFA); 2) determine area-level factors that explain SPAIFA variations, and; 3) identify clusters where low level of walkability and/or greenness are compounded by low SPAIFA.

**Methods:** Six local government areas (LGAs) from western and south-western Sydney were selected. Social physical activities were found by web crowdsourcing and ground truthing using search engine's map tools (Bing and Google), councils' websites, social media, sports specific and venues websites. Database included venue address, venue type, PA type, provider (private/public) target age group, schedule and cost. The database was linked to suburb demographic profile, socio-economic index for area, walkability and greenness scores and proportion of past week low-to-no exercise. Spatial analysis techniques were used to identify clusters and outliers using ArcGIS Pro software and QGIS.

**Results:** 176 suburbs were assessed. The mean SPAIFA was 10.4 activities per 10,000 population across all suburbs but with large variations between LGAs; with the highest mean being 18.2 per 10,000 people to the lowest of 6.9 per 10,000 people. Being at the highest quartile of SPAIFA was significantly associated with high socio-economic index for area and low proportion of low/no-exercises, but not with walkability or greenspace scores. Spatial analysis identified three clusters of low SPAIFA within the lowest walkability and/or lowest greenness scores and three clusters of highest SPAIFA complementing within the highest walkability and/or greenness scores.

**Conclusions:** To support populations to be physically active SPAIFA is an additional indicator that can be used by local governments and policy makers for benchmarking and monitoring. More importantly, efforts can be directed to areas where natural and/or urban design are not conducive for PA. Expanding the index to capture other domains relevant for health (eg., art activities, support groups) can become a social prescribing resource for health professionals.

# The effect of food environment interventions on dietary behavior in tertiary education settings: a systematic scoping review and meta-analysis

**Dr. Eden Barrett**<sup>1,2</sup>, Miss Ashleigh Hart<sup>3</sup>, Dr. Saiuj Bhat<sup>4,5</sup>, Dr. Matti Marklund<sup>1,2,6</sup>, Dr. Daisy Coyle<sup>1,2</sup>, Miss Maddie Heenan<sup>1,2</sup>, Prof. Simone Pettigrew<sup>1,2</sup>, Prof. Jason Wu<sup>1,2</sup>

<sup>1</sup>George Institute for Global Health, Sydney, Australia, <sup>2</sup>University of New South Wales, Sydney, Australia,

<sup>3</sup>University of Sydney, Sydney, Australia, <sup>4</sup>Royal Perth Hospital, Perth, Australia, <sup>5</sup>University of Western Australia, Perth, Australia, <sup>6</sup>Johns Hopkins University, Baltimore, USA

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**Purpose:** Tertiary education institutions, where hundreds of millions of people work and study globally, are a key setting for healthy food environment interventions. We aimed to synthesize the evidence for the design and effectiveness of healthy food environment interventions in improving the dietary behavior of students and staff in tertiary education settings.

**Methods:** Academic databases were searched for studies published before October 2022. Studies were eligible if they assessed the impact of a food environment intervention on dietary behavior (purchases or consumption) in students or staff at tertiary education settings and targeted at least one of the following food environment elements: placement, price, product, or promotion. Business-related outcomes were included as secondary outcomes. Randomised controlled trials (RCTs) and quasi-experimental studies were eligible. Findings were synthesised in narrative form, organised by element targeted. Where comparable dietary outcome data were available from  $\geq 10$  interventions, findings were also pooled using random effects meta-analysis.

**Results:** Of 9107 studies initially identified, 53 (75% quasi-experimental) were included, describing 69 separate interventions. Two-thirds ( $n=47$ , 68%) of interventions demonstrated significant improvements in dietary behavior, including  $n=32/49$  (65%) of single-element interventions and  $n=15/20$  (75%) of multi-element interventions. Among single-element interventions, the one intervention targeting placement and all three targeting price improved dietary behavior. Most ( $n=9/10$ , 90%) interventions targeting product improved dietary behavior, while  $n=19/35$  (54%) targeting promotion did. Pooled findings from nine studies reporting changes in energy content following interventions demonstrated a significant decrease in energy content purchased or consumed (-8.9%; 95%CI: -11.2, -6.5). Nearly all interventions ( $n=11/12$ , 92%) that evaluated impact on business-related outcomes found significant increased total sales revenue following the intervention or had no impact.

**Conclusions:** We found encouraging evidence supporting the role of food environment interventions in tertiary education settings to support healthy dietary behaviors of students and staff without compromising business revenue. There is a need for more rigorously designed and longer-term studies, including RCTs, to further ascertain the precise effects of such interventions.



# The role of the physical food environment on the diet-related behaviours of adolescents: a mobile Ecological Momentary Assessment study

**Miss Sarah Shaw**<sup>1,2</sup>, Associate Professor Sarah Crozier<sup>1,3</sup>, Prof. Cyrus Cooper<sup>1,2</sup>, Associate Professor Dianna Smith<sup>4</sup>, Prof. Mary Barker<sup>1,2,5</sup>, Prof. Christina Vogel<sup>1,2,3,6</sup>

<sup>1</sup>MRC Lifecourse Epidemiology Centre, University of Southampton., Southampton, United Kingdom, <sup>2</sup>NIHR Southampton Biomedical Research Centre, University of Southampton and University Hospital Southampton NHS Foundation Trust., Southampton, United Kingdom, <sup>3</sup>NIHR Applied Research Collaboration Wessex, Southampton Science Park, Innovation Centre, Chilworth., Southampton, United Kingdom, <sup>4</sup>Geography and Environmental Science, University of Southampton. , Southampton, United Kingdom, <sup>5</sup>School of Health Sciences, Faculty of Environmental and Life Sciences, University of Southampton., Southampton, United Kingdom, <sup>6</sup>Centre for Food Policy, City, University of London, London, United Kingdom

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**Purpose:** During adolescence, many young people start making more independent food purchases. Little, however, is known about the role physical food environments play in these decisions. This study aimed to use ecological momentary assessment (EMA) and global positioning systems (GPS) to understand associations between community and consumer environments and adolescents' food purchasing and dietary behaviours.

**Methods:** A one-week observational study was conducted with 108 adolescents, aged 11-18 years, from Hampshire, UK. Participants completed a demographic questionnaire and a validated 20-item Food Frequency Questionnaire which assessed diet quality. Participants also used an EMA mobile phone app which captured GPS data for adolescents' journeys, and on which adolescents recorded their use of food outlets and food purchases during the 7 days. A community environment healthfulness score was calculated using GPS-generated activity spaces and food outlet location data from Ordnance Survey Points of Interest. Consumer environment factors describing use of promotions, money spent, and store placement were recorded for each purchase. The healthfulness of purchases made on each purchasing occasion were assessed against UK healthy eating guidelines. Eighty adolescents recorded 273 purchasing occasions and 65 participants had valid GPS data. Fully adjusted linear regression and multilevel logistic regression models were used to investigate associations between community and consumer environment exposures, and diet quality and food purchasing outcomes.

**Results:** Adolescents with greater exposure to healthier community environments tended to have better quality diets ( $\beta$  0.18 SD/SD; 95%CI -0.08, 0.44;  $p=0.17$ ), with the strongest relationships observed among adolescents from lower socio-economic backgrounds ( $\beta$  0.55 SD/SD; 95% CI 0.04, 1.07;  $p=0.04$ ). Fast-food outlets, cafes and small supermarkets were the most frequently used food outlets by young people. Spending more money was associated with healthier purchases (OR 1.40 per  $\approx$ £5.00 category; 95% CI 1.06, 1.83;  $p=0.02$ ) but no notable associations were observed for promotions and prominent store placement.

**Conclusions:** This study provides insight into the relationship between features of physical food environment and the healthfulness of foods purchased by adolescents. These data suggest that increasing the numbers of healthier food outlets and reducing the price of healthy foods could support healthier food choices among young people.

# Differences in online grocery delivery service use and food and drink purchase behaviour before and during the COVID-19 pandemic: a longitudinal analysis of UK purchase data

**Dr. Amy Yau<sup>1</sup>**, Dr. Cherry Law<sup>1,2</sup>, Dr. Laura Cornelsen<sup>1</sup>, Prof. Jean Adams<sup>3</sup>, Prof. Emma Boyland<sup>4</sup>, Dr. Thomas Burgoine<sup>3</sup>, Prof. Frank de Vocht<sup>5,6</sup>, Prof. Martin White<sup>3</sup>, Prof. Steven Cummins<sup>1</sup>

<sup>1</sup>London School of Hygiene & Tropical Medicine, London, United Kingdom, <sup>2</sup>University of Reading, Reading, United Kingdom, <sup>3</sup>University of Cambridge, Cambridge, United Kingdom, <sup>4</sup>University of Liverpool, Liverpool, United Kingdom, <sup>5</sup>University of Bristol, Bristol, United Kingdom, <sup>6</sup>NIHR Applied Research Collaboration West, Bristol, United Kingdom

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**Purpose:** Online grocery delivery services (OGDS) provided a way to reduce physical contact with others during the COVID-19 pandemic. However, OGDS may not have been equally available to all households and may have exacerbated health inequalities. Pre-pandemic, OGDS use was more prevalent among higher-income households and was associated with healthier purchases. This study aimed to explore whether there were differences in the sociodemographic patterning of OGDS use and online grocery purchases, before and during the pandemic.

**Methods:** Item-level take-home food and drink purchase data from households in London and the North of England (n=1,245) were obtained from the UK Kantar Fast Moving Consumer Goods Panel. Purchases from the early stages of the pandemic [23/03/2020-14/06/2020] (n=636,762), during the UK's strictest lockdown period, were compared to the same period in 2019 [25/03/2019-16/06/2019] (n=562,573). We categorised households as using OGDS: 1) in 2019 and 2020 (persistent user), 2) in 2020 but not in 2019 (new adopter), 3) in 2019 but not in 2020 or 4) not in 2019 or 2020. We used logistic regression to estimate the likelihood of OGDS use by sociodemographic characteristics. T-tests were used to test differences in monthly household purchases.

**Results:** Households with an annual income of  $\geq$ £40,000 were more likely to be persistent users (OR 2.18, 95% CI 1.20; 3.94 for £40,000-£50,000 vs  $<$ £20,000). Households with shoppers aged  $\geq$ 65 years vs 18-34 years were more likely to be new adopters (OR 2.30, 95% CI 1.10; 4.80). New adopters had the greatest reduction in monthly in-store shopping, 2.7 occasions (95% CI 2.1; 3.3) [33.8%]. Among persistent users, monthly online purchasing increased by 16,891 kcal (95% CI 8,171; 25,610) [27.9%], but the proportion of energy that was from fruit and vegetables decreased, -1.7% (95% CI -0.5; -2.9).

**Conclusions:** Higher rates of adoption among the oldest age group may reflect greater caution due to higher risk of severe illness from COVID-19 with age. Persistent users continued to benefit from OGDS. However, reductions in fruit and vegetable purchases relative to other food categories suggest a shift in focus to purchasing products with a longer shelf-life or product shortages.

# Nutrition and technology use in underserved communities

**Prof. Clare Collins**<sup>1,2</sup>, Ms. Hannah McCormick<sup>1,2</sup>, Ms. Tsz Ting Yip<sup>1</sup>, Dr. Hannah Brown<sup>1</sup>, Dr. Sasha Fenton<sup>1,2</sup>, Dr. Vanessa Shrewsbury<sup>1,2</sup>

<sup>1</sup>University of Newcastle, Callaghan, Australia, <sup>2</sup>Hunter Medical Research Institute, Callaghan, Australia

**O.3.25 - Lifestyle and healthy weight development, UKK - K3+4 (Level 3), June 17, 2023, 2:00 - 3:30 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Optimal dietary intakes are associated with lower risk of adverse pregnancy outcomes, yet accessing accurate nutrition information in pregnancy can be challenging for women. In addition, surveys confirm pregnant women may not be aware of specific food and nutrient recommendations, with limited nutrition information adapted to meet the needs of underserved communities, including culturally and linguistically diverse (CALD) groups. Given potential reach and scale of online technologies this mode could be exploited to ensure nutrition information is accessible to all. This presentation provides an overview of current knowledge of dietary patterns and technology use during pregnancy and by underserved communities.

**Methods:** Our team previously conducted a review of publicly available phone apps that included nutrition and / or weight gain advice pregnancy. We also reviewed pregnancy nutrition resources available from public health websites for women from CALD and/ or lower literacy backgrounds and surveyed CALD pregnant women from CALD with assistance from community programs and services that support them. We subsequently began a work program to address the gaps identified through co-creation of nutrition resources.

**Results:** Nutrition resources available through government and health service organisations addressed healthy eating, gestational weight gain (GWG), gestational diabetes, food safety, alcohol and vitamin and minerals. We identified 33 resources designed for CALD pregnant women, with 16 tailored to lower literacy, but none addressed GWG. Major app stores held over 120 pregnancy apps, with pregnancy specific nutrition topics ranging from zero to seven. While both quality and quantity of information varied, frequently topics were food safety, alcohol, fish and environmental contaminants, with fewer providing information on GWG or specific foods group recommendations during pregnancy.

A resource was co-created, 'Pregnancy Weight Gain', along with two meal plans and written and pictorial shopping lists, nutrition analyses and snack guides and made available online. The GWG resource has been translated into five languages.

**Conclusions:** Given pregnant women from underserved communities are more vulnerable in terms of diet-related adverse pregnancy outcomes, it is important to develop resources that are culturally appropriate and to be aware of limitations within current publicly available, including apps.

# Monthly variations in children's height, weight, and BMI gain

**Dr. R Glenn Weaver<sup>1</sup>**, Dr. Elizabeth Adams<sup>1</sup>, Dr. Bridget Armstrong<sup>1</sup>, Dr. Sarah Burkart<sup>1</sup>, Dr. Michael Beets<sup>1</sup>, Mr. James White<sup>1</sup>, Ms. Olivia Finnegan<sup>1</sup>, Ms. Julia Xuanxuan<sup>1</sup>, Mr. Roddrick Dugger<sup>1</sup>, Ms. Lauren Von Klinggraeff<sup>1</sup>, Ms. Hannah Parker<sup>1</sup>, Ms. Meghan Bastyr<sup>1</sup>, Ms. Alexandra da Silva Bandeira<sup>1</sup>, Dr. Christopher Pfladderer<sup>1</sup>, Dr. Layton Reesor-Oyer<sup>1</sup>

<sup>1</sup>University of South Carolina, Columbia, USA

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**Purpose:** What drives accelerated summer body mass index (BMI) gain remains unclear. The Circadian and Circannual Rhythm Model (CCRM) posits BMI gain is biologically driven by shifting light-dark cycles, accelerating during summer when days are longer (i.e., height gain slows while weight gain accelerates) and slowing during winter when days are shorter (i.e., weight gain slows while height gain accelerates). The Structured Days Hypothesis (SDH) proposes accelerated summer BMI gain is due to the removal of structured school days which leads to accelerating weight gain during school breaks (e.g., winter/spring/summer break). This study explored monthly height, weight, and BMI z-score (zBMI) change during and outside of summer to understand which theory better predicts zBMI change.

**Methods:** Children's (N=147, 8.2 years) height and weight were measured monthly during the 2021-2022 school year, and once in summer 2022 (mid-July). Age and sex specific zBMI was calculated using CDC growth charts. Monthly percent change in children's height and weight and monthly change in zBMI were calculated. Coefficient of variation (CV) explored variability in children's monthly height, weight, and zBMI change.

**Results:** Consistent with the SDH, monthly percent weight change was larger and more variable ( $\Delta=1.1\%$ ,  $SD=3.3\%$ ,  $CV=3.0$ ) with height change relatively constant throughout the year ( $\Delta=0.37\%$ ,  $SD=0.98\%$ ,  $CV=1.42$ ). Mean monthly percent weight change was highest during July ( $\Delta=3.3\%$ ,  $SD=11.0\%$ ), as predicted by both theories. Weight change was lowest in December prior to school winter break ( $\Delta=-0.5\%$ ,  $SD=2.6\%$ ), as predicted by the CCRM. Consistent with the SDH, spikes in weight gain were observed in January ( $\Delta=2.1\%$ ,  $SD=2.5\%$ ) following winter break and March ( $\Delta=2.1\%$ ,  $SD=1.6\%$ ) following spring break. Change in monthly zBMI mirrored changes in weight with spikes in July ( $\Delta=0.07$ ,  $SD=0.44$ ), January ( $\Delta=0.03$ ,  $SD=0.19$ ) and March ( $\Delta=0.05$ ,  $SD=0.15$ ) and a decrease in December ( $\Delta=-0.10$ ,  $SD=0.19$ ).

**Conclusions:** zBMI change was driven by larger and more variable weight change, compared to height. Both the CCRM and SDH may partially explain BMI gain but the SDH may better predict changes. Interventions to mitigate accelerated weight gain may be warranted during winter and spring break from school.

# Maternal diet quality trajectories from pregnancy to postpartum and associations with sociodemographic characteristics

Mrs. Meaghan Sexton-Dhamu<sup>1</sup>, Prof. Li Ming Wen<sup>2,3</sup>, **Dr. Katherine Livingstone<sup>1</sup>**, Dr. Ewa Szymlek-Gay<sup>1</sup>, Dr. Miaobing (Jazzmin) Zheng<sup>1</sup>

<sup>1</sup>Institute for Physical Activity and Nutrition School of Exercise and Nutrition Sciences, Deakin University, Geelong, Australia, <sup>2</sup>School of Public Health and Sydney Medical School, The University of Sydney, Sydney, Australia, <sup>3</sup>Health Promotion Unit, Population Health Research and Evaluation Hub, Sydney Local Health District, Sydney, Australia

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**Purpose:** Maternal diet quality from pregnancy to postpartum has significant effects on maternal and child health, but how maternal diet quality changes (i.e., trajectories) during this time remains unclear. This study aimed to examine maternal diet quality trajectories from pregnancy to postpartum and its sociodemographic characteristics using two diet quality indices.

**Methods:** Data of 473 women from the Healthy Beginning trial were used. Dietary intake was collected at four time points: pregnancy (24–34-weeks gestation) and 1, 2, and 3.5 years postpartum. Diet quality scores were calculated using the 2013 Dietary Guideline Index (DGI-2013) and the RESIDential Environment Guideline Index (RDGI). Group-based trajectory modelling was used to identify maternal diet quality trajectories from pregnancy to 3.5 years postpartum. Multinomial logistic regression was used to assess associations between sociodemographic characteristics and identified maternal diet quality trajectories.

**Results:** For both DGI-2013 and RDGI, two stable trajectories of low or high diet quality from pregnancy to 3.5 years postpartum were identified. Women who were tertiary educated (OR 0.41; 95%CI 0.22, 0.77) and married (OR 0.44; 95%CI 0.21, 0.95) were less likely to follow the low DGI-2013 trajectory group compared with women with no tertiary education or who were not married, respectively. In contrast, women who smoked during pregnancy were more likely (OR 1.74; 95%CI 1.13, 2.69) to follow the low DGI-2013 trajectory group compared with women who have never smoked. Similar results were found for maternal education and smoking status during pregnancy and the low RDGI trajectory group. In addition, women who were unemployed (OR 1.78; 95%CI 1.13, 2.78) also had higher odds of following the low RDGI trajectory. For both the DGI-2013 and RDGI trajectories, no associations were found for maternal age, country of birth and pre-pregnancy body mass index.

**Conclusions:** From pregnancy to postpartum, women followed stable trajectories of low or high diet quality. Women without tertiary education or who smoked or were unemployed during pregnancy had a higher likelihood of following a low maternal diet quality trajectory. Two diet quality indices showed similar findings. The present study highlights the importance of targeting these women for future nutrition interventions.



# Longitudinal characterisation of appetite traits associated with healthy and overweight growth patterns in the first 7 years of life.

**Dr. Anna Fogel<sup>1</sup>**, Dr. Beatrice Franzolini<sup>1</sup>, Dr. Andrea Cremaschi<sup>1</sup>, Prof. Maria De Lorio<sup>1</sup>, Dr. Mary Chong Foong-Fong<sup>1</sup>, Dr. Keri McCrickerd<sup>1</sup>, Dr. Fabian Yap<sup>3</sup>, Prof. Yung Seng Lee<sup>4</sup>, Prof. Keith Godfrey<sup>2</sup>, Dr. Neerja Karnani<sup>1</sup>, Prof. Johan Eriksson<sup>1</sup>

<sup>1</sup>Singapore Institute for Clinical Sciences, Singapore, Singapore, <sup>2</sup>Medical Research Council Lifecourse Epidemiology Unit, University of Southampton, Southampton, United Kingdom, <sup>3</sup>KK Women's and Children's Hospital, Singapore, Singapore, <sup>4</sup>Department of Paediatrics, Yong Loo Lin School of Medicine, National University of Singapore, Singapore, Singapore

**O.3.25 - Lifestyle and healthy weight development, UKK - K3+4 (Level 3), June 17, 2023, 2:00 - 3:30 PM**

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**Purpose:** Variations in appetite traits are expressed early in life. Little is known about longitudinal patterns of appetite traits and how they differ across children with healthy and overweight growth trajectories. Identifying early behavioural markers of obesity risk will inform how and when to intervene. The purpose of this study was to characterise detailed longitudinal patterns of appetitive traits among children with different growth trajectories.

**Methods:** The participants were 273 children from the Growing Up in Singapore Towards healthy Outcomes (GUSTO) cohort. We derived BMI z-scores from anthropometry at 14 time-points (12, 15, 18 months, and 2, 3, 4, 4.5, 5, 5.5, 6, 6.5, 7, 8, and 9 years). Using the Child Eating Behaviour Questionnaire, we assessed appetite traits at 1, 3, 5, and 7 years. Questionnaires were evaluated to estimate appetite latent traits using methods from item response theory, in particular a mixed effect partial credit score model. Hierarchical clustering was then employed to cluster children based on growth trajectories and appetite traits.

**Results:** We identified two distinct clusters of children with a stable healthy weight trajectory (n=239), and an overweight trajectory (n=34) characterised by a gradual increase in BMI over time reaching overweight around 2 years and obesity around age 6 years. The two clusters did not differ in appetite traits at age 12 months. From 3 years old, children with an overweight trajectory were reported to enjoy food more (p<0.001), to be less responsive to signals of satiety (p<0.001) and to eat faster (p<0.001), and from 5 years to also be less fussy (p<0.001). The healthy weight cluster reported an increase in food avoidance and a decrease in food approach traits over time; there was little change in these traits over time among children with an overweight trajectory. Satiety responsiveness was the overall strongest differentiator between the two clusters from 3 years.

**Conclusions:** We identified four appetite traits differentiating children with healthy and overweight trajectories from age 3 years, with satiety responsiveness emerging as the strongest differentiator. Interventions might be most effective if implemented before age 3 years, with satiety responsiveness the most promising target for intervention.

# Parental lifestyle patterns around pregnancy and risk of childhood obesity

**Dr. Marion Lecorquillé**<sup>1</sup>, Ms. Mireille Schipper<sup>2</sup>, Dr. Aisling O'Donnell<sup>3</sup>, Dr. Alexander Douglass<sup>3</sup>, Mr. Malamine Gassama<sup>4</sup>, Dr. Marie-Aline Charles<sup>1,4</sup>, Prof. Cecily C Kelleher<sup>3</sup>, Dr. Catherine Phillips<sup>3</sup>, Dr. Romy Gaillard<sup>2</sup>, Dr. Sandrine Lioret<sup>1</sup>, Dr. Barbara Heude<sup>1</sup>

<sup>1</sup>Université Paris Cité and Université Sorbonne Paris Nord, Inserm, INRAE, Center for Research in Epidemiology and Statistics (CRESS), F-75004, Paris, France, <sup>2</sup>The Generation R Study Group (Na 29-15), Erasmus University Medical Center, PO Box 2040, 3000 CA, Rotterdam, Netherlands, <sup>3</sup>School of Public Health, Physiotherapy and Sports Science, University College Dublin, Dublin, Ireland, <sup>4</sup>UMS Elfe Team, Inserm, EFS, Aubervilliers, Paris, France

**O.3.25 - Lifestyle and healthy weight development, UKK - K3+4 (Level 3), June 17, 2023, 2:00 - 3:30 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** The prevalence of overweight in children remains high, with strong social inequalities observed at early ages. So far, most studies have evaluated the effects of perinatal factors on childhood obesity separately, with only a few studies assessing the combined effect of parental lifestyle factors. Our project aims to identify parental lifestyle patterns in preconception and during pregnancy, and to study their associations with the risk of overweight and obesity (OW-OB) in school-aged children.

**Methods:** We harmonized and interpreted results from four European mother-offspring cohorts (EDEN, Elfe, Lifeways, and Generation R) with data available for 1900, 18000, 1100, and 9500 families (mothers, fathers, and young children), respectively. Perinatal factors were collected with questionnaires and included mothers' and fathers' smoking habits, body mass index (BMI), dietary quality and inflammatory index, physical activity, and sedentary behavior. We applied principal component analyses to identify lifestyle patterns in preconception and pregnancy and subsequently assessed their prospective associations with child BMI z-score and risk of OW-OB (as defined with the IOTF25 threshold) between 5 and 12 years using multivariable linear and logistic regressions.

**Results:** Among the various lifestyle patterns identified, two patterns explained most of the variance and were consistent across cohorts. These patterns were characterized by « high parental smoking, low maternal diet quality and/or high maternal sedentary behaviour » and « high parental BMI and low gestational weight gain ». A one-SD increase in the first pattern was associated with higher risk of overweight in Elfe [OR (95%CI) 1.32 (1.23;1.42)]. The second pattern was consistently associated with higher BMI z-score and risk of overweight in children at any age in most cohorts.

**Conclusions:** Our results provide a better understanding of how perinatal factors combined into lifestyle patterns may synergistically be associated with the risk of child OW-OB. Examination of the potential facilitators and barriers of the family lifestyle patterns identified, with a specific focus on socio-economic inequalities, geographic origin and psychological factors is warranted. Collectively the results from this project will help inform the development of future childhood obesity prevention strategies at the population level, or more personalized for groups at risk.

# Examining Parent-Child Interactions during Active Play with and without Digital Games

Dr. Richard Boles<sup>1</sup>, **Dr. Laura Bellows<sup>2</sup>**, Dr. Nan Zeng<sup>3</sup>, Ms. Abigail Flesher<sup>1</sup>, **Prof. Susan Johnson<sup>1</sup>**

<sup>1</sup>University of Colorado Anschutz Medical Campus, Aurora, USA, <sup>2</sup>Cornell University, Ithaca, USA, <sup>3</sup>University of New Mexico, Albuquerque, USA

**O.3.25 - Lifestyle and healthy weight development, UKK - K3+4 (Level 3), June 17, 2023, 2:00 - 3:30 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Active play, in nurturing relationships with parents, is essential to healthy development and learning. This study examined the quality of parent-child active play interactions using interactive digital games with preschool-aged children.

**Methods:** A cross-sectional, within subjects, repeated measures design was used with mother-father-child triads. Parents were instructed to play with their child as they normally would, during 3, 6-minute movement-based activity sessions: (1) Traditional Toys (e.g., balls, bean bags, hoops, tunnel, etc.); (2) Tablet-based Mobile App (e.g., Jungle Gym); and (3) Active Video Game (e.g., Dancing). Parent-child play interactions were videotaped and then observationally coded by researchers trained to criterion for type and quality across 5 domains using the Parents Interacting with Children: Checklist of Observation Linked to Outcomes (PICCOLO): Affection, Responsiveness, Encouragement, Teaching, and Playfulness.

**Results:** Tests of repeated measures (GLM) for each of the parenting domains across play conditions were shown to support the hypothesis that a significant difference exists in parenting behaviors across domains, depending on play condition. Specifically, Affection, Responsiveness, and Encouragement were highest in the Traditional Toys condition, followed by the Mobile App condition, and lowest in the Active Video Game condition:  $F(1.3, 24.4)=6.83$ ,  $p=.01$ , partial eta squared ( $\eta_p^2$ )=.26;  $F(2, 38)=14.94$ ,  $p=.001$ ,  $\eta_p^2=.44$ ;  $F(1.4, 26.4)=17.19$ ,  $p=.001$ ,  $\eta_p^2=.47$ , respectively. Teaching was highest in the Mobile App condition, followed by Traditional Toys then the Active Video Game conditions,  $F(1.7, 33.1)=3.41$ ,  $p=.051$ ,  $\eta_p^2=.15$ . Mothers and fathers demonstrated significant differences in parenting ( $p<.05$ ) for Responsiveness and Playfulness in the Traditional Toys condition, Playfulness in the Mobile App condition, and Teaching in the Active Video Game condition.

**Conclusions:** Different types of parenting behaviors are elicited during parent-child interactions focused on physical activity, depending on the structure of the game. These differences (and in some instances, similarities) in parenting behaviors may foster multiple aspects of child development during physical activity. Future research will clarify the specific parenting behaviors that may be most responsible for differences across conditions and be used to further develop and test interventions designed to foster child development and enhance physical activity.

# Effects of the Sleep SAAF Responsive Parenting Intervention on Infants' Sleep: A Randomized Clinical Trial among Black American Families

**Dr. Justin Lavner<sup>1</sup>**, Dr. Emily Hohman<sup>2</sup>, Dr. Steven Beach<sup>1</sup>, Dr. Brian Stansfield<sup>3</sup>, Dr. Jennifer Savage<sup>2</sup>

<sup>1</sup>University of Georgia, Athens, USA, <sup>2</sup>The Pennsylvania State University, State College, USA, <sup>3</sup>Augusta University, Augusta, USA

**O.3.26 - Hot topics on physical activity and sleep, Clarion Hotel Gillet - Room Gillesalen, June 17, 2023, 2:00 PM - 3:30 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Black Americans experience sleep disparities beginning in infancy and continuing throughout the lifespan, calling for early interventions to improve sleep. This study aimed to investigate whether a responsive parenting (RP) intervention for Black mothers improves infant sleep and increases responsive sleep parenting practices.

**Methods:** The Sleep SAAF (Strong African American Families) study is a randomized controlled trial comparing an RP intervention with a safety control condition over the first 16 weeks postpartum. Data were collected between spring 2018 and summer 2021. Families were recruited from the mother/infant nursery at Augusta University Medical Center, Augusta, GA, USA, and completed home visits at 1, 3, 8, and 16 weeks postpartum. Primiparous Black mother-infant dyads were screened for eligibility using medical records. 292 families were eligible, 234 enrolled, 212 were randomized, 203 provided data at 3 weeks, 187 provided data at 8 weeks, and 194 provided data at 16 weeks. The RP intervention curriculum focused on infant sleep, soothing/crying, and feeding. The control group received a safety intervention. Community Research Associates delivered the interventions during home visits at 3 and 8 weeks postpartum. Mothers reported on bedtime routine and sleep behaviors, infant sleep duration, and nighttime waking and feeding at 3, 8, and 16 weeks postpartum.

**Results:** Randomized mothers were Black/African American (100%) and non-Hispanic (99%); 49% participated in the Supplemental Nutrition Assistance Program (SNAP). At 16 weeks, infants in the RP group had longer reported nighttime sleep duration ( $481 \pm 135$  vs.  $441 \pm 126$  minutes,  $p=.03$ ), longer total sleep duration ( $765 \pm 223$  vs.  $693 \pm 182$  minutes,  $p=.02$ ), fewer nighttime wakings ( $1.5 \pm 0.9$  vs.  $1.8 \pm 1.0$ ,  $p=0.01$ ), and greater likelihood of meeting guidelines of >12 hours of total sleep/day (64.9% vs. 45.8%,  $p=0.008$ ) than controls. Relative to controls, mothers in the RP group reported engaging in more responsive parenting practices such as putting the baby to bed while awake and giving the baby a few minutes to fall back asleep on their own, and were less likely to feed their baby as the last activity before bed.

**Conclusions:** An RP intervention for Black American families improved infant sleep and increased responsive sleep parenting practices.

# Sport characteristics and objectively measured physical activity and sedentary levels in children

**Dr. Daniela Rodrigues<sup>1,2</sup>**, Prof. Aristides Machado-Rodrigues<sup>1,3</sup>, Assistant Professor Augusta Gama<sup>1,4</sup>, Assistant Professor Maria-Raquel Silva<sup>1,5</sup>, Assistant Professor Helena Nogueira<sup>1,6</sup>, Associate Professor Cristina Padez<sup>1,2</sup>

<sup>1</sup>University of Coimbra, CIAS – Research Centre for Anthropology and Health, Coimbra, Portugal, <sup>2</sup>University of Coimbra, DCV – Department of Life Sciences, Coimbra, Portugal, <sup>3</sup>High School of Education, Polytechnic Institute of Viseu, Viseu, Portugal, <sup>4</sup>Department of Animal Biology, Faculty of Sciences of the University of Lisbon, Lisbon, Portugal, <sup>5</sup>Faculty of Health Sciences, University Fernando Pessoa, Porto, Portugal, <sup>6</sup>University of Coimbra, Faculty of Letters, Coimbra, Portugal

**O.3.26 - Hot topics on physical activity and sleep, Clarion Hotel Gillet - Room Gillesalen, June 17, 2023, 2:00 PM - 3:30 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Current guidelines recommend children accrue 60 minutes of moderate-to-vigorous physical activity (MVPA) per day. Nevertheless, a substantial proportion of children and adolescents are not active enough to benefit their health. We examined how children's participation in different organized sports contributed to physical activity (PA) levels, sedentary time, achieving PA recommendations, and to body mass index (BMI).

**Methods:** This cross-sectional study included 332 6-to-10-years-old children. PA was measured for 1 week via accelerometers; children's height and weight were objectively collected. Organized sport participation was parent-report and later classified into three categories: indoor vs. outdoor; individuals vs. team; combat vs. individual aesthetic vs. racing vs. invasion. Sex- and BMI-adjusted one-way ANCOVA was used to examine the effect of the sport categories in terms of PA levels (i.e., sedentary, light, moderate, vigorous, and moderate-to-vigorous).

**Results:** Boys, more than girls, were engaged in outdoor and team sports, whereas the majority of girls practiced an individual aesthetic sport while half of the boys were involved in an invasion sport. The minutes per day in moderate and vigorous PA was significantly higher in boys compared to girls, while the inverse was found for the sedentary time. Overall, more boys than girls were meeting the PA guidelines. Children engaged in outdoor sports (vs. indoor) had two times the odds to achieve the PA guidelines, as they accumulate more vigorous PA (VPA) and moderate to vigorous PA (MVPA). Being involved in team sports (vs. individual) was significantly associated with lower minutes per day in sedentary activities. The likelihood of having overweight or obesity was 2-times higher in children not engaged in any organized sport (vs. practicing).

**Conclusion:** Findings point that promoting outdoor and team sports are likely to decrease children's sedentary behavior, increase daily VPA and MVPA. We highlight the potential importance of promoting participation in those sports as a strategy to increase overall PA levels in children, particularly girls.



# Impacts of restricted nighttime sleep on child health outcomes: A meta-analysis of experimental evidence

**Ms. Lauren von Klinggraeff<sup>1</sup>**, Ms. Michal Smith<sup>1</sup>, Dr. Sarah Burkart<sup>1</sup>, Dr. Christopher D. Pfledderer<sup>1</sup>, Dr. Bridget Armstrong<sup>1</sup>, Dr. R. Glenn Weaver<sup>1</sup>, Dr. Michael W. Beets<sup>1</sup>, Dr. Elizabeth L. Adams<sup>1</sup>

<sup>1</sup>University of South Carolina, Columbia, USA

**O.3.26 - Hot topics on physical activity and sleep, Clarion Hotel Gillet - Room Gillesalen, June 17, 2023, 2:00 PM - 3:30 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Health guidelines recommend adequate sleep for optimal child health. Understanding the impact of restricted nighttime sleep on health outcomes in youth can provide valuable evidence to inform behavioral interventions. This study conducted a meta-analysis on experimental studies restricting nighttime sleep in children.

**Methods:** We conducted a systematic search of PubMed, CINAHL Complete, PsychINFO, Web of Science, and EMBASE. Studies were included if they intentionally restricted nighttime sleep in healthy children (ages 0-18 years) and reported measures of health-related outcomes during both typical and restricted sleep conditions. Health-related outcomes were extracted and categorized into three domains: emotional functioning, cognitive functioning, and observable behaviors. Multilevel meta-analyses, nesting effects within studies, were performed separately for positive and negative outcomes within each domain (six separate models).

**Results:** Studies (k=25) reported outcome data for 944 children (2.5-18 years) providing 222 effects. Most studies reported within-person data (k=23) and half utilized randomized cross-over designs (k=13). Nighttime sleep duration averaged 509±41min (typical sleep) and 347±28min (restricted sleep), with typical sleep conditions lasting an average of 4±2 nights and restricted conditions lasting 4±2 nights. Positive emotional functioning (e.g., happiness) increased after typical sleep (ES 0.61, 95CI -0.67, 1.90), while negative emotional functioning (e.g., irritability) increased after restricted sleep (emotional ES -0.23, 95CI -1.03, 0.56). Positive cognitive functioning (e.g., memory) significantly improved (ES 1.95, 95CI 0.03, 0.36) in typical sleep conditions while negative cognitive functioning (e.g., inattention) increased during restricted sleep (cognitive ES -0.15, 95CI -0.32, 0.02). Similarly, positive behaviors increased in typical sleep conditions (e.g., physical activity; ES 0.18, 95CI -0.06, 0.42) while negative behaviors increased during restricted sleep (e.g., consumption of sugar sweetened beverages; ES -0.15, 95CI -0.31, 0.01).

**Conclusion:** Children with restricted nighttime sleep exhibit worse outcomes, including emotional functioning, cognitive functioning, and health behaviors, when compared to children with adequate sleep. Identifying when children may be most likely to experience less-than-typical sleep in natural settings can provide targets for behavioral interventions to improve sleep and mitigate the effects of sleep restriction in everyday life.

# Comparing perceptions of activity compensation to accelerometer data in primary school children: The REACT Study

**Ms. Brittany Swelam**<sup>1</sup>, Dr. Lauren Arundell<sup>1</sup>, Prof. Jo Salmon<sup>1</sup>, Associate Professor Nicky Ridgers<sup>1,2</sup>

<sup>1</sup>Institute for Physical Activity and Nutrition (IPAN), Deakin University, Burwood, Australia, <sup>2</sup>Alliance for Research in Exercise, Nutrition, and Activity (ARENA), University of South Australia, Adelaide, Australia

**O.3.26 - Hot topics on physical activity and sleep, Clarion Hotel Gillet - Room Gillesalen, June 17, 2023, 2:00 PM - 3:30 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Activity compensation in children is poorly understood. It is currently unknown whether children's perceptions of compensatory responses to certain scenarios may predict device-measured compensation. The aim of this study was to explore within-day compensatory responses of primary school children following experimental conditions delivered at school.

**Methods:** Children (aged 8-12 years; n=360) participated in at least one of three experimental conditions across six weeks: (a) restricted light-, moderate-, and vigorous-intensity physical activity (LMVPA); (b) imposed moderate- to vigorous-intensity physical activity (MVPA); and (c) imposed light-intensity physical activity (LPA). Prior to the first experimental condition, children completed a self-report measure assessing their perceptions of their 'usual' within-day compensatory behaviour in response to scenarios of restricted/imposed activity. During the 'usual' and experimental condition weeks, children wore a hip-mounted ActiGraph accelerometer. To describe self-report and device-measured compensation data, heat mapping and compensation matrices were completed for each experimental condition. ROC analyses explored the predictive accuracy of children's perceptions of their usual within-day compensation via survey sub-scales into device-measured within-day compensatory percentage categories (e.g., partial compensation, overcompensation), which were derived from daily and time period specific counts per minute.

**Results:** The analytical sample included 201 participants in the restricted LMVPA condition, 209 in the imposed MVPA condition, and 154 in the imposed LPA condition. Most participants' (92.5%) perceptions of their compensatory behaviour matched their device-measured compensation following the restricted LMVPA condition, but not the imposed MVPA (47.4%) and LPA (43.5 %) activity conditions. Over two-thirds (≥68.8%) of children compensated at least 50% of their activity from the experimental condition within that same day. The ROC analyses indicated that the survey sub-scales did not differentiate between the device-measured compensation classification groups (area under the curve: 0.503-0.727).

**Conclusions:** Regardless of the experimental condition (i.e., imposed or restricted activity), most children compensated their activity based on device-measured data. Although children's perceptions of their usual compensatory behaviour did not predict their device-measured compensatory responses, the presence of device-measured compensation warrants the consideration of compensatory responses in future interventions to mitigate potentially harmful compensatory responses. Future research should identify which perturbation thresholds prompt compensatory responses.

# Longitudinal effects of dog ownership status on children's movement behaviours: Findings from the PLAYCE cohort study

**Ms. Emma Adams<sup>1,2</sup>**, Associate Professor Kevin Murray<sup>2</sup>, Associate Professor Hayley Christian<sup>1,2</sup>

<sup>1</sup>Telethon Kids Institute, University of Western Australia, Perth, Australia, <sup>2</sup>School of Population and Global Health, The University of Western Australia, Perth, Australia

**O.3.26 - Hot topics on physical activity and sleep, Clarion Hotel Gillet - Room Gillesalen, June 17, 2023, 2:00 PM - 3:30 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Regular physical activity is important for children's physical and mental health, yet many children do not achieve recommended amounts of physical activity. Dog ownership has been associated with increased physical activity in children, however, there have been no longitudinal studies examining this relationship. This study uses data obtained from the Play Spaces and Environments for Children's Physical Activity (PLAYCE) cohort study to examine the longitudinal effects of dog ownership on children's movement behaviours.

**Methods:** Change in dog ownership from preschool (T1, age 2-4) to fulltime school (T2, age 5-6) was used as a natural experiment with four distinct dog ownership status groups (continuing non-dog owners, continuing dog owners, dog acquired, and dog loss). Daily movement behaviours, including physical activity, sedentary time, sleep, and screen time, were collected using accelerometry and parent-report surveys for 602 children. Linear mixed effects regression models were used for analysis.

**Results:** Girls who acquired a dog had a significant increase in objectively measured daily total physical activity by an average of 62.6 minutes per day ( $p=0.010$ ) which was made up of increases in light activities and games (46.8 minutes,  $p=0.043$ ) and brisk walking (15.4 minutes,  $p<0.001$ ). Girls who lost a dog had a significant decrease in daily light activities and games (-65.2 minutes,  $p=0.031$ ). Girls who were continuing non-dog owners increased their daily total physical activity by 27.4 minutes ( $p=0.017$ ). For boys, there were no significant changes in daily total physical activity, and inconsistent changes in specific levels of physical activity. There were significant increases in parent-reported weekly frequency of unstructured physical activity for the dog acquired groups (boys=8.4 times/week, girls=7.1 times/week; both  $p<0.001$ ) and significant decreases in unstructured physical activity for the dog loss groups (boys=-6.4 times/week,  $p=0.004$ ; girls=-9.9 times/week,  $p<0.001$ ). There were no significant associations for structured physical activity, outdoor play, sleep, or screen time.

**Conclusions:** The influence of dog ownership on children's movement behaviours begins in early childhood and differs by child sex. Further research should examine the specific contributions dog-facilitated physical activity makes to children's overall physical activity, including the intensity and duration of dog walking and play.

# Effects of reducing leisure screen time on physical activity and sedentary body positions in children and parents

**Mr. Jesper Schmidt-Persson<sup>1</sup>**, Mr. Martin Gillies Banke Rasmussen<sup>1,2</sup>, Ms. Sarah Overgaard Sørensen<sup>1</sup>, Ms. Sofie Rath Mortensen<sup>1,3</sup>, Ms. Line Grønholt Olesen<sup>1</sup>, Associate Professor Jan Christian Brønd<sup>1</sup>, Associate Professor Søren Brage<sup>1,4</sup>, Associate Professor Peter Lund Kristensen<sup>1</sup>, Prof. Anders Grøntved<sup>1</sup>

<sup>1</sup>University of Southern Denmark, Odense, Denmark, <sup>2</sup>Steno Diabetes Center Odense, Odense, Denmark,

<sup>3</sup>Naestved-Slagelse-Ringsted Hospitals, Slagelse, Denmark, <sup>4</sup>University of Cambridge, Cambridge, United Kingdom

**O.3.26 - Hot topics on physical activity and sleep, Clarion Hotel Gillet - Room Gillesalen, June 17, 2023, 2:00 PM - 3:30 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** The purpose of this study was to investigate the effects of reducing leisure screen time on physical activity during weekdays and weekend days in children and adults. Furthermore, we investigate the effect on time spent in specific physical activity types (standing/moving, walking, running, cycling) and sedentary body positions (sitting, lying).

**Methods:** We conducted a cluster randomized controlled trial between June 2019 and March 2021. Families with children aged 4-14 years were randomized to an intervention or a control group. The intervention group had to reduce leisure screen time to less than 3 hours/week and handover their smartphones and tablets for two weeks. Intervention adherence was objectively assessed using tracker applications and TV-monitors. Participants in the control group had to carry on as usual. Physical activity was measured at baseline and two-week follow-up using two accelerometers worn on the thigh and hip in elastic belts. Accelerometer data were classified into physical activity types (standing/moving, walking, running, cycling) and sedentary body positions (sitting, lying) using validated algorithms. Mixed linear regression models were used to assess the effect of the intervention.

**Results:** We included 89 families, and 45 families (86 children, 82 adults) were allocated to the intervention group and 44 families (95 children, 82 adults) to the control group. Children and adults in the intervention group increased their engagement in physical activity between 15:00 to 18:00PM on weekdays (children: 18.5 min/weekday 95%CI: 12.2 to 24.8, adults: 8.2 min/weekday 95%CI: 1.6 to 14.9) and during all hours on weekend days (e.g. between 12:00 to 15:00PM: 23.1 min/weekday 95%CI: 12.3 to 33.8) compared to the control group. Analyses of total time spent in the different physical activity types and sedentary body positions showed significant differences for children's time spent walking (10.9 min/weekday, 32.8 min/weekend day) and lying (-42.9 min/weekday, -72.3 min/weekend day) in favour of the intervention group.

**Conclusions:** Reducing leisure screen time in families increases children's engagement in physical activity, particularly during weekends and afternoon hours on weekdays. Thus, future interventions should aim to reduce leisure screen time during these periods to enhance prevention of physical inactivity in children.

# “Ignorance is Bliss”? An Investigation of Calories on Menus and Body Image Across the Lifespan

**Miss Sarah Galway<sup>1</sup>**, Miss Julia Lavalle<sup>1</sup>, Dr. Kimberley Gammage<sup>1,2</sup>

<sup>1</sup>Brock University, St Catharines, Canada, <sup>2</sup>Brock-Niagara Centre for Health and Well-Being, St Catharines, Canada

**O.3.27 - Improving lifestyle behaviours in different population groups, Clarion Hotel Gillet - Room Akademien, June 17, 2023, 2:00 PM - 3:30 PM**

## **SIG - Primary Choice:** H. Policies and environments

It is well known that obesity burdens health care systems through increased health care costs. One way to address obesity rates is via public policy. The *Healthy Menu Choices Act* requires that all restaurants in Ontario, Canada with 20 or more locations post calories on their menus as a strategy to decrease obesity rates. However, the effect of calorie labelling on reducing caloric intake is minimal, and researchers have suggested examining potential unintended consequences of mandated calorie labelling

**Purpose:** The purpose of the present study was to qualitatively examine the relationship between calories on menus and body image in men and women across the lifespan.

**Methods:** Thirty-four men and women aged 20-82 were recruited and completed a semi-structured interview. Participants were asked questions related to their body image and use and perceptions of calorie information on restaurant menus. They referred to a menu with calories on it during the interview to facilitate conversations. Interviews were audio recorded and transcribed verbatim, and then analyzed using Braun and Clarke's reflexive thematic analysis.

**Results:** Many responses were paradoxical in nature, and participants contradicted themselves while explaining their use of calories on menus in relation to their body image. These contradictory responses were evident across three themes including: 1) perceptions versus actions 2) “it's not funny when your pants don't fit”: appearance concerns and calorie use, and 3), the good, the bad and the ugly: emotional and affective responses to calories on menus. Most participants thought calorie labelling was beneficial for those who were overweight or uneducated regarding nutrition, and opinions often included weight-biased and stigmatizing attitudes towards individuals living in larger bodies. Participants were more likely to use calorie information when they were dissatisfied with their weight or appearance. Participants also identified negative consequences, such as feelings of shame and guilt, as a result of calorie labelling on menus.

**Conclusion:** Participants use of calorie information on menus to influence meal choice was dependent on contextual and individual factors including body image. Future research can examine how to promote healthy eating amongst a broad population to target obesity prevention more effectively.



# Barriers and facilitators for participation in and implementation of workplace health promotion programs

**Ms. Denise Smit<sup>1,2</sup>**, Ms. Jennifer Campmans<sup>1</sup>, Dr. Sandra van Oostrom<sup>1</sup>, Dr. Josephine Engels<sup>3</sup>, Prof. Karin Proper<sup>1,2</sup>

<sup>1</sup>National Institute for Public health and the Environment, Bilthoven, Netherlands, <sup>2</sup>Amsterdam UMC, Amsterdam, Netherlands, <sup>3</sup>HAN University of Applied Sciences, Nijmegen, Netherlands

**O.3.27 - Improving lifestyle behaviours in different population groups, Clarion Hotel Gillet - Room Akademien, June 17, 2023, 2:00 PM - 3:30 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Workplace health promotion programs (WHPPs) can benefit both employers and employees. However, WHPPs are not always successful in practice. A lack of proper implementation of WHPPs and low participation rates might contribute to ineffectiveness of WHPPs. The current study was conducted in preparation for the implementation and evaluation of an integrated WHPP. Integrated WHPPs target multiple lifestyle factors at different levels (individual and organizational) and are therefore potentially more effective compared to single component WHPPs in improving lifestyle behaviors. The aim of this study was to identify the barriers and facilitators for participation in and implementation of an integrated WHPP, according to employees and employers respectively.

**Methods:** Data on the barriers and facilitators for participation was collected by means of 62 peer-to-peer interviews with employees. Data on the barriers and facilitators for implementation was collected with 2 online focus groups with employers. Interviews and focus groups were transcribed verbatim and analyzed using thematic content analysis. Data was coded both deductively, using the Consolidated Framework for Implementation Research (CFIR) consisting of five domains: 1) Intervention Characteristics, 2) Outer Setting, 3) Inner Setting, 4) Characteristics of Individuals, and 5) Process, and inductively. For the analysis of the peer-interviews, the framework was complemented with two constructs of the Social Ecological model. Subsequently, the constructs were rated to indicate whether they were a barrier or facilitator for participation or implementation.

**Results:** Numerous barriers and facilitators within all five domains of the CFIR were identified. Support of supervisors is an important facilitator for both participation and implementation. Co-workers who motivate each other facilitate participation in WHPP. Including employees in the development and implementation of WHPPs is an important facilitator for implementation. A main barrier for participation is an organizational culture where vitality is not yet a topic to discuss. Implementation of WHPPs is hampered by scattered initiatives within an organization.

**Conclusions:** Our findings on the barriers and facilitators for participation in and implementation of WHPPs according to employees and employers will be used to develop a tailored implementation plan. This may contribute to more successful implementation and higher participation rates of the integrated WHPP.

# Marketing of ultra-processed products targeted at adolescents on Instagram

**Dr. Gastón Ares<sup>1</sup>**, Ms. Florencia Alcaire<sup>1</sup>, Ms. Vanessa Gugliucci<sup>1</sup>, Mr. Leandro Machín<sup>1</sup>, Ms. Carolina de León<sup>2</sup>, Ms. Virginia Natero<sup>1</sup>, Dr. Tobias Otterbring<sup>3</sup>

<sup>1</sup>Universidad de la República, Montevideo, Uruguay, <sup>2</sup>Intendencia de Montevideo, Montevideo, Uruguay,

<sup>3</sup>University of Agder, Kristiansand, Norway

**O.3.27 - Improving lifestyle behaviours in different population groups, Clarion Hotel Gillet - Room Akademien, June 17, 2023, 2:00 PM - 3:30 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** To examine the prevalence and power of Instagram posts of ultra-processed products targeted at adolescents in Uruguay, a high-income Latin American country.

**Methods:** Cross-sectional exploratory design. A total of 2,014 Instagram posts promoting ultra-processed products or brands commercializing such posts, generated by 118 Instagram accounts between August 15th, 2020, and February 15th, 2021, were analyzed. Nine indicators of food marketing targeted at adolescents were developed based on previous studies to identify posts targeted at adolescents. Inductive coding was used to describe the content of the posts. Data were analyzed using generalized linear models to compare the content of posts targeted and not targeted at adolescents.

**Results:** Posts targeted at adolescents accounted for 17.6% of all the Instagram posts. Graphic design and adolescent language were the most frequent strategies to target posts at adolescents, followed by explicit references to adolescents or young adults and memes. Posts targeted at adolescents mainly promoted snacks and discretionary foods. Differences in the content of posts targeted and not targeted at adolescents were identified. Posts targeted at adolescents tended to significantly ( $p < 0.05$ ) less frequently include references to nutrition, health and wellbeing and product processing compared to those not targeted at adolescents.

**Conclusions:** The study breaks new ground by analyzing the prevalence and exploring the characteristics and content of Instagram posts promoting ultra-processed products to adolescents. Results stress the need to implement food digital marketing regulations to reduce the vulnerability of adolescents to the deleterious effect of unhealthy food marketing and provide empirical evidence to inform their development.

# Exploring facilitators and barriers for a physically active lifestyle during office hours

**Mr. Oskar Halling Ullberg**<sup>1</sup>, Prof. Susanna Toivanen<sup>1,5</sup>, Prof. Abby C. King<sup>3,4</sup>, Prof. Katarina Bälter<sup>1,2</sup>

<sup>1</sup>Division of Public Health Sciences, Mälardalen University, Västerås, Sweden, <sup>2</sup>Department of Medical Epidemiology and Biostatistics, Karolinska Institutet, Stockholm, Sweden, <sup>3</sup>Department of Epidemiology and Population Health, Stanford University School of Medicine, Stanford, CA, USA, <sup>4</sup>Stanford Prevention Research Center, Department of Medicine, Stanford University School of Medicine, Stanford, CA, USA, <sup>5</sup>Department of Public Health Sciences, Stockholm University, Stockholm, Sweden

**O.3.27 - Improving lifestyle behaviours in different population groups, Clarion Hotel Gillet - Room Akademien, June 17, 2023, 2:00 PM - 3:30 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Office work is characterized by sedentary work, contributing to a physically inactive lifestyle.

**Method:** Here, data were collected from an 8-week long intervention study on sustainable lifestyle, SOFIA; on office workers that used the app the Stanford Healthy Neighborhood Discovery Tool to take photos of and describe the environment at work or connected to work, that facilitated or hindered them from having a physically active lifestyle during office hours. Photos and text narratives were analyzed deductively using qualitative content analysis.

During November 2022, 35 photos were taken, and more photos will be added to the analysis during the spring of 2023, when the intervention will be repeated.

**Results:** Three themes have emerged so far: The built environment, building design, and office ergonomics. Facilitators for physical activity in the built environment were access to pedestrian features such as parks and sidewalks, whereas participants working in a more urban setting described the lack of greenery and parks for walks as a barrier. Factors regarding building design highlight that the location of stairs and elevators affects the employee's behavior to move around in the building. Also, offices high up in the building are seen as a barrier for movement, making it too strenuous to climb the stairs for 10+ floors. Access to showers and exercise equipment in the same office building was described as a positive facilitator for exercise during, before, or after the workday. The access to secure and protected bike sheds and the ability to store bikes indoors were important facilitators for active commuting to and from work. All offices in the study were equipped with adjustable desks, which are seen as a facilitator to break up static work. In the activity-based offices, there was a wish from the employees to implement active workstations with treadmills for indoor walk-and-talk.

**Conclusion:** This study highlights environmental factors that facilitate or hinder a physically active lifestyle in an office context. Knowledge for this study may improve the working environment and the health among office workers and should be considered when building new or renovating old office buildings.

# Toddler milk: A scoping review of research on consumption, perceptions, and marketing practices

**Ms. Ana Paula C. Richter**<sup>1,2</sup>, Dr. Anna H. Grummon<sup>3,4</sup>, Dr. Jennifer Falbe<sup>5</sup>, Dr. Lindsey Smith Taillie<sup>2,6</sup>, Dr. Deshira D. Wallace<sup>1</sup>, Dr. Allison J. Lazard<sup>7,8</sup>, Dr. Shelley D. Golden<sup>1</sup>, Dr. Marissa G. Hall<sup>1,2,8</sup>

<sup>1</sup>Department of Health Behavior, Gillings School of Global Public Health, University of North Carolina, Chapel Hill, USA, <sup>2</sup>Carolina Population Center, University of North Carolina, Chapel Hill, USA, <sup>3</sup>Department of Nutrition, Harvard TH Chan School of Public Health, Boston, USA, <sup>4</sup>Department of Pediatrics, Stanford University School of Medicine, Palo Alto, USA, <sup>5</sup>Department of Human Ecology, UC Davis, Davis, USA, <sup>6</sup>Department of Nutrition, Gillings School of Global Public Health, University of North Carolina, Chapel Hill, USA, <sup>7</sup>Hussman School of Journalism and Media, University of North Carolina, Chapel Hill, USA, <sup>8</sup>Lineberger Comprehensive Cancer Center, University of North Carolina, Chapel Hill, USA

**O.3.27 - Improving lifestyle behaviours in different population groups, Clarion Hotel Gillet - Room Akademien, June 17, 2023, 2:00 PM - 3:30 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** We aimed to summarize the literature about toddler milk to address what is known about: 1) caregivers' toddler milk purchasing and feeding behaviors, 2) toddler milk marketing, and 3) how marketing practices influence caregivers' beliefs about toddler milk.

**Methods:** In January 2022, we systematically searched six databases (i.e., PubMed, PsycINFO, Scopus, Cochrane Central, Embase, and CINAHL) and screened references to identify articles about toddler milk, following guidelines from the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR). Two investigators independently screened abstracts and full-texts, and a third investigator resolved discrepancies. For each included study, we extracted the title, author, year, journal, country, setting of data collection, sample characteristics, country's economic level, funding source, study aims, study design, outcomes, sample size, setting of population (e.g., rural), characteristics of participants (e.g., gender, race, income, and educational level, if reported), and key research findings related to toddler milk. We synthesized the extracted data qualitatively to assess patterns.

**Results:** Articles addressed topics in five areas: (1) consumption and feeding behaviors; (2) demographic correlates of toddler milk purchasing and consumption; (3) perceptions and beliefs; (4) sales; (5) marketing practices and responses to marketing. Most of the 48 included studies were conducted in high-income countries ( $k=29$ ) or in lower-middle, middle, or upper-middle income countries ( $k=16$ ). Three studies were conducted with participants from a range of country income levels. The included studies suggested that toddler milk sales are growing rapidly worldwide. Findings also revealed that toddler milk packages (e.g., labels, branding) resemble infant formula packages, and that toddler milk marketing practices may function as indirect advertising for infant formula. Purchasing, serving, and consumption of toddler milk were higher in Black and Hispanic populations than non-Hispanic White populations, and young caregivers with higher educational attainment and income were more likely to offer toddler milk to their children.

**Conclusions:** Findings suggest a need for policies to prevent cross-marketing of toddler milk and infant formula, reduce the unnecessary provision of toddler milk to infants and toddlers, and prevent caregivers from being misled about toddler milk healthfulness.

# “Let’s don’t go back:” perspectives of state and local School Meal Program administrators on sustaining COVID-19-related operational changes

**Dr Hannah Lane<sup>1</sup>**, Dr. Lindsay Ballengee<sup>1</sup>, Ms. Kiran Grover<sup>1</sup>, Ms. Janny Dinh<sup>3</sup>, Ms. Mercedes Brown<sup>1</sup>, Ms. Marisa Kirk-Epstein<sup>2</sup>, Ms. Margaret Read<sup>2</sup>

<sup>1</sup>Duke University School of Medicine, Durham, USA, <sup>2</sup>Share Our Strength, Washington D.C., USA, <sup>3</sup>Johns Hopkins Bloomberg School of Public Health, Baltimore, USA

**O.3.27 - Improving lifestyle behaviours in different population groups, Clarion Hotel Gillet - Room Akademien, June 17, 2023, 2:00 PM - 3:30 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** School meal programs (SMPs) reduce food insecurity and promote a healthy diet among schoolchildren, but not all eligible children participate. In the first two years of COVID-19, SMPs underwent many policy and administrative changes in order to remain operational. If sustained, these changes could increase participation rates long-term. This study describes operational changes related to communication, partnerships, staffing, and improved financial support (e.g, no-cost meals, higher reimbursement) in the first two years of COVID-19, in order to identify strategies to translate those changes into sustainable practice.

**Methods:** We conducted 15 semi-structured interviews with 8 state agency representatives (administer funds and oversee SMPs) and 7 school district administrators (operate programs in school districts) between December 2021- June 2022. We coded data using a hybrid deductive/inductive approach across four domains: (1) communication across administrative levels, (2) staffing, (3) partnerships, (4) financial support. We used the Expert Recommendations for Implementing Change (ERIC; set of research-tested strategies for implementing innovations) to develop sustainability guidance and policy recommendations.

**Results:** Communication between national, state and local administrators and students/families became more frequent and efficient during COVID-19. ERIC strategies to sustain positive communication outcomes include: Centralize technical assistance, Create a learning collaborative, Organize team meetings, Distribute educational materials. SMP staff roles/responsibilities were revised iteratively as the pandemic evolved to better anticipate challenges (e.g., staffing shortages, financial changes). Sustainability strategies include: Revise professional roles, Organize team meetings, and Alter incentive structures. Findings suggest that local partnerships formed during COVID-19 were highly valued, but administrators needed more infrastructure/capacity to maintain them. Potential strategies to sustain partnerships were: Develop resource sharing agreements, Build a Coalition. Participants described the direct impacts of improved financial support including increased participation, reduced stigma, higher quality meals, and increased staff morale. A single sustainability strategy was identified: Alter allowance structures.

**Conclusions:** Findings informed implementation guidance for sustaining COVID-related operational changes in order to increase participation and reduce stigma related to SMPs, thereby reducing food insecurity and improving diet among schoolchildren. Findings strongly support federal and state policy changes to expand SMPs, including increasing reimbursement rates and offering meals free of charge to all students.



# POSTER PRESENTATIONS

## Sedentary behavior, physical activity, and health behavior in the situation of covid-19 pandemic of Bangkok's office workers

**Dr. Raweewan Maphong**<sup>1</sup>, Associate Professor Sonthaya Sriramatr<sup>2</sup>

<sup>1</sup>Chulalongkorn University, Bangkok, Thailand, <sup>2</sup>Srinakharinwirot University, Bangkok, Thailand

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** The purposes of this study were to study changes in health behaviors and factors influencing health behaviors of office workers (OW) living in Bangkok during the Covid-19 pandemic.

**Methods:** The online survey was designed to collect data of physical activity (PA), sedentary behavior (SB), stress, healthy food consumption, and sleep quality from 494 OW (199 males, 295 females), aged 28.82 (6.4) years. Multinomial logistic regression was used to determine the factors influencing health behaviors due to the pandemic. The fully adjusted models were mutually adjusted for the other factors (gender, age, education, income, marital status, type of residence, and the number of people living together).

**Results:** During the pandemic, OW reported having good health, healthy food consumption, good sleep quality, and moderate PA; but their stress and SB were increased. Undergraduate OW reported being 4 times healthier than those with postgraduate education (OR = 4.30). Those with bachelor's degrees reported 3 times less stress than OW with postgraduate degrees (OR = 3.54). The PA of OW who earn 20,000-30,000 Baht/month was 3 times lower compared to higher earners (OR = 3.11). Younger and female OW had 2 times increase in SB (OR = 2.01 and 2.30, respectively). Officers who lived in single-family homes and apartments reported consuming 3 times less and twice as many healthy foods as those who lived in dorms, consequently, (OR = 2.57 and 2.40, respectively). The OW who lived in a single house and condominiums reported 2 and 4 times less good sleep quality compared to those who lived in dorms (OR = 2.16 and 4.71, respectively). If returned to normal, OW wants to work as a hybrid, be more physically active, eat a nutritious diet, put greater emphasis on sleep and reduce SB.

**Conclusions:** Changes in health behaviors as a result of an epidemic depend on a number of factors, including age, education, and accommodation. After the pandemic, Bangkok OW increased their desire to take care of their health. Organizations should take into account the factors that influence health behaviors and have policies in place to promote better health of their workforce.

# Findings from the ‘Vivo Play Scientist’ program – a community based intervention involving the use of wearable activity trackers and an eHealth application.

**Prof. Patricia Doyle-Baker<sup>1</sup>**, Dr. Jennie Petersen<sup>1</sup>, Ms. Dalia Ghoneim<sup>1</sup>, Ms. Anita Blackstaffe<sup>1</sup>, Ms. Calli Naish<sup>1</sup>, Associate Professor Gavin McCormack<sup>1</sup>

<sup>1</sup>University of Calgary, Calgary, Canada

Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Interventions incorporating wearable technology and eHealth applications encourage participants to self-regulate physical activity (PA) and sedentary behaviour (SB). In 2020, a Calgary (Canada) recreational facility developed and implemented the ‘Vivo Play Scientist (VPS)’ program, which provided participants with a free wearable activity tracker (WAT; Garmin Vivofit4) with the option of connecting to a customized eHealth dashboard. **Objective:** To evaluate the effectiveness of the VPS program on PA and SB.

**Methods:** Our concurrent mixed-method study included a single-arm repeated-measures design with semi-structured interviews. Participants ( $\geq 18$  years;  $n=87$ ) completed three self-administered online surveys ( $T_0$ , before receiving WAT/dashboard;  $T_1$ , 4-weeks;  $T_2$ , 8-weeks). The surveys captured sociodemographic characteristics, PA behaviour, motivation, SB, WAT and eHealth use and perceived usefulness. Some participants ( $n=23$ ) completed semi-structured telephone interviews on their program experiences. PA and SB were compared between the three time points using Friedman’s tests and the interview data was analyzed using thematic methodology.

**Results:** The mean age of participants was 39.8 (SD 7.4) years and 74.7% were female. Approximately half of all participants had used wearable technology (46.0%) or an eHealth application (49.4%) prior to the intervention. On average, participants wore the WAT on 6.4 (SD 1.7) days in the past week at  $T_1$  and on 6.0 (SD 2.2) days in the past week at  $T_2$ . On average participants used the dashboard on 1.6 (SD 2.1) days in the past week at  $T_1$  and 1.0 (SD 1.8) days in the past week at  $T_2$ . Average levels of perceived usefulness and ease of use for the Vivofit4 and dashboard remained high during the 8-week program ( $T_1$  to  $T_2$ ). The average time spent walking at 8-weeks was significantly higher compared with baseline ( $T_0$  180.34 vs.  $T_2$  253.79 min/week,  $p=.005$ ). Compared to baseline, the mean time spent sitting was significantly lower at 8-weeks ( $T_0$  334.26 vs.  $T_2$  267.13 min/day,  $p<.001$ ). Participants described how the WAT output and “move” notifications encouraged them to modify their PA and SB.

**Conclusions:** Providing adults with a free WAT and eHealth application has the potential to facilitate improvements in PA and SB in the short-term, even under COVID-19 pandemic public health restrictions.

# Sustainable Development for Mobile Health Applications Using the Human-Centered Design Process

**Miss Qingfan An**<sup>1</sup>, Dr. Marjorie Kelley<sup>2</sup>, Assistant Professor Audra Hanners<sup>2</sup>, Associate Professor Po-Yin Yen<sup>3,4</sup>

<sup>1</sup>Umeå University, Umeå, Sweden, <sup>2</sup>The Ohio State University, Columbus, USA, <sup>3</sup>Washington University School of Medicine in St. Louis, St. Louis, USA, <sup>4</sup>Barnes-Jewish College, St. Louis, USA

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** There is well-documented scientific evidence indicating that mobile health (mHealth) applications (apps) for health behavior change can improve the quality of life, relieve symptoms and restore health for patients. In addition to improving patients' health outcomes, mHealth apps also reduce health care utilization and the cost burdens associated with disease management. Currently, patients and healthcare providers (HPs) have a wide variety of choices among commercially available mHealth apps. However, due to the high resource costs and low user adoption of mHealth apps, the cost-benefit relationship remains controversial.

**Methods:** When compared to traditional expert-driven approaches, applying human-centered design (HCD) may result in more useable, acceptable, and effective mHealth apps. After reviewing the current HCD practices in the mHealth for health behavior change domain, we made recommendations on HCD practices when developing mHealth apps.

**Results:** These recommendations focus on employing cultural considerations, applying iterative evaluation, incorporating novelty in design outcomes, and considering privacy and reliability across the entire HCD process. To guide the development of mHealth apps, we also suggest a sociotechnical lens toward HCD practices to promote the sustainability of mHealth apps.

**Conclusion:** Future research should consider standardizing the HCD practice to help mHealth researchers and developers avoid barriers associated with inadequate HCD practices.

# Physical activity during the COVID-19 pandemic in the UK: a qualitative analysis of free-text survey data

**Miss Verity Hailey<sup>1</sup>**, Dr. Alexandra Burton<sup>1</sup>, Prof. Mark Hamer<sup>1</sup>, Dr. Daisy Fancourt<sup>1</sup>, Dr. Abigail Fisher<sup>1</sup>

<sup>1</sup>University College London, London, United Kingdom

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Several quantitative studies have found a decline in physical activity in response to COVID-19 pandemic restrictions. The aim of the present study was to use large-scale free text survey data to qualitatively gain a more in-depth understanding of the impact of the COVID-19 pandemic on physical activity, then map barriers and facilitators to the Capability, Opportunity, Motivation, and Behaviour (COM-B) Model of Behaviour to aid future intervention development.

**Methods:** Data was gathered from the COVID-19 Social Study, a large scale, longitudinal, observational, panel study of adults living in the UK during the COVID-19 pandemic. 17,082 participants provided a response to the free text module, and data from those who mentioned a physical activity related word in any context were included in the analysis. Data were analysed using thematic analysis using an inductive approach, and key themes identified.

**Results:** 5396 participants provided 7490 quotes related to physical activity. The sample were predominately female (84%), white (British/Irish/Other) (97%) and aged <60 years (57%). Seven key themes were identified: the importance of outdoor space, changes in daily routine, COVID-19 restrictions prevented participation, perceived risks or threats to participation, the importance of physical health, the importance of physical activity for mental health and the use of technology.

**Conclusion:** Future physical activity interventions could encourage people to walk outdoors, which is low cost, flexible, and accessible to many. Developing online resources to promote and support physical activity provides a flexible and accepted way to deliver quality content to a large audience. Online resources can provide activities that can easily be undertaken both outdoors and indoors e.g. in the home environment to facilitate year-round participation.

# Context is Everything: The development of an electronic time-use diary to concurrently measure context during accelerometer wear protocols for youth

**Dr. Michael Beets**<sup>1</sup>, Dr. Christopher Pfladderer<sup>1</sup>, Dr. Sarah Burkart<sup>1</sup>, Miss Xuanxuan Zhu<sup>1</sup>, Dr. Layton Reesor-Oyer<sup>1</sup>, Dr. Bridget Armstrong<sup>1</sup>, Dr. R. Glenn Weaver<sup>1</sup>, Dr. Elizabeth Adams<sup>1</sup>

<sup>1</sup>University of South Carolina, Columbia, USA

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Variation in where youth spend their time within and across days can have an impact on their 24hr movement behaviors. Current methods to capture time-use often sample a limited number of days and are burdensome for participants. This presentation describes the development of an electronic time-use diary which allows contextual data to be collected over multiple, consecutive days via smartphone and mapped onto accelerometry data to create contextually rich, time-segmented data for understanding contextual influences on youth 24hr movement behaviors.

**Methods:** Initial considerations during the development of the time-use diary were: 1) ease of completion by parent (time to complete), 2) contextual comprehensiveness (programs, settings, events, and activities linked to youth 24hr movement behaviors), and 3) the ability to capture duration of events (start and end times of activity contexts in 15min increments). We contracted with the open-source R package GGIR to create a novel day-segment analysis package for backend processing.

**Results:** The time-use diary was created in Qualtrics. The time-use diary was deployed in a cohort study of US children's school/summer behaviors using a 14-day accelerometer wear protocol. The diary was distributed at 7:30PM each night to a parent's smartphone via an automated texting service developed by our research team. The time-use diary involved parents completing a series of questions about their child's previous 24hrs, starting with bedtime the previous night, waketime, meal timing, snack consumption, accelerometer wear time compliance, and the setting-specific contexts of their child's activities (e.g., afterschool program, sports, friend's house). Each completed time-use diary had time/date stamped information which was used to map onto accelerometry data for segmentation within and across days. An average of 6,671 time-use diaries were completed on an average of 614 children across five, 14-day periods (2021-2022). The average duration to complete the time-use diary was 6.7min (3.3-12.3min 25<sup>th</sup> to 95<sup>th</sup> quantile). Children had on average 11 time-use diaries completed per 14-day measurement period.

**Conclusion:** The creation of a participant-friendly time-use diary facilitates capturing important contextual information that can be used to further the understanding of how youth spend their time and the impact of context on 24hr movement behaviors.



# Exercise providers in the UK are not using the physical activity guidelines to inform their strength prescription with older adults

**Dr. Ashley Gluchowski<sup>1</sup>**

<sup>1</sup>University of Manchester, Manchester, United Kingdom

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** Strength recommendations have been embedded within the UK's Chief Medical Officers' physical activity guidelines since 2011. In 2019, the strength recommendations were given a more prominent position in the accompanying infographic. However, there is limited evidence that these recommendations underpin strength prescription in the older adult population. This study aimed to explore exercise providers' engagement with the guidelines to gain a nuanced understanding of their awareness, knowledge, and implementation of evidence-based strength training prescription to their older adult clientele.

**Methods:** Fifteen exercise providers working with older adults in the UK participated in one online interview. A general inductive approach was used to generate themes from the data. Five major themes were found – 1. The strength guidelines, 2. Building strength, 3. The motivators and barriers to working with the older adult population, 4. The interpretation of evidence-based strength training, and 5. The future of strength training.

**Results:** Most (n=9), but not all, exercise providers were familiar with the guidelines, however, other sources of exercise information seemed to be preferred. Only one provider had implemented the guidelines into their practice, as guidelines were generally felt to be irrelevant to their clientele. The words '*strength*' and '*exercise*' were avoided, as they were known to intimidate older adults. Job satisfaction was notably high in our participants, but financial barriers to evidence-based prescription were mentioned throughout our conversations. Strength training took on a variety of meanings and resulted in exceptionally varied prescription. The future of strength training prescription needs to overcome a number of barriers in order for evidence to become widely adopted in practice.

**Conclusions:** From our interviews, the strength programmes described are likely not optimised for strength gain and other important outcomes and benefits to the older adult population. Since increased strength has been shown to decrease individual and societal burden of age-associated disease, multi-morbidity, and all-cause mortality, we hope these findings continue to draw attention to, and further the debate, research, and drive for practical change in the way we promote and disseminate evidence-based strength training to the older adult population and the ones who provide this service.

# Are Physical Activity and Loneliness interrelated with in older people and Long-Covid Patients? Findings from a longitudinal study over 6 years and an RCT Study

**Prof. Sonia Lippke**<sup>1</sup>, Dr. Volker Cihlar<sup>2</sup>

<sup>1</sup>Jacobs University Bremen, Bremen, Germany, <sup>2</sup>Bundesinstitut für Bevoelkerungsforschung, Wiesbaden, Germany

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** To investigate (1) How physical activity (PA) and loneliness are interrelated, (2) What predicts PA over and beyond loneliness – both in community-dwelling older adults and Long-Covid Patients participating in an RCT empowering them to self-manage their disease. The innovative contribution about this research is to combine primary and secondary prevention perspectives (older healthy adults, Long-Covid patients).

**Methods:** Two studies were conducted with a longitudinal research design. Measures were taken by means of interviews; analyses performed with SPSS employing binary and multivariate analyses as well as MPlus running a structural equation model.

In study 1 with older adults, three-measurement survey was conducted over 6 years (n=5,002 in T1, n=2,501 in T2, n=1,561 in T3). Participants were aged 54-70 years. Of the sample 55% was female.

In study 2 with Long-Covid patients were assessed also three times and randomized to Intervention Group (Self-management support by Counselors and via web-based services, Assessment at a clinic, n=51), a Control Group (CG, same as IG but no Assessment; n=62) and a Comparison Group which only was measured by questionnaires (n=63). Participants were aged 20-61 years. The sample consisted of 63% women.

**Results:** In older adults, the proportion of physically active individuals increased over time (T1 53.8%; T2 58.6%; T3 66.4%). Loneliness was partially correlated with PA. In the path model, subsequent PA was predicted by previous PA, self-rated physical and mental health, but not loneliness. Lonely individuals appeared more likely to report poor self-rated health, high neuroticism, low extraversion, and low conscientiousness. Long-Covid patients' PA was significantly correlated with the risk factor adiposity but not with loneliness directly but indirectly. However, more sleeping problems were associated with more loneliness and less PA.

**Conclusions:** Helping lonely individuals and Long-Covid patients to become adequately physically active and thereby managing health limitations could be an important target for future PA interventions. Taking behavioral nutrition and sleep routines into account can help as well becoming sufficiently physically active. Implications are tailored approaches also based on to multiple behavior change theory taking loneliness into account.

**Keywords:** Loneliness, physical activity, path analysis, big five, behavior change.

# Adapting a home-based obesity prevention intervention to promote healthy family routines in deprived neighbourhoods in Germany using qualitative focus groups

**Dr. Heide Busse**<sup>1</sup>, Dr. Tilman Brand<sup>1</sup>, Miss Marie Schepan<sup>1</sup>, Miss Elisabeth Rataj<sup>2</sup>, Associate Professor Jess Haines<sup>3</sup>, Dr. Maike Wolters<sup>4</sup>, Prof. Hajo Zeeb<sup>1</sup>, Prof. Wolfgang Ahrens<sup>4</sup>, Other - on behalf of the GrowH! consortium<sup>5</sup>

<sup>1</sup>Department Prevention and Evaluation, Leibniz Institute for Prevention Research and Epidemiology - BIPS, Bremen, Germany, <sup>2</sup>State Association for Health and Academy for Social Medicine Lower Saxony (Landesvereinigung für Gesundheit und Akademie für Sozialmedizin Niedersachsen e. V.) , Bremen, Germany, <sup>3</sup>Department of Family Relations & Applied Nutrition, College of Social & Applied Human Sciences, University of Guelph, Guelph, Canada, <sup>4</sup>Department Epidemiological Methods and Etiological Research, Leibniz Institute for Prevention Research and Epidemiology - BIPS, Bremen, Germany, <sup>5</sup>Leibniz Institute for Prevention Research and Epidemiology - BIPS, Bremen, Germany

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Family-based approaches have been identified as an effective way to promote child health and prevent childhood obesity. The “Healthy Habits, Happy Homes” intervention involves health educators trained in motivational interviewing providing home visits with participating families to support them in improving self-selected family health behaviours. The intervention has been found effective in North America and will be tested for feasibility and acceptability in Germany. To assure its relevancy, we aimed to contextually adapt the intervention by conducting focus groups with parents and stakeholders in Germany.

**Methods:** Parents were recruited through local community centres. Stakeholders, health educators currently working in schools and communities in the local area, were recruited through existing contacts. Focus groups were arranged either face-to-face or online, depending on participants' preferences. Semi-structured topic guides were employed to obtain views on the relevancy of the target intervention behaviours and materials and to discuss recruitment and communication. Focus groups were audio-recorded, transcribed and analysed using thematic analysis.

**Results:** Three focus groups were conducted with parents (n=15 mothers) and two focus groups with stakeholders (n=14) lasting approximately 90 minutes in length. Participants generally deemed the intervention useful and relevant for the German context and agreed with the selected range of health behaviours. Suggestions were made to additionally plan for ‘family time’ and ‘family communication’ within visits. Some participants identified that home visits could make families feel controlled or judged, suggesting that a ‘neutral’ meeting space should be offered in addition to home visits. Visits with families should be provided depending on the family’s availability, which might likely involve weekends. Contact with families is best kept through mobile phone or WhatsApp and all intervention material should be in easy-to-understand, simple language.

**Conclusions:** Results contributed to the adaption of the “Healthy Habits, Happy Homes” intervention materials and study processes for the German context. Being flexible and providing families with an element of choice were seen as important aspects when working with families in health promotion activities. Study results also helped inform the design of the planned feasibility study of the intervention in Germany, which is the next step in this research project.

# Effects of Personalized Exercise Prescriptions and Social Media through m-Health on Elderly Cancer Survivors' Physical Activity and Quality of Life

**Prof. Zan Gao<sup>1</sup>**, Ms. Suryeon Ryu<sup>1</sup>, Mr. Wanjiang Zhou<sup>1</sup>, Ms. Kaitlyn Adams<sup>1</sup>, Dr. Mohamed Hassan<sup>1</sup>, Dr. Rui Zhang<sup>1</sup>, Dr. Anne Blaes<sup>1</sup>, Dr. Julian Wolfson<sup>1</sup>, Dr. Ju San<sup>1</sup>

<sup>1</sup>University of Minnesota, Minnesota, USA

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** C. Cancer prevention and management

**Purpose:** To our knowledge, few studies have integrated multiple m-health approaches to promote physical activity (PA) and health in elderly cancer survivors. Therefore, the purpose of this project was to examine the effects of a multi-component intervention (personalized exercise prescription and social media) on cancer survivors' PA and other health outcomes, compared to prescription only, Facebook only, and attention control conditions.

**Methods:** A total of 126 cancer survivors ( $\bar{X}$  age = 60.37  $\pm$  7.41 years) were recruited from the U.S. for this 6-month study. They were randomly placed to 4 groups with each receiving a Fitbit tracker and installing its companion app: 1) received weekly personalized exercise prescriptions via email, 2) received weekly Facebook health education and interacted with one another, 3) received both conditions 1 and 2, and 4) control condition: adopted usual care. Cancer survivors' PA daily steps, quality of life (i.e., physical health and mental health), and PA determinants (e.g., self-efficacy, social support) were measured at baseline, 3 months, and 6 months.

**Results:** Final sample size included 123 cancer survivors with only 3 dropouts. The results revealed the 3 intervention conditions had greater improvements in PA daily steps than the control group over time (all  $p < 0.05$ ; partial eta-squared = 0.05-0.12 with small, medium, and large effect sizes classified as 0.01, 0.06, and 0.14). Notably, Cancer survivors in the multi-component condition demonstrated more improvements (+1,514 steps/day) in steps than personalized exercise prescription only arm (+420 steps/day) and Facebook only arm (+419 steps/day). Similarly, those in the multi-component condition had the most improvement in physical health as compared with other 3 conditions and in mental health as compared to the 2 other intervention conditions ( $p < 0.05$ ). Also, those in the intervention conditions showed greater increased self-efficacy and enjoyment than those in the control condition ( $p < 0.05$ ). No other significant difference were identified.

**Conclusions:** The study findings suggested that the implementation of multi-component mobile health intervention had positive effects on cancer survivors' PA, quality of life, and certain PA determinants. Also, offering sole m-health intervention may be beneficial to cancer survivors' PA and certain PA determinants.

# The importance of nutrition in pregnancy and the impact of food insecurity (FI) for maternal and infant health and well-being

**Dr. Nicola Heslehurst<sup>1</sup>**, Ms. Zoe Bell<sup>1</sup>, Dr. Gina Nguyen<sup>1</sup>, Dr. Steph Scott<sup>1</sup>

<sup>1</sup>Newcastle University, Newcastle, United Kingdom

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** FI exists when there is inadequate access to sufficient, safe, nutritious foods to meet dietary needs/preferences for healthy lives. FI removes individuals “healthy diet choices”. FI prevalence in HICs is increasing, particularly among young women and children; life course stages with increased nutritional demands. This symposium provides an overview of completed and on-going systematic review evidence from HICs on FI during life course stages around pregnancy.

**Methods:** Quantitative evidence from global HICs reports associations between FI and maternal diet/nutrition in pregnancy, gestational weight gain (GWG) and pregnancy health outcomes. Qualitative evidence reports experiences of FI and nutritional health/wellbeing amongst childbearing-age women in European HICs, women’s pregnancy-specific experiences of FI among global HICs, and UK newspaper portrayal of maternal FI.

**Results:** Seven studies reported associations between maternal FI and diet/nutrition outcomes, including reduced fruit, vegetable and Vitamin E intake and diet quality, and increased red/processed meat intake. Nine studies reported mixed results for FI and GWG which showed both increased and reduced GWG, and inadequate GWG. Twenty-two qualitative studies reported European women’s experiences of attempting to access sufficient food, inability to meet nutritional needs, how FI was embedded into their everyday lives, and embodied unhealthful physical, social, nutritional and mental health. There were 254 UK newspaper articles, which portrayed the government as the main driver of FI, and mothers and children suffering the health consequences and requiring access to food aid strategies. The reviews exploring FI and pregnancy outcomes and pregnancy-specific experiences in global HICs are on-going.

**Conclusions:** Women experiencing FI around pregnancy life course stages have poorer nutritional health and wellbeing, and the psychosocial impact is substantial. As FI is a determinant of diet behaviour, which removes individual agency, interventions to reduce health inequalities are required to support healthy nutrition in this population. News media is powerful at shaping public perceptions and framing health issues, which could influence government response to public demands for change. The empathetic newspaper portrayal of maternal FI suggests there is public support for policy and intervention in this population to address health inequalities and improve health and well-being of women and their children.



# Associations of motivation and interpersonal context with self-report and objective physical activity of married partners

**Prof. Elizabeth Richards**, Prof. Melissa Franks, Prof. Sharon Christ, Dr. Anna Forster, Prof. Shirley Rietdyk  
<sup>1</sup>Purdue University, West Lafayette, USA

Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** A. Ageing

**Purpose:** Physical activity (PA) prevents chronic disease yet a majority of developed countries' populations do not meet PA guidelines. This highlights the importance of understanding a broad range of psychosocial PA correlates such as autonomous motivation. In addition, married partners are concordant in their PA, which is an additional factor to consider beyond individual-level motivation. Further, most research uses self-reported PA specific to exercise when assessing correlates. Understanding how motivation relates to a broad range of PA measured objectively is an important next step to identify target points for future interventions. This study examined the associations of motivation with self-report and objective PA among husbands and wives. The associations of partner's PA is also examined.

**Methods:** Two community samples (n=74 couples; age range 25-74 years) were recruited to study PA in the context of committed relationships. Motivation was assessed with the relative autonomy index (RAI) derived from the Behavioral Regulation in Exercise Questionnaire-3. Self-report moderate-to-vigorous PA (MVPA) was measured with the Godin Leisure Time Exercise questionnaire. Objective MVPA was assessed with Actigraph™ accelerometers. Bivariate correlations and multiple regression analyses, adjusting for accelerometer wear time, body mass index, age, self-rated health, and partner MVPA, were conducted.

**Results:** Husbands' and wives' self-reports and objective MVPA were correlated ( $r=.36-.43$ ;  $p<.01$ ) and their RAI were weakly correlated ( $r=.26$ ;  $p<0.10$ ). For wives', RAI was significantly associated with self-report MVPA ( $\beta=.48$ ;  $p<0.01$ ) but not objective MVPA ( $\beta=.06$ ;  $p>0.10$ ). In husbands, RAI was also significantly associated with self-report MVPA ( $\beta=.33$ ;  $p<0.01$ ) but not objective MVPA ( $\beta=.05$ ;  $p>0.10$ ). Husbands' and wives' objective MVPA was significantly associated with spouses' MVPA ( $\beta=.40-.43$ ;  $p<0.01$ ).

**Conclusions:** Findings suggest RAI is associated with self-reports of MVPA for exercise but not with overall MVPA measured objectively, which includes exercise and non-exercise activity. Motivation is likely associated with PA for health purposes (such as leisure time activity) rather than all forms of activity measured by accelerometry. In couples, PA participation may not be solely an individual endeavor but also linked to the PA of the spouse. These results highlight the importance of considering the interpersonal context of marital partners when assessing PA factors.

# Parental travel behaviours, accompaniment, and children's active transportation: A multi-site study

**Mrs. Victoria Hecker**<sup>1</sup>, Dr. Sébastien Blanchette<sup>2</sup>, Dr. Guy Faulkner<sup>3</sup>, Dr. Negin Riazi<sup>4</sup>, Dr. Mark Tremblay<sup>5</sup>, Dr. François Trudeau<sup>6</sup>, Dr. Richard Larouche<sup>1</sup>

<sup>1</sup>Faculty of Health Sciences, University of Lethbridge, Lethbridge, Canada, <sup>2</sup>Department of Kinesiology, Crandall University, Moncton, Canada, <sup>3</sup>School of Kinesiology, University of British Columbia, Vancouver, Canada, <sup>4</sup>Department of Health Sciences, Brock University, St. Catharines, Canada, <sup>5</sup>Healthy Active Living and Obesity Research Group, CHEO Research Institute, Ottawa, Canada, <sup>6</sup>Département des sciences de l'activité physique, Université du Québec à Trois-Rivières, Trois-Rivières, Canada

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Active transportation (AT) can be an important source of physical activity in children, but most previous research has focused on the trip to/from school. This study investigated whether parents' travel mode to school as a child, current travel mode to work, and parental accompaniment on the trip home from school are associated with their children's AT to/from multiple locations.

**Methods:** Grade 4-6 children were recruited from urban, suburban, and rural schools in the regions of Vancouver, Ottawa and Trois-Rivières. Parents reported their current travel mode(s) to work, school travel mode as a child, and how many days they accompanied their child home from school. During 7 consecutive days, children self-reported the number of active trips that they took to and from different locations (school, houses of friends and relatives, parks, shops, sport venues, etc.) in a diary. The analytic sample included 1699 children (55% girls) and multiple imputation was performed to replace missing data. Generalized linear mixed models based on a negative binomial distribution were used to investigate the association between parental behaviours and their child's AT. The models were stratified by gender and adjusted for child age, parent gender, level of urbanization, and school-area socioeconomic status.

**Results:** Children whose parents took the bus to school as a child reported 12% less active trips (95%CI 0.79-0.99). For each day a parent accompanied their child home from school, children participated in 7% less active trips (95%CI for girls 0.90-0.97, boys 0.90-0.96). Boys living in Vancouver had 51% more active trips compared to Ottawa as a reference site (95%CI 1.13-2.04). There were no significant associations for parent's current travel mode.

**Conclusions:** Our findings suggest that children may have more opportunities for AT if parents allow them to come home from school unaccompanied. Given that parents may drive their child to/from school on the way to work, interventions to promote children's AT should address the perceived convenience of driving and encourage active commuting to work among parents. More research is needed to investigate why children engage in less AT if their parents took the bus as children.

# Relative importance of determinants of changes in eating behavior during the transition to parenthood: priorities for research and interventions

**Dr. Vicka Versele**<sup>1,2</sup>, Dr. Marijn Stok<sup>3</sup>, Prof. Dirk Aerenhouts<sup>1</sup>, Prof. Peter Clarys<sup>1</sup>, Prof. Benedicte Deforche<sup>1,4</sup>, Prof. Eva D'Hondt<sup>1</sup>, Prof. Roland Devlieger<sup>2,5,6</sup>, Prof. Annick Bogaerts<sup>2,7,8</sup>, Prof. Tom Deliens<sup>1</sup>

<sup>1</sup>Faculty of Physical Education and Physiotherapy, Department of Movement and Sport Sciences, Vrije Universiteit Brussel, Brussels, Belgium, <sup>2</sup>Faculty of Medicine, Department of Development and Regeneration, KU Leuven, Leuven, Belgium, <sup>3</sup>Department of Interdisciplinary Social Science, Utrecht University, Utrecht, Netherlands, <sup>4</sup>Faculty of Medicine and Health Science, Department of Public Health and Primary Care, Ghent University, Ghent, Belgium, <sup>5</sup>Obstetrics and Gynaecology, University Hospitals KU Leuven, Leuven, Belgium, <sup>6</sup>Department of Obstetrics, Gynaecology and Fertility, GZA Campus Wilrijk, Antwerp, Belgium, <sup>7</sup>Faculty of Medicine and Health Sciences, Centre for Research and Innovation in Care (CRIC), University of Antwerp, Antwerp, Belgium, <sup>8</sup>Faculty of Health, University of Plymouth, Plymouth, Plymouth, United Kingdom

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Understanding the relative importance of determinants of changes in eating behavior throughout pregnancy and postpartum is crucial when developing interventions aiming to improve eating behavior in this lifechanging phase. We aimed to investigate to what extent determinants of changes in eating behavior affect expecting and first-time parents' eating behavior, taking sex into account. A second aim was to involve experts in the field of maternal health and/or nutrition/physical activity and/or public health prioritizing the determinants.

**Methods:** A list of 54 determinants was rated by first-time parents on a scale of 1 (no impact) to 10 (very high impact). Descriptive statistics were used to describe each determinant, independent samples t-tests to examine sex differences. Experts rated the determinants on a level of modifiability, relationship strength and population-level effect, after which a 'priority for research'-score was generated based on these ratings.

**Results:** During pregnancy, the top three determinants receiving the highest scores for women were at the individual level, namely 'health concerns', 'physiological changes' and 'fatigue'. For men the three most important determinants were at the individual level, namely 'health concerns' and 'health consciousness', and at the interpersonal level, namely 'influence of the pregnant partner'. Postpartum, the three highest rated determinants by women were related to the baby (interpersonal), namely 'adaptation to the rhythm of the baby', 'baby becomes priority' and 'practical constraints because of the baby'. For men, 'adaptation to the rhythm of the baby' (interpersonal) received the highest score, followed by 'fatigue' and '(lack of) anticipation' (both at the individual level). According to the experts, the determinants 'professional support' (interpersonal), 'food knowledge' (individual) and 'home food availability' (environmental) were of highest priority for both sexes and during both periods, as these were rated as highly modifiable, strongly related to eating behavior and having a high population level effect.

**Conclusions:** During pregnancy and postpartum, research priority should go to interventions supported through health professionals, aimed at both parents, and with a focus on food and health education. Postpartum, an additional focus towards supporting balance between one's own health and care for the baby is advised.

# Mashing Three Potatoes with One Fork: Examples of Advancing Implementation Science, Nutrition Research, and Community Priorities in a Single Project

**Dr. Taren Swindle, Dr. Julie Rutledge**

<sup>1</sup>University of Arkansas for Medical Sciences, Little Rock, USA, <sup>2</sup>Louisiana Tech University, Ruston, USA

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** Community-Engaged Dissemination and Implementation Research (CEDI) emphasizes the importance of partner engagement in effective implementation projects. Examples of effective CEDI projects in nutrition research are limited. The purpose of this presentation is to describe two CEDI projects that advanced the implementation of evidence-based nutrition practices in the early care and education (ECE) setting. We illustrate common methods for identifying and prioritizing determinants of implementation with community partners, selecting and specifying implementation strategies as aligned with community priorities, and evaluating the success of our strategies using Effectiveness-Implementation Hybrid Designs.

**Methods:** Project 1 aimed to increase uptake and fidelity of 4 evidence-based practices (EBPs) for nutrition promotion in ECE. Project 2 aimed to decrease (i.e., de-implement) use of inappropriate feeding practices and increase use of EBPs at nutrition lessons and meals. For both projects, we identified determinants of implementation through in-depth interviews with front-line implementers who were high and low (i.e., deviant) on EBPs. Next, we sorted identified barriers and facilitators into high, medium, and low priority using a card sort activity with a panel of community partners. The research team aligned the prioritized determinants with potential implementation strategies and presented them to the panel. The panel then rated each potential strategy on its importance and feasibility for achieving the desired goals of the project and provided input on the specification of selected strategies before testing. Finally, both projects deployed a Hybrid Type III implementation trial to evaluate success. Implementers provided qualitative feedback on their experiences to inform further iteration of strategies.

**Results:** Both projects impacted targeted implementation outcomes in the desired direction. Project 1 demonstrated significantly improved fidelity to 3 of 4 targeted EBPs as well as improvements in implementers' perceived appropriateness of the practices and their organizational readiness for change. Project 2 demonstrated significantly decreased inappropriate feeding practices and increased EBPs at both nutrition lessons and meals. Qualitative feedback provided specific ways to improve each of the implementation strategies for both projects (e.g., reminders of resources).

**Conclusions:** CEDI approaches can improve the relevance and success of implementation projects for advancing the use of nutrition research evidence in community settings.

# How to involve teachers at vocational schools as ambassadors for physical activity in childcare

Ms. Vanessa Kaiser, Ms. Celine Maisel, **Mr. Holger Hassel**

<sup>1</sup>Coburg University Of Applied Sciences, Coburg, Germany

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** During the project “QueB 2 – developing quality with and through physical activity (PA)” fourteen childcare centres in Bavaria developed their setting to activity friendly environments by themselves. In the second phase different strategies to empower multipliers in spreading awareness for PA were tested. Currently, the aim is to involve teachers at vocational schools for early childhood education in order to reach out and sensitize prospective educators for PA. Therefore, the integration of project planning tools in the curriculum to ensure high qualitative and sustainable interventions is essential.

**Methods:** Educational materials for teachers at vocational schools were developed in three steps: (1) To train future educators in planning PA interventions four workshops in two schools with 80 students were implemented. (2) A theoretical model for project planning then helped to categorize the collected recommendations and sample projects from the students and, based on this, to create a manual for project development. (3) After testing the materials in class, utilisation and acceptance were reflected with the help of a short questionnaire.

**Results:** The categorized results of the second step were summarized in a manual for planning PA interventions in childcare centres. Additionally, a short tutorial by video was designed. These two variations form the basis of the educational materials to enable teachers to disseminate PA promotion in class. Both instructional materials were published on a website and provided for free in order to be used by the interested target group. In step three, teachers tested the proceeding in class and filled in the short questionnaire. The majority of teachers perceived the training material as useful, appreciated its clear structure and appealing design. An increased awareness of factors concerning PA in childcare centres was also emphasized by the teachers.

**Conclusions:** Teachers at vocational schools considered the materials as useful to embed parts of planning PA interventions in childcare settings in the curriculum. Transferring developed manuals to multipliers by providing suitable training modules seem to be a successful and sustainable way to ensure quality in planning processes.



# Real-Time Predictors of Food Parenting Practices and Child Eating Behaviors in Racially/Ethnically Diverse Families within the Context of Food Insecurity

**Dr. Jerica Berge<sup>1</sup>**

<sup>1</sup>University of Minnesota, Minneapolis, USA

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Prior research indicates associations between controlling food parenting practices (e.g., pressure-to-eat, restriction) and factors that increase risk for cardiovascular disease in children (e.g., low diet quality, obesity). However, little is known about whether these associations depend on food security status, race/ethnicity, or sex/gender. This study aimed to examine associations between real-time parental stress and depressed mood, food parenting practices, and child eating behaviors within the context of food insecurity.

**Methods:** Children ages 5-9 and their families (n=631) from six racial/ethnic groups (African American, Hispanic, Hmong, Native American, Somali/Ethiopian, White) were recruited for this study through primary care clinics in Minneapolis/St. Paul, MN in 2018. Ecological momentary assessment was carried out over seven days with parents at two time points, 18 months apart. Generalized estimating equations with a binomial variance family and logistic link to account for multiple daily observations for each family/child were run. To examine moderation, interaction terms between the predictor variables and child race/ethnicity, sex, and food security status at the data collection time point, were added separately to each model.

**Results:** High levels of parental stress and depressed mood experienced earlier in the day were associated with controlling food parenting practices and child food fussiness at dinner the same night. Results were dependent on food insecurity status, race/ethnicity, and child gender. Specifically, parents from immigrant/refugee households were more likely to engage in restrictive food parenting practices in the face of stress, whereas Black and Native American parents were more likely to engage in pressure-to-eat food parenting practices. In addition, the association between high stress and engaging in controlling food parenting practices was dependent on being a daughter and from a food insecure household.

**Conclusions:** Health care professionals may want to consider screening, or continue screening, parents for stress, depressive symptoms, and food insecurity during well child visits and discuss the influence of these factors on every day food parenting practices and child eating behaviors. Additionally, future research should consider using real-time interventions such as ecological momentary intervention to reduce parental stress and depressed mood to promote healthy food parenting practices and child eating behaviors.

# The Use of Virtual Reality to Assess the Impact of Geographical Environments on Walking and Cycling: A Systematic Literature Review

**Ms. Marzieh Ghanbari<sup>1</sup>**, Prof. Martin Dijst<sup>1, 3</sup>, Dr. Roderick McCall<sup>2</sup>, Dr. Camille Perchoux<sup>1</sup>

<sup>1</sup>Luxembourg Institute of Socio-Economic Research (LISER), Esch Sur Alzette, Luxembourg, <sup>2</sup>Luxembourg Institute of Science and Technology, Esch-sur-Alzette, Luxembourg, <sup>3</sup>University of Luxembourg, Esch-sur-Alzette, Luxembourg

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** This systematic literature review aims to identify attributes of geographical environments investigated in relation with walking and cycling behaviors, using Virtual Reality technologies. This study further aims to report on the impacts of environmental correlates of physical activity on people's attitudes and emotional experiences.

**Methods:** PubMed, Scopus, EBSCO, IEEE Xplore, and Cochrane Library were explored for articles published between January 2010 and February 2022. The search strategy was based on three keywords and their synonyms and types, which include: a) Virtual Reality (VR), b) Active behavior, and c) Built environment. The articles were limited to the English-language, reporting information relating to adults (+18), and were published in journals. There was no restriction for gender. Studies on indoor environments, driving simulation, disease-specific groups, interventions related to other disciplines (e.g. Military, Emergency evacuation, and Education), and studies that optimized the methodology or software were excluded. The full protocol is available from PROSPERO (ID=CRD42022308366).

**Results:** In total 75 out of 8992 original studies met the selection criteria. Expected results will consider different population characteristics (e.g. age ranges, socio-economic status, and participants' previous experience with VR), different study designs, and experiment session information (e.g. duration of experiment, length of exposure). It will also account for the different attributes of the walking and cycling behaviors, like walking speed, heart rate, heart rate variability and environmental characteristics of the built and natural environments; for instance, greenness and crowdedness. Expected results will identify and summarize the effects of geographical environment on walking and cycling in Virtual Reality experiments, and excavates the advantages and disadvantages of utilizing Virtual Reality in these studies, providing details on the consistency and limitations of the existing literature.

**Conclusions:** The findings of this review will identify the gaps in the literature and will provide valuable recommendations for future research to implement effective policy interventions to increase physical activity.

**Keywords:** Virtual Reality, Walking, Cycling, Experiment, Geographical environments

# Strategies to Increase Student School Meal Participation: A Systematic Review

Dr. Amelie Hecht<sup>1</sup>, **Dr. Deborah A. Olarte<sup>2</sup>**, Dr. Gabriella McLoughlin<sup>3</sup>, Dr. Juliana Cohen<sup>2</sup>

<sup>1</sup>The Lab at District of Columbia, Washington, District of Columbia, USA, <sup>2</sup>Merrimack College, North Andover, USA, <sup>3</sup>Temple University, Philadelphia, USA

Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** G. Children and families

**Purpose:** School meals play a critical role in promoting child nutrition and advancing equity. However, in the United States (US) many students do not participate in the National School Lunch Program or the School Breakfast Program. To increase student participation in school meals, a better understanding of evidence-based strategies that increase participation rates is warranted.

**Methods:** A systematic review was conducted to understand which interventions, initiatives, and policies increase school meal participation. Four electronic databases were searched (PubMed, Academic Search Ultimate, Education Resources Information Center, and Thomson Reuters' Web of Science) to identify peer-reviewed and government studies conducted in the US and published in English through January 2022. Study quality (i.e., risk of bias) was assessed using the Newcastle-Ottawa Scale for cross-sectional and cohort studies.

**Results:** Thirty-four articles met inclusion criteria. This review found strong evidence to support alternative breakfast models (e.g., breakfast in the classroom or grab-and-go breakfast) increase participation. Specifically, alternative breakfast models in combination with universal free school meals had greater effects on improving participation than either strategy alone. There is also strong evidence that restrictions on competitive foods (i.e., foods sold outside the school meal program through vending machines, à la carte, or school stores) increase school meal participation. Restrictions on competitive foods may also promote equity in schools by eliminating a two-tiered system of food service inaccessible to many children from households with low incomes. There is promising evidence that stronger nutrition standards do not negatively impact meal participation, and in some cases, may promote meal participation. There was limited high-quality evidence on the effect of taste tests, modified menu options, changes to the meal period length, changes to the cafeteria environment, and wellness policies.

**Conclusions:** Several interventions and policies may shape meal participation, such as alternative breakfast models, strategies to increase student enrollment in free and reduced-price meals and policies that ban meal shaming. Additional rigorous research is needed to explore these and other strategies to promote meal participation, including school-based interventions and local and state policies.

# A qualitative analysis of patient-provider conversations around movement behaviors during infant well-child visits

**Dr. Elizabeth Adams<sup>1</sup>**, Ms. Meghan Bastyr<sup>1</sup>, Dr. Laura Caccavale<sup>2</sup>, Dr. Romesh Wijesooriya<sup>2</sup>, Dr. Layton Reesor-Oyer<sup>1</sup>, Dr. Christopher Pfledderer<sup>1</sup>, Dr. Michael Beets<sup>1</sup>, Dr. R. Glenn Weaver<sup>1</sup>, Dr. Bridget Armstrong<sup>1</sup>, Dr. Sarah Burkart<sup>1</sup>, Dr. Melanie Bean<sup>2</sup>

<sup>1</sup>University of South Carolina, Columbia, USA, <sup>2</sup>Virginia Commonwealth University, Richmond, USA

Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** G. Children and families

**Purpose:** Infant well-child visits offer multiple opportunities to deliver evidence-based guidance on movement behaviors that promote health and well-being. This includes time in physical activity (e.g., active play, tummy time), sedentary behavior (e.g., screen time, restrictive devices), and sleep. However, the extent to which these topics are discussed in clinical settings is unknown, particularly during infancy. This study conducted an in-depth qualitative analysis of patient-provider conversations around movement behaviors during well-child visits to understand guidance parents receive and their questions/concerns regarding these behaviors within the first months of life.

**Methods:** Mother-infant dyads (N=20) were enrolled in this longitudinal pilot study. For each dyad, well-child visits at 2, 4, and 6 months of age were audiorecorded. Patient-provider conversations were transcribed and analyzed using thematic analyses. Themes around physical activity, sedentary behavior, and sleep were derived. Within each theme, dialogue was further conceptualized into pediatrician-initiated guidance and parent-initiated questions/concerns. Themes were compared across ages, and percentages were derived for the frequency of initiated topics discussed.

**Results:** Sleep was the most discussed movement behavior. Discussions centered around: 1) safe sleep practices (e.g., Sudden Infant Death Syndrome), 2) sleep duration and timing, and 3) parenting practices at bedtime and night wakings (e.g., sleep training). Pediatricians provided the most guidance around safe sleep and parenting practices at 2-months (45% and 70% of visits, respectively), while parents had the most questions/concerns about sleep duration and timing (initiated in 15-25% of visits across ages). Physical activity was discussed less often, and themes included: 1) active play (e.g., tummy time), 2) reaching motor milestones (e.g., rolling over), and 3) safe movement (e.g., baby proofing). Active play guidance was most commonly provided at 2-months (30% of visits), with safe movement guidance provided mostly at 6-months (55% of visits). Sedentary behaviors of screen time and restrictive devices were almost never discussed (5% of visits).

**Conclusions:** Although sleep was commonly discussed during infant well-child visits, guidance on physical activity and sedentary behaviors was minimal. These findings can inform enhancements to clinical care and identify opportunities for providing additional guidance, particularly regarding reducing sedentary behaviors to support healthy habits early in life.

# Do Adolescents' Physical Activity and Screen Time Differ across Settlement Types? Findings from the Otago Region, New Zealand

Associate Professor Asaduzzaman Khan<sup>1</sup>, Prof. Melody Smith<sup>2</sup>, Dr. Enrique García Bengoechea<sup>3,4</sup>, Prof. John Spence<sup>5</sup>, **Prof. Sandra Mandic<sup>6,7</sup>**

<sup>1</sup>University of Queensland, Brisbane, Australia, <sup>2</sup>The University of Auckland, Auckland, New Zealand, <sup>3</sup>Sport Ireland, Dublin, Ireland, <sup>4</sup>University of Limerick, Limerick, Ireland, <sup>5</sup>University of Alberta, Edmonton, Canada, <sup>6</sup>Auckland University of Technology, Auckland, New Zealand, <sup>7</sup>AGILE Research Ltd., Wellington, New Zealand

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Unhealthy lifestyle behaviours including insufficient physical activity (PA) and high screen time (ST) have been frequently reported among urban adolescents in developed countries. Knowledge about those behaviours among adolescents living in less urbanized areas and rural settings is limited. This study compared PA and ST among New Zealand adolescents attending schools across different settlement types.

**Methods:** Adolescents (n=2,113) from 23 of 27 secondary schools in the Otago region, New Zealand participated in the Built Environment and Active Transport to School (BEATS) Studies between 2014 and 2018. Adolescents self-reported their PA and recreational ST in an online questionnaire completed at school under supervision of research staff. The proportion of adolescents meeting PA ( $\geq 60$  min of moderate-to-vigorous PA/day) and recreational ST guidelines ( $\leq 2$  hrs/day) was calculated. Based on school location, participants were categorized into four groups: 'large-urban' area (n=1,125; 11 schools), 'medium-urban' area (n=260; 3 schools), 'small-urban' area (n=562; 5 schools) and 'rural' setting (n=166; 5 schools). Differences between the groups were compared using ANOVA and Chi-square tests.

**Results:** Overall, few adolescents met recommendations for PA (20.0%) and ST (14.1%). Differences across settlement types were observed for PA ('large-urban', 'medium-urban', 'small-urban', 'rural': 16.8%, 16.5%, 26.3%, 25.3%;  $p < 0.001$ ), motorised transport to school (66.5%, 56.6%, 48.6%, 54.8%;  $p < 0.001$ ) and sport participation at school (67.6%, 63.8%, 53.7%, 66.3%;  $p < 0.001$ ) and outside school (49.4%, 54.2%, 59.4%, 61.4%;  $p < 0.001$ ). Average daily ST outside school was significantly higher for adolescents living in the large urban areas compared to rural settlements ( $5.5 \pm 3.0$  vs.  $4.8 \pm 3.2$  hours/day;  $p = 0.040$ ). Weekend day average ST was higher for adolescents living in large and medium urban areas ( $6.9 \pm 3.5$  hours/day for both areas) compared to rural settlements ( $5.8 \pm 3.4$  hours/day;  $p < 0.05$ ). Weekday average ST was not different across settlement types ( $5.0 \pm 2.9$ ,  $5.0 \pm 2.8$ ,  $5.0 \pm 2.9$ ,  $4.4 \pm 3.0$ ;  $p = 0.112$ ).

**Conclusions:** Overall, few New Zealand adolescents met recommended PA and ST guidelines and unhealthy behaviours were more common among those living in large urban areas compared to rural settings. Therefore, health promotion interventions for adolescents should be comprehensive and tailored to urban and rural settings.



# Are fathers involved in developing healthy behaviours in adolescents? : A qualitative inquiry from Kolkata, India

**Dr. Neha Rathi**<sup>1</sup>, Prof. Anthony Worsley<sup>2</sup>, Prof. Sangeeta Kansal<sup>1</sup>

<sup>1</sup>Department of Community Medicine, Institute of Medical Sciences, Banaras Hindu University, Varanasi, India, <sup>2</sup>School of Exercise and Nutrition Sciences, Deakin University, Geelong, Australia

Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** G. Children and families

**Purpose:** Unhealthy dietary behaviours and sedentary lifestyle among Indian adolescents poses a significant public health challenge. The mounting prevalence of adolescent obesity and its associated adverse consequences are top concerns for policy makers and public health professionals. Family diet is viewed as a primary contributor to these health adversaries, with parents influencing their adolescents' food intake. Yet, much of the existing research exploring parenting influences on adolescents' diet focuses on mothers while fathers' involvement in shaping eating and physical activity behaviours of their young ones is underreported in the literature, more so in the LMIC context. Therefore, this qualitative inquiry aimed to describe Indian fathers' perceptions of developing healthy behaviours in adolescents.

**Methods:** Convenience sampling was used to recruit 36 fathers of adolescents aged 10-19 years from Kolkata, India. Based on the study aim and literature review, an interview guide with a series of open-ended questions was prepared and pre-tested. In-depth, semi-structured interviews were conducted either face-to-face or over Zoom/telephone in Hindi, Bengali, and English. All interviews were digitally recorded, transcribed verbatim, and translated to English. Underpinned by the Template Analysis technique, transcribed data were analysed both manually as well as using the NVivo software program. This study received ethical approval from the Institutional Ethics Committee of Banaras Hindu University (Dean/2021/EC/3006).

**Results:** Five themes were identified during thematic analysis which included (i) Limited engagement of fathers in food related tasks particularly cooking for adolescents; (ii) Fathers can play a crucial role in setting food rules e.g. restricting television viewing during mealtime (iii) Challenges to developing healthy dietary behaviour in adolescents e.g. fussy eating i.e. dislike of green vegetables, love of junk food; (iv) Fathers' engagement in adolescents' physical activity was mostly restricted to weekends; (v) Barriers to routine involvement in adolescent upbringing e.g. full-time paid employment, poor financial status.

**Conclusions:** This growing understanding of paternal parenting behaviour highlights the need to engage fathers in lifestyle-based interventions to promote health and wellbeing in vulnerable Indian adolescents while alleviating the risk of triple burden of malnutrition.

# Barriers and facilitators perceived by healthcare professionals for implementing lifestyle-related treatment modalities in osteoarthritis: a cross-sectional study

**Ms. Sioukje Bouma<sup>1</sup>**, Dr. Martin Stevens<sup>1</sup>, Prof. Lucas van der Woude<sup>2,3</sup>, Prof. Ron Diercks<sup>1</sup>, Dr. Inge van den Akker-Scheek<sup>1</sup>

<sup>1</sup>University of Groningen, University Medical Center Groningen, Department of Orthopedics, Groningen, Netherlands, <sup>2</sup>University of Groningen, University Medical Center Groningen, Center for Human Movement Sciences, Groningen, Netherlands, <sup>3</sup>University of Groningen, University Medical Center Groningen, Department of Rehabilitation Medicine, Groningen, Netherlands

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** Osteoarthritis (OA) is a highly prevalent degenerative joint disorder, accounting for a significant burden at the patient level and societal level. International guidelines recommend the use of lifestyle-related treatment modalities (LRTMs) aimed at increasing physical activity and weight reduction. However, it has been demonstrated that LRTMs are currently underutilized as OA treatment. To gain more insight into this evidence-practice gap, previous work of our research team identified influencing factors for applying LRTMs from the perspective of healthcare professionals (HCPs). The aim of the current study was to identify within these influencing factors which are perceived as the main barriers and facilitators to the opinion of various primary and secondary HCPs for implementing LRTMs in patients with hip and/or knee OA.

**Methods:** A cross-sectional study. Data were collected using an online survey, distributed among primary and secondary HCPs: general practitioners (in-training), physiotherapists, orthopedic surgeons (in-training), nurse practitioners or physician assistants orthopedics (in-training), exercise therapists, dieticians, lifestyle counselors and other HCPs in general practice. The survey section on barriers and facilitators consisted of thirty-two research-derived statements about implementing LRTMs. Based on participants' responses to these statements, 'barriers' and 'facilitators' were presented as factors with 'major agreement' ( $\geq 75\%$ ), 'minor agreement' (60-75%) or 'no agreement' ( $< 60\%$ ).

**Results:** The survey was completed by 213 participants. Seven 'barriers' and twenty 'facilitators' were identified. Two of three 'major agreement barriers' were related to the social, political, and legal context (i.e. organization of Dutch healthcare system (84.5%) and lifestyle climate in Dutch society (78.4%)), and the other to capacity for organizational change (i.e. audits within organization (81.2%)). The total number of 'barriers' differed per subgroup of HCPs, with the highest number (12) among orthopedic surgeons (in-training) and the lowest number (4) among dieticians, physiotherapists and lifestyle counselors.

**Conclusions:** The results suggest that the implementation of LRTMs within OA care could be improved by focusing on societal factors rather than individual HCP factors. National preventive policies on health promotion seem required to counteract the expected increase in healthcare demand and costs due to OA. Future research is needed to match relevant implementation strategies to all barriers identified.

# Physical Activity, Screen Time and Dietary Behaviours in New Zealand Adolescents Prior to and Following the Onset of the COVID-19 Pandemic

**Prof. Sandra Mandic**<sup>1,2</sup>, Associate Professor Asaduzzaman Khan<sup>3</sup>, Dr. Enrique García Bengoechea<sup>4,5</sup>, Prof. John Spence<sup>6</sup>, Associate Professor Kirsten Coppel<sup>7</sup>, Prof. Melody Smith<sup>8</sup>

<sup>1</sup>Auckland University of Technology, Wellington, New Zealand, <sup>2</sup>AGILE Research Ltd., Wellington, New Zealand, <sup>3</sup>University of Queensland, Brisbane, Australia, <sup>4</sup>Sport Ireland, Dublin, Ireland, <sup>5</sup>University of Limerick, Limerick, Ireland, <sup>6</sup>University of Alberta, Edmonton, Canada, <sup>7</sup>University of Otago, Dunedin, New Zealand, <sup>8</sup>The University of Auckland, Auckland, New Zealand

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Insufficient physical activity (PA), high screen time (ST), unhealthy dietary patterns and clustering of these behaviours among adolescents in developed countries were reported prior to the COVID-19 pandemic. While emerging international evidence suggests these health behaviours worsened during the pandemic, data from many countries are lacking. This study compared PA, ST and dietary behaviours in New Zealand adolescents five to six years prior to (T1) and during (T2) the COVID-19 pandemic.

**Methods:** Adolescents (n=2,085; age: 15.2±1.4 years; 51.8% female) from all 12 secondary schools in Dunedin, New Zealand, participated in the Built Environment and Active Transport to School (BEATS) studies in 2014/2015 (T1; n=1,266) and 2021/2022 (T2; n=819). Participants self-reported PA, recreational ST (TV/computer/video games) and dietary behaviours in an online survey. The proportion of adolescents meeting guidelines for PA (≥60 minutes of moderate-to-vigorous PA/day), recreational ST (≤2 hours/day) and fruit and vegetable (F&V) intake (>1/day each for both fruit and vegetables) was calculated. Data were analysed using ANOVA and Chi-square tests.

**Results:** At both time points, few adolescents met health behaviour guidelines. Compared to T1, a greater proportion of adolescents at T2 met guidelines for PA (16.7% vs 23.1%; p<0.001) and ST (13.3% vs. 18.3%; p<0.002) while no significant difference was observed for F&V intake (29.6% vs. 27.0%; p=0.193) and all three health behaviours (2.1% vs. 2.1%; p=0.106). At T2, average daily ST outside school was lower on weekend days (6.9±3.5 vs. 6.1±3.6 hours/day), but higher on weekdays (5.0±2.9 vs. 5.6±2.9; p<0.001) compared to T1. Higher weekly intake of sweets (3.1±3.1 vs. 3.5±3.2 times/week; p=0.005) and lower weekly intake of fruit (8.1±4.9 vs. 7.7±4.9 times/week; p=0.027) and sugary soft drinks (2.6±3.2 vs. 1.8±2.8 times/week; p<0.001) were found at T2 versus T1.

**Conclusions:** In 2021-2022, New Zealand adolescents self-reported higher levels of PA, weekday ST and consumption of sweets, and lower weekend ST and intake of fruit and sugary soft drinks compared to pre-pandemic levels. Worsening of health behaviours, particularly related to weekday screen time and consumption of fruit and sweets during the COVID-19 pandemic, reinforces the need for comprehensive health promotion for adolescents.

# Comparing the Effectiveness and Appeal of Delivering the Whole Body Approach (WBA) Program via Text Messages and In-Person to Northern Illinois Food Bank Clients

**Dr. Henna Muzaffar<sup>1</sup>**, Miss Ashley Werner<sup>1</sup>, Miss Olivia Bosse<sup>1</sup>, Mrs. Kelly Brasseur<sup>2</sup>

<sup>1</sup>Northern Illinois University, Dekalb, USA, <sup>2</sup>Northern Illinois Food Bank, Geneva, USA

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** To compare the effectiveness and appeal of delivering a virtual and in-person health promotion program regarding eating competence, interest and enjoyment in physical activity, and confidence related to consuming and providing fruits and vegetables for low-income food pantry users.

**Methods:** Non-experimental design comparing a text message and an in-person ten-week Whole Body Approach (WBA) program delivered to two convenience, purposive samples of Northern Illinois Food Bank users. The text message group (TMG) recruited 156 participants from Northern Illinois Food Bank's mobile food pantry, My Pantry Express (MPX). The in-person group (IPG) recruited 19 participants from Northern Illinois Food Bank's pantry, Winnebago Community Market in Rockford, Illinois. The maximum capacity for the IPG was 20 participants due to classroom size restrictions. The text message program was delivered from February to April 2021, and the in-person program was delivered from February to April 2022. The topics discussed in both programs included stress management, relationship with food, mindful eating, healthy body image, and enjoyable movement. Outcome measurement tools included Eating Competence Satter Inventory 2.0 (ecSI 2.0), fruit and vegetable Self-Efficacy Questionnaire, and the Interest/Enjoyment subscale of the Motives for Physical Activity Revised (MPAM-R). Independent samples t-test was used to compare post-intervention outcome measures in participants who completed both the pre- and post-surveys for the text message program and in-person program.

**Results:** There was a significant difference in post-intervention outcomes between the TMG and IPG programs for eating attitudes ( $p = 0.007$ ), food acceptance ( $p = 0.030$ ), internal regulation ( $p = 0.030$ ), eating context ( $p = 0.032$ ), and overall eating competence ( $p = 0.006$ ). There was also a significant difference ( $p = 0.004$ ) for motives for physical activity between the two intervention groups. There was not a significant difference between the two intervention groups for their overall self-efficacy for consumption of fruits and vegetables ( $p > 0.05$ ).

**Conclusion:** Post-intervention outcome measures were significantly better for IPG compared to TMG for all variables of overall eating competence and motives for physical activity. Future studies may include comparing the effectiveness of the TMG and IPG with a hybrid (50% in-person and 50% virtual) WBA group.

# Yoga instructors' experiences of adapting tele yoga in the Successful Ageing (SAGE) yoga trial: lessons for telehealth delivery

**Dr. Heidi Gilchrist<sup>1,2</sup>**, Dr. Abby Haynes<sup>1,2</sup>, Dr. Juliana Oliveira<sup>1,2</sup>, Prof. Cathie Sherrington<sup>1,2</sup>, Prof. Anne Tiedemann<sup>1,2</sup>

<sup>1</sup>School of Public Health, Faculty of Medicine and Health, The University of Sydney, Camperdown, Gadigal Country, Australia, <sup>2</sup>Institute of Musculoskeletal Health, The University of Sydney, Sydney Local Health District, Camperdown, Gadigal Country, Australia

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Live online yoga classes (tele yoga) for older participants are known to be acceptable and feasible, but little is known about which strategies optimise engagement. This paper identifies practical lessons learnt in the delivery of the Successful Ageing (SAGE) yoga trial. We 1) explore challenges and opportunities experienced by the yoga instructors when moving the SAGE yoga program online and 2) describe how yoga instructors adapted to manage these challenges and leverage opportunities presented by tele yoga. We provide transferable information for health and exercise professionals who want to deliver, or who are already delivering, online classes for older people.

**Methods:** The SAGE yoga trial is a novel randomised controlled trial testing the effect of a yoga-based exercise program on falls among 700 community-dwelling people aged 60+ years. Our realist process evaluation sought to explain outcomes of high satisfaction and adherence described by most participants, focusing on what was working for whom, and conditions which supported this. This study draws on focus groups, semi-structured interviews and participant observation with four SAGE yoga instructors. Multiple data sources enabled analytic triangulation. Data were analysed using six previously developed program theories, combined with inductive coding and an analytical workshop.

**Results:** The SAGE yoga instructors identified four concerns about delivering tele yoga for older people: threats to safety, altered interpersonal dynamics, challenges to facilitating mind-body connection and difficulties with technology. The instructors used eight modifications to manage these challenges: a 1:1 participant interview prior to program commencement, more descriptive verbal instructions, increased focus on interoception, increased attention and support, slower more structured class flow, simplifying poses, adapting the studio environment and IT support. Tele yoga required the development of new skills and adaptive teaching strategies.

**Conclusions:** This study provides unique insights into the challenges of delivering tele yoga to older people from the perspective of the yoga instructor and identifies pragmatic strategies instructors developed to overcome these challenges and maximise engagement with tele yoga, presenting them in a typology of transferable lessons. These manageable strategies could be applied to a wide range of telehealth classes, improving the uptake and adherence of beneficial online programs and services.



# Associations between screen time and drawing ability at 3.5 years in children from the French nationwide Elfe birth cohort

**Dr. Lorraine Poncet**<sup>1</sup>, Ms. Melea Said<sup>1</sup>, Mr. Shuai Yang<sup>1</sup>, Dr. Falk Mueller-Riemenschneider<sup>2, 3</sup>, Dr. Claire Berticat<sup>4</sup>, Dr. Michel Raymond<sup>4</sup>, Dr. Melissa Barkat-Defradas<sup>4</sup>, Dr. Marie-Aline Charles<sup>1, 5</sup>, Dr. Jonathan Y Bernard<sup>1, 6</sup>

<sup>1</sup>Centre for Research in Epidemiology and Statistics (CRESS), Université de Paris, Inserm, INRAE, Paris, France, <sup>2</sup>Saw Swee Hock School of Public Health, National University of Singapore, Singapore, Singapore, <sup>3</sup>Berlin Institute of Health, Charité University Medical Centre, Berlin, Germany, <sup>4</sup>ISEM, University of Montpellier, CNRS, EPHE, IRD, Montpellier, France, <sup>5</sup>Unité Mixte Inserm-Ined-EFS Elfe, INED, Aubervilliers, France, <sup>6</sup>Singapore Institute for Clinical Sciences (SICS), Agency for Science, Technology and Research (A\*STAR), Singapore, Singapore

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**SIG - Primary Choice:** G. Children and families

**Purpose:** Screen use in young children has long raised considerable concern for its potential negative impact on overall cognitive development. However, little is known regarding screen time and drawing ability, a specific dimension of cognition. We aim to assess the associations between screen time and drawing ability, and examine whether these are confounded by family socioeconomic status and children's activities competing with screen time.

**Methods:** We used data from the Elfe birth cohort, which enrolled 18,329 new-borns in 2011, across 349 randomly selected maternity units in France. At age 3.5 years, children underwent the Draw-a-person test during home visits; drawings were collected and scored using the 12-point McCarthy score. Data on total and device-specific screen time, household sociodemographic characteristics and children's competing activities were collected from parents in phone interviews at 3.5 years. Among 7,577 children with valid data on screen time and drawing score, we examined the associations between screen time and the McCarthy score using multivariable zero-inflated Poisson regression models. Analyses were controlled for household socioeconomic characteristics (model 1) and competing activities (e.g. drawing/painting practice, playing outdoors, sleep time) (model 2) separately. Analyses were stratified according to child sex.

**Results:** In unadjusted models, total screen time was associated with drawing score. Increased total screen time was associated with a higher likelihood to obtain a null score for boys (OR=1.15, 95 % CI=1.07-1.23) and girls (OR=1.13, 95 % CI=1.03-1.24). In girls only, increased total screen time was associated with a higher drawing score above zero (coef=-0.02, 95 % CI=-0.04; -0.01). Overall, estimates were slightly stronger when considering TV time only. After adjusting for SES characteristics, associations were no longer observed. When controlling for competing activities only, total screen time and TV time remained associated with drawing score in boys and girls.

**Conclusion:** The associations between screen time and drawing score in 3.5-year-old children was confounded by family SES, not by activities competing with screen time.

# Family facilitators, barriers and strategies of healthy eating among adolescents – Qualitative interviews with parent-adolescent dyads

**Ms. Kiki SN Liu<sup>1</sup>**, Dr. Kai Sing Sun<sup>2</sup>, Ms. Joyce PY Tsang<sup>1</sup>, Dr. Julie Y Chen<sup>1</sup>, Prof. Cindy LK Lam<sup>1</sup>

<sup>1</sup>Department of Family Medicine and Primary Care, The University of Hong Kong, Hong Kong, Hong Kong, <sup>2</sup>JC School of Public Health and Primary Care, The Chinese University of Hong Kong, Hong Kong, Hong Kong

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Healthy eating is vital in reducing adolescent obesity and future non-communicable diseases. While family influence on adolescent eating habits is well-studied in Western populations, little is known in Chinese families. Exploring family facilitators, barriers and strategies of healthy eating among adolescents in Chinese families can provide directions for future interventions in local setting.

**Methods:** A theoretical framework of dietary knowledge, attitudes and practices was applied to guide the qualitative semi-structured interviews with each parent-adolescent dyad. The dyads were purposively sampled by age, gender, dietary intake and household income. The transcripts were coded by thematic analysis to identify the key family factors.

**Results:** Twenty-five adolescents (aged 12 to 19 years) and their mothers participated. Thirteen adolescents were female, and eight reported healthy eating of 5 or more servings of fruit and vegetables (FV) per day. A total of fourteen themes under five domains were identified: **A) Family health** with 1) Illness experience in the family; **B) Parental knowledge** on 2) Dietary recommendations, 3) Preparation of healthy food, and 4) Healthy food choice; **C) Parental attitudes** towards 5) Importance of healthy eating, and 6) Priority of family health; **D) Socioeconomic factors** of 7) Time concern, and 8) Cost concern; and **E) Food parenting practices** in 9) Nutrition education, 10) Role modelling, 11) Food provision, 12) Child involvement, 13) Parental supervision, and 14) Cultivation of food preference. Parenting styles had an influence on themes 12 to 14. Families reported useful strategies such as incorporating healthy ingredients in adolescents' favourite recipes, provision of a variety of FV at home, and involvement of adolescents in meal preparation.

**Conclusions:** Positive parental attitudes towards healthy eating, healthy food provision, and authoritative parenting style were key facilitators, where deficiency in dietary knowledge in parents, time and cost concerns, and limited family discussion on food-related issue were key barriers. There is a need to resolve the barriers through public education to empower parents with practical nutrition knowledge; to adopt an authoritative style in food parenting practices; to discuss more on healthy eating; and to acquire practical skills on time- and cost-saving healthy cooking.

# Feasibility and acceptability of a package of interactive health education lessons and take-home activities, to improve children's diets, reduce sedentary behaviours, and introduce habit formation among primary school children in Singapore

**Ms. Cindy Mei-Jun Chan<sup>1</sup>**, Dr. Michael Chia<sup>2</sup>, Dr. Falk Müller-Riemenschneider<sup>1</sup>, Dr. Zoe Jane-Lara Hildon<sup>1</sup>, Dr. Mary Foong-Fong Chong<sup>1,3</sup>

<sup>1</sup>Saw Swee Hock School of Public Health, National University of Singapore and National University Health System, Singapore, Singapore, <sup>2</sup>Physical Education & Sports Science Academic Group, National Institute of Education, Nanyang Technological University, Singapore, Singapore, <sup>3</sup>Singapore Institute for Clinical Sciences, Agency for Science, Technology and Research, Singapore, Singapore

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**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** A large proportion of children globally are not meeting dietary and movement recommendations. School-based interventions have shown promising results but should be multicomponent to be effective. As part of a multicomponent intervention programme (Promoting hEalthy Diet and Active Lifestyle, PEDAL), we co-developed a package of interactive health education lessons and take-home activities with health and education professionals to improve children's diets, reduce sedentary behaviours, and introduce habit formation. Prior to the full-scale PEDAL programme, the feasibility of the health education package was assessed qualitatively, focusing on the implementation (e.g., adherence and barriers) and acceptability (e.g., satisfaction and appropriateness) among students and teachers.

**Methods:** Ten teachers underwent a training workshop and conducted the lessons and activities with Primary 5 students (aged 10 to 12 years old) in two primary schools (n=404). Upon lesson completion, 16 students (n=8 girls) and 5 teachers (n=1 female) took part in five semi-structured focus group discussions (FGD). The FGDs were audio-recorded, and data was extracted using the scribing approach and analysed inductively using thematic analysis.

**Results:** Teachers found the lessons easy to implement as the videos and slides were provided to them, and the lessons were generally pitched at an appropriate level to students. However, some found teaching the topic of habit formation challenging to less academically inclined students. Teachers also struggled to complete all lessons in the package within the intended 3-month period due to other school activities and suggested more time for completion. The students reported that they enjoyed the PEDAL lessons more than the typical health education lesson as they were entertained by the educational videos and the quiz games which require them to answer with body movements. They also liked the variety of take-home activities but faced challenges in completing them due to the lack of parental support at home. Overall, students and teachers expressed that the information on habit formation and the activities increased their awareness and skills in forming healthy habits.

**Conclusions:** Feedback from this study is valuable to inform the roll-out of the full-scale multi-component PEDAL programme involving parental engagement and improving the school canteen environment.

# Prevalence of Meeting 24-hour Movement Guidelines among school children in Kuala Lumpur, Malaysia

**Dr. Jyh Eiin Wong<sup>1</sup>**, Dr. Airu Chia<sup>2</sup>, Miss Kar Mun Chong<sup>1</sup>, Dr. Denise Choon Lian Koh<sup>3</sup>, Dr. Nor Aini Jamil<sup>1</sup>, Dr. Mary Foong-Fong Chong<sup>2</sup>, Prof. Bee Koon Poh<sup>1</sup>

<sup>1</sup>Universiti Kebangsaan Malaysia, Kuala Lumpur, Malaysia, <sup>2</sup>National University of Singapore, Singapore, <sup>3</sup>Universiti Kebangsaan Malaysia, Bangi, Malaysia

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** A healthy balance of movement behaviours, namely physical activity, sedentary behaviour and sleep across a 24-hour day has been associated with positive growth and health in children. However, less is known about the adherence to 24-hour movement guidelines among school children in a multiethnic Asian context. To address this knowledge gap, this study aims to examine the prevalence of meeting 24-hour movement guidelines among schoolchildren in Malaysia.

**Methods:** My E-Diary for Activities and Lifestyle (MEDAL) is a web-based time-use diary developed to assess diet and movement behaviour of Asian schoolchildren. A total of 297 Malaysian children (51% girls) aged  $10.7 \pm 0.6$  years from seven primary schools in Kuala Lumpur self-reported their daily activities on MEDAL for four days, including a weekend day. Based on self-reported moderate-to-vigorous physical activity (MVPA), screen viewing and sleep, adherence to movement guidelines were calculated. Adherence to movement guidelines was defined as  $\geq 60$ min MVPA/day,  $\leq 2$ h screen-viewing/day, and 9–11h of sleep/night.

**Results:** On average, children spent  $42 \pm 54$ min on MVPA,  $3.4 \pm 2.0$ h on screen activities and  $10.1 \pm 1.9$ h sleeping daily. Approximately 25%, 27%, and 45% of children met MVPA, screen and sleep recommendations respectively. Only 3% of children met all recommendations, while 32% did not meet any recommendation. The prevalence of meeting at least one of the recommendations was highest among Indian children, but did not differ by sex.

**Conclusions:** While two-in-three children met at least one of the movement guidelines, adherence to all three guidelines was very low in this sample of urban schoolchildren. Greater emphasis should be given to increase overall physical activity and reduce sedentary behaviours, especially screen time, among schoolchildren in Malaysia.

# Home-based cooking intervention delivered with a smartphone app to improve eating behaviors in Swiss children aged 7-9 years: a feasibility study

**Dr. Joyce Haddad<sup>1</sup>**, Dr. Maria Vasiloglou<sup>2</sup>, Mrs. Franziska Scheidegger-Balmer<sup>1</sup>, Dr. Ulrich Fiedler<sup>1</sup>, Prof. Klazine Van der Horst<sup>1</sup>

<sup>1</sup>Bern University of Applied Sciences, Bern, Switzerland, <sup>2</sup>University of Bern, Bern, Switzerland

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Digital interventions in real-life home settings that support health behavior are needed, especially in Switzerland. This study aimed to develop and evaluate the feasibility of using a mobile application in Swiss households, and compare dietary behavior and food acceptability between children who cooked with limited parental support with children who were not involved in cooking.

**Methods:** A 10-week randomized controlled trial was conducted between August and December 2020. Parents in both groups were given access to a mobile-app which delivered easy-to-follow recipes weekly. Each recipe emphasized one of two generally disliked foods (Brussels sprouts or whole-meal pasta). Children in the intervention group were involved in the meal preparation of the recipes with limited parental support, while the control group were only served parent-prepared meals. Parents were asked to photograph and weigh the food components from the child's plate before and after consumption. After each meal, parents were asked to report whether their child liked the meal and the target food, and how the appetite of the child was that day.

**Results:** Of 24 parents who completed the baseline questionnaires and fulfilled the inclusion criteria, 18 parents and their children completed the evaluation phase. The median (range) age of the children was 8 (7 to 9) years. For the total child sample, mean baseline Brussel sprouts and whole-meal pasta intakes were 19 grams (SD=24.2) and 86 grams (SD=69.7) per meal, respectively. No meaningful differences in Brussels sprouts and whole-meal pasta intake were found post-intervention or between intervention groups. More children reported a neutral or positive liking towards the target foods in the intervention group compared to those in the control group.

**Conclusion:** This was the first evidence-based mobile application developed to reach and support Swiss families during the height of the COVID-19 pandemic. This study demonstrated that integrating digital interventions in the home environment and promoting meal preparation has the potential to improve child reported acceptance of healthy foods. Using such technology is important, as it can play a key role in improving children's dietary behavior, saving time for parents, and engaging families in cooking and consuming healthier meals.



# How social norms of Spanish parents are associated with their children's active commuting to school

Miss Hanna Forsberg<sup>1</sup>, **Mrs. Ximena Palma-Leal**<sup>2,3</sup>, Miss Ana Ruiz-Alarcón<sup>4</sup>, Dr. Susana Aznar<sup>5</sup>, Ms. Pablo Campos-Garzón<sup>2</sup>, Dr. Stina Ruberg<sup>1</sup>, Dr. Anna-Karin Lindqvist<sup>1</sup>, Dr. Palma Chillón<sup>2</sup>, Dr. Francisco Javier Huertas Delgado<sup>4</sup>

<sup>1</sup>Health, Education and Technology, Luleå University of Technology, Luleå, Sweden, <sup>2</sup>PROFITH Research Group, Department of Physical Education and Sports, Faculty of Sport Sciences, Sport and Health University Research Institute (iMUDS), University of Granada, Granada, Spain, <sup>3</sup>IRyS Group, School of Physical Education, Pontificia Universidad Católica de Valparaíso, Viña del Mar, Chile, <sup>4</sup>PA-Help "Physical Activity for Health Promotion" Research Group, 'La Inmaculada' Teacher Training Centre, University of Granada, Granada, Spain, <sup>5</sup>PAFS Research Group, Department of Physical Activity and Sport Sciences, Faculty of Sports Sciences, University of Castilla-La Mancha, Toledo, Spain

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Social norms (subjective and descriptive) refer to the perception of what other significant people think about me performing a behaviour, as well what other significant people are doing (respectively). These social norms have been reported as important determinants for parents' intentions to let their child use active commuting to and from school, because parents ultimately decide how their children commute to and from school. The aims of this study were to describe the social norms of Spanish parents and their children's mode of commuting to and from school, and to analyse the associations between the social norms of Spanish parents and their children's active commuting to and from school.

**Methods:** A total of 410 parents (74.6% mothers) and their children (49.8% girls) from Spain were included in this cross-sectional study. Social norms of parents, and children's mode of commuting to and from school were self-reported by parents. Two binary logistic regression models were used to analyse the associations between social norms of parents (independent) and the mode of commuting to and from school (dependent), separately in each model. The models were adjusted for child's age and distance to school.

**Results:** The average for social norms of parents was  $1.80 \pm 0.81$  (ref. scale from 1 [low social norms] to 4 [high social norms]), and most of their children used active commuting (i.e., walking and cycling) to school (60.0%), and from (61.7%) school. When parents reported higher social norms, their children tended to actively commute to school (Odd Ratio [OR]: 1.92; CI95%: 1.30-2.83;  $p < 0.001$ ), and from school (OR: 2.40; CI95%: 1.56-3.69;  $p < 0.001$ ), compared to parents who reported lower social norms.

**Conclusions:** This study has identified that social norms of Spanish parents are a key factor to increase their children's active commuting to and from school. Therefore, if parents perceived greater visibility in the neighbourhood of significant people walking or cycling, their children will be more likely active in their trip to and from school, and they will obtain multiple health benefits.

# A qualitative study exploring elementary school teachers' experiences teaching nutrition in Canada

**Dr. Beatriz Franco-Arellano<sup>1</sup>**, Dr. Ellen Vogel<sup>1</sup>, Dr. Matthew Stein<sup>2</sup>, Miss Vanessa Laketa<sup>1</sup>, Miss Jacqueline Brown<sup>1</sup>, Dr. JoAnne Arcand<sup>1</sup>

<sup>1</sup>Faculty of Health Sciences, Ontario Tech University, Oshawa, Canada, <sup>2</sup>Faculty of Social Science and Humanities, Ontario Tech University, Oshawa, Canada

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** F. Early care and education

**Purpose:** A higher level of food literacy among children is associated with higher diet quality. Nutrition education in schools is a key strategy to establish food literacy and promote healthy eating habits. Nutrition is a component of Canadian elementary school curricula; however, limited research assessing the factors that impact the implementation of nutrition education in schools exists. This study explored elementary school teachers' views, attitudes, practices, barriers and drivers related to teaching nutrition.

**Methods:** A qualitative descriptive study involving online focus groups (n=2, 6 participants, each session averaged 90-minutes) and individual interviews (n=2, 2 participants, each interview averaged 30-minutes) was conducted among Canadian elementary teachers (Grades KG-8). Recruitment occurred via social media. The Consolidated Framework for Implementation Research informed the semi-structured interview guide that contained probes, which was pilot tested before use. Interviews were audio-recorded and verbatim transcripts prepared. An anonymized summary of each focus group or individual interview was sent to participants for member checking. Two researchers independently and inductively coded the transcripts using content analysis.

**Results:** Participants (n=8) considered nutrition to be an important curriculum subject for children; albeit they had mixed feelings about how nutrition has impacted their own personal lives. There were several barriers when teach nutrition including insufficient availability of nutrition-specific resources, training, support from the school boards and time to prepare lesson plans. The cost of procuring classroom materials was considered a barrier. Participants strongly agreed that nutrition is not prioritized in the provincial school curriculum, nor is its instruction standardized. When teaching nutrition to higher-level grade students (i.e., 7<sup>th</sup> - 8<sup>th</sup> grades), participants cautiously provided content to avoid triggering mental or eating disorders among students. Importantly, integrated, hands-on, interactive activities, like cooking activities and field trips were recognized by participants as among the best strategies to teach nutrition to children, regardless of the grade.

**Conclusion:** This study revealed several barriers that impact the implementation of nutrition curricula in schools, including lack of time, training, and resources; as well as costs. This research highlights the complexity and pressure of teaching nutrition in Canadian elementary schools and the need to better support teachers.

# Adherence to the WHO Global guidelines for physical activity, sedentary behaviour, and sleep for Japanese children under 5 years of age: Interim analysis of the SUNRISE International study of movement behaviours in the early years

**Prof. Chiaki Tanaka**<sup>1</sup>, Prof. Masayuki Okuda<sup>2</sup>, Prof. Shigeho Tanaka<sup>3</sup>, Prof. Minoru Takakura<sup>4</sup>, Dr. Shinpei Okada<sup>5</sup>, Dr. Masashi Watanabe<sup>6</sup>, Dr. Kensaku Sasayama<sup>7</sup>, Prof. Kyota Takami<sup>8</sup>, Mr. Takuya Watanabe<sup>9</sup>, Dr. Kar Hau Chong<sup>10</sup>, Dr. Penny L Cross<sup>10</sup>, Dr. Rebecca Calleia<sup>10</sup>, Prof. John J Reilly<sup>11</sup>, Prof. Mark S Tremblay<sup>12</sup>, Prof. Anthony Okely<sup>10</sup>

<sup>1</sup>Tokyo Kasei Gakuin University, Tokyo, Japan, <sup>2</sup>Yamaguchi University, Yamaguchi, Japan, <sup>3</sup>Kagawa Nutrition University, Saitama, Japan, <sup>4</sup>University of the Ryukyus, Okinawa, Japan, <sup>5</sup>Physical Education and Medicine Research Foundation, Nagano, Japan, <sup>6</sup>Ibaraki University, Ibaraki, Japan, <sup>7</sup>Mie University, Mie, Japan, <sup>8</sup>Hosei University, Tokyo, Japan, <sup>9</sup>Junior College Division, University of Aizu, Fukushima, Japan, <sup>10</sup>University of Wollongong, Wollongong, Australia, <sup>11</sup>University of Strathclyde, Glasgow, United Kingdom, <sup>12</sup>Children's Hospital of Eastern Ontario Research Institute, Ottawa, Canada

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** SUNRISE is an international study of movement behaviours in the early years. In Japan, the main study started in October, 2021 and will continue until 2024. We examined adherence to the World Health Organization's (WHO) Global guidelines for physical activity, sedentary behaviour and sleep for children under 5 years of age in Japan as an interim analysis.

**Methods:** Data on 3 to 4-year-old children from urban and rural areas in Japan obtained by the beginning of November, 2022 were used for analysis. Physical activity was measured using a triaxial accelerometer (ActiGraph GT3X). Screen time and sleep duration were assessed via parent questionnaire. Meeting the WHO guidelines was defined as participating in, over a 24-hour period:  $\geq 180$  mins of total physical activity, of which at least 60 minutes was of moderate-to vigorous-intensity physical activity,  $\leq 1$  hr of sedentary screen time, restrained for  $\leq 1$  hr at a time, and 10-13 hrs of sleep (including naps).

**Results:** Participants included 185 children ( $4.2 \pm 0.5$  years old, girls  $n=91$ , boys  $n=94$ ; urban  $n=57$ , rural  $n=128$ ). The proportions of children meeting physical activity, sedentary behaviour, sleep and all guidelines were 68.6%, 29.1%, 87.6% and 16.2%, respectively. There were no significant differences in the proportions between urban and rural children. A higher proportion of boys than girls met the physical activity guideline (78.7% vs, 58.2%), with average total physical activity and moderate-to vigorous-intensity physical activity in girls ( $195.2 \pm 40.6$  min/day and  $80.6 \pm 26.5$  min/day) shorter than in boys ( $217.5 \pm 36.6$  min/day and  $104.3 \pm 28.1$  min/day), even after adjustment for age and sector (urban or rural). There were no significant differences in sedentary behaviour or sleep between girls and boys.

**Conclusions:** Japanese 3 to 4-year-old girls were less active than boys. Continuing the survey and increasing the number of participants will provide more information to confirm or refute these initial findings.

# Results from the 2022 India Report Card: Physical activity patterns among children and youth in India

**Dr. Jasmin Bhawra**<sup>1</sup>, Dr. Tarun R Katapally<sup>2</sup>, Dr. Anuradha Khadilkar<sup>3</sup>, Dr. Krishnaveni Ghattu V<sup>4</sup>, Dr. Kumaran Kalyanaraman<sup>5</sup>

<sup>1</sup>Toronto Metropolitan University, Toronto, Canada, <sup>2</sup>Western University, London, Canada, <sup>3</sup>Hirabai Cowasji Jehangir Medical Research Institute, Pune, India, <sup>4</sup>Epidemiology Research Unit, CSI Holdsworth Memorial Hospital, Mysuru, India, <sup>5</sup>University of Southampton, Southampton, United Kingdom

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Research has shown a physical inactivity epidemic in India, which has critical implications for both long-term health outcomes and the global economy. To date, physical activity among Indian children and youth has not been well-studied. The 2022 India Report Card (IRC) aimed to assess 11 indicators of active living to address existing data gaps and inform active living programs and policies.

**Methods:** As part of the Active Healthy Kids Global Alliance (AHKGA), 57 countries (including India) participating in the Global Matrix 4.0 Report Card initiative assessed 10 indicators of active living among children and youth: *Overall Physical Activity, Organized Sport, Active Play, Active Transportation, Sedentary Behavior, Family and Peers, School, Community and Built Environment, Government Strategies, and Physical Fitness*. Yoga was added to the IRC given its cultural significance. A systematic search of peer-reviewed and grey literature published since the 2018 IRC was conducted. Studies were appraised based on representativeness, sample size, and data quality. Each indicator was assessed with an evidence-based and globally standardized rubric developed by AHKGA to assign grades (A+ to F).

**Results:** Although a major proportion of Indian children and youth appear to participate in *Active Transportation* (B-), they are not meeting recommended *Physical Activity* (C) and *Sedentary Behaviour* guidelines (D-), and not practicing *Yoga* (D-) regularly. Based on the grades assigned to *Community and Built Environment* (D), and *Government* strategies (C+), some of the active living challenges faced by Indian children and youth could be attributed to the dearth of progressive urban planning policies. *Organized Sport, Active Play, Family and Peers, and Physical Fitness* were all graded incomplete due to lack of data.

**Conclusions:** The 2022 IRC reiterated the need for nationally representative active living research and renewed government investments to facilitate active living among children and youth. Although most children and youth are not accumulating recommended levels of physical activity, there are encouraging signs of active transportation—a phenomenon that needs to be explored further. Evidence generated by the 2022 IRC suggests opportunities for improvement not only in India, but also the 56 other countries taking part in Global Matrix 4.0.

# Factors that influenced behaviour change amongst adults who participated in a physical activity coaching intervention: a qualitative investigation using the theoretical domains framework and COM-B

**Dr. Stephen Barrett**<sup>1,2</sup>, Associate Professor Stephen Begg<sup>2</sup>, Associate Professor Paul O'Halloran<sup>3</sup>, Mr. Kane Rodda<sup>1</sup>, Mrs. Gabrielle Barrett<sup>1</sup>, Prof. Jeff Breckon<sup>4</sup>, Prof. Michael Kingsley<sup>2,5</sup>

<sup>1</sup>Bendigo Health, Bendigo, Australia, <sup>2</sup>La Trobe University, Bendigo, Bendigo, Australia, <sup>3</sup>La Trobe University, Melbourne, Melbourne, Australia, <sup>4</sup>Teesside University, Middlesbrough, United Kingdom, <sup>5</sup>University of Auckland, Auckland, New Zealand

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Behaviour change interventions have shown promise for improving physical activity (PA) but the underlying mechanisms by which the interventions promote behaviour change are rarely identified. Behavioural science tools such as the COM-B (capability, opportunity, motivation – behaviour) and the Theoretical Domains Framework (TDF) can help in understanding behaviour change and inform intervention development. The aim of this study was to identify the enablers and barriers to PA among insufficiently physically active adults that completed a PA telephone coaching intervention.

**Methods:** We conducted semi-structured interviews with a purposive sample of participants who completed a telephone coaching intervention designed to increase PA. Thematic analysis were conducted using an interpretive description approach. Emerging themes were mapped against the COM-B and TDF. Participants' responses were analysed for descriptions of behaviour change techniques and microskills used during the telephone coaching intervention.

**Results:** We interviewed 18 participants (72% women) with a mean age of  $54 \pm 5$  years. Four theme were identified that mapped directly onto five components of COM-B, and 10 domains of the TDF. Participants highlighted that the strength-based and autonomy-supportive intervention helped to evoke their own reasons for change, which influenced PA behaviour change. Participants noted how they were encouraged to reflect on their individual social and/or professional strengths, and how these skills were transferred to set appropriate PA goals and self-regulate PA behaviour. A number of relational components (e.g., collaboration, supporting self-efficacy) were deemed influential for promoting change, and should be considered when designing future behaviour change interventions.

**Conclusions:** This study provides a first-hand understanding of how participants viewed a PA telephone coaching intervention and identified some of the factors that influenced PA change. The findings support the beneficial effect of using theory-informed behaviour change techniques, and delivering them in a relational style that promotes autonomy and collaboration. The lived experiences of participants should play a key role in the design and implementation of behaviour change interventions that aim to increase PA in insufficiently active adults.



# Lessons learned from implementing an integral system approach for evidence-based interventions in six regions in The Netherlands

**Dr. Joske Nauta**, Ms. Gioia Muru, Dr. Femke van Nassau  
<sup>1</sup>AmsterdamUMC, Amsterdam, Netherlands

Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** In 2021, six regions in the Netherlands received a grant to stimulate an integral system approach for implementing evidence-based interventions in their local community. In this study, we evaluate the implementation process. The lessons learned were evaluated on three levels - practice, policy and governance - in order to develop a practical tool to support other regions in implementing an integral system approach.

**Methods:** We conducted desk research on the knowledge that was developed within the six regions to inform the development of the interview guide. We interviewed at least three project members per consortium to get insight into the success factors and barriers for implementation. We interviewed representatives of the practice, policy and governance level. The analysis were based on a codebook using a thematic approach. Following the interviews, co-creation sessions were organized with representatives of the six regions. The first aim of these sessions was to assess the representativeness of the overarching findings. Next, a practical tool to support future integral system approaches for implementing evidence-based interventions was co-designed with the representatives of the six consortia.

**Results:** We will present the lessons learned within the six local consortia: a broad variety of evidence-based interventions was implemented through the integral system approaches. Using a systematic approach to develop the implementation plan was deemed helpful. It was deemed important to have representatives of practice, policy and governance involved as stakeholders throughout implementation. Furthermore, tailoring of evidence based interventions to the local context was essential for optimal uptake. Lastly, while considerable effort was put into establishing the local consortia, many of the consortia were under pressure because of the discontinuation of funding beyond the project. Furthermore, we will present the practical tool to support future integral system approaches for the three levels of interest: practice, policy and governance.

**Conclusions:** Conducting overarching evaluation studies on factors that impact the implementation of evidence-based interventions are important to generate generalizable knowledge regarding the implementation processes. This knowledge then needs to be translated into practical tools to support stakeholders from practice, policy and governance in future efforts to implement interventions into their local systems.

# The development of a mobile app to support dietary education and adherence among heart failure patients

**Ms. Bridve Sivakumar**<sup>1</sup>, Ms. Maria Ricupero<sup>2</sup>, Ms. Anisha Mahajan<sup>3</sup>, Mr. John Wenger, Ms. Katherine Jefferson<sup>1</sup>, Dr. Jillianne Code<sup>4</sup>, Dr. JoAnne Arcand<sup>1</sup>

<sup>1</sup>Ontario Tech University, Oshawa, Canada, <sup>2</sup>University of Toronto, Toronto, Canada, <sup>3</sup>University of Guelph, Guelph, Canada, <sup>4</sup>The University of British Columbia, Vancouver, Canada

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Adherence to dietary sodium and fluid restriction are key to improving heart failure (HF) outcomes. Mobile apps may be a promising and novel way to support patients with adherence through education and monitoring. Despite the growing number of apps to support HF management, most focus solely on symptom monitoring. Few have dedicated features to support dietary education and adherence. To describe the development of a mobile app designed to support dietary education and adherence among HF patients.

**Methods:** Guided by the Obesity-Related Behavioural Intervention Trials model, our interdisciplinary team (4 Registered Dietitians, 1 patient representative, 1 PhD student, and 1 industry partner) iteratively developed a mobile app for HF patients to provide education about dietary sodium and fluid restriction. The Discovery phase of the app development included qualitative interviews with patients and healthcare providers (i.e., HF cardiologist and nurses) to identify needs, motivations, and challenges of app use for HF management; as well as background research in mHealth app development, behaviour change, and nutrition pedagogy. Insights from the discovery phase informed the systematic development of app content and design, grounded in the Theoretical Domains Framework, and aligned with established HF guidelines. Behaviour change techniques (BCTs) and gamification elements from mHealth and nutrition literature, and those mentioned within the qualitative interviews were identified and selected for app development.

**Results:** Five learning modules were developed that provide information on dietary sodium recommendations in HF, contributors of sodium in the diet, nutrition labelling, lowering dietary sodium, and fluid restriction. Seven BCTs were integrated into the app, including shaping knowledge, information about health consequences, information on antecedents, feedback on behaviour, behavioural practice/rehearsal, goal setting, and action planning. Gamified components of the app included the use of an avatar and point-system to engage patients in their learning. The next step of the app development process involves user-testing sessions among HF patients to optimize app content and features.

**Conclusions:** Results from this study can produce a feasible intervention that may support dietary education and adherence in the HF population to improve self-care, quality of life, and HF outcomes.

# Effectiveness of digital interventions to reduce sedentary behaviours in (home-) office employees: a systematic review.

**Miss Iris Parés Salomón**, Mr. Fernando Martín Bozas, Mrs. Anna M. Puig Ribera, Mrs. Anna M. Señé Mir, Mrs. Cristina Vaqué Crusellas, Mr. Alan Coffey, Dr. Kieran P. Dowd, Mrs. Karin Proper, Mrs. Judit Bort Roig  
<sup>1</sup>Universitat de Vic, Vic, Spain

Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** The pandemic instigated a hybrid paradigm among office-based jobs, resulting in increases of employees sitting time, especially when working from home. Although sedentariness at work is closely related to the evolution of technology, the potential of digital solutions has been highlighted as an opportunity in the previous literature (up to 2017). The purpose of this systematic review was to assess the effectiveness of digital interventions to reduce sitting behaviours in (home-) office employees.

**Methods:** A systematic literature search was conducted in five databases (PubMed, Web of Science, Scopus, CINAHL and PsycINFO) between September 2017 and September 2022 using a combination of keywords related to office work, sedentary behaviour, and technology. Randomised controlled trials of digital interventions conducted in computer or screen-based jobs were included. Data regarding the study and intervention characteristics, outcomes and main findings were extracted, and a qualitative synthesis was performed.

**Results:** A total of 21 articles met the inclusion criteria. Most of the studies focused on office-workers (60.4% female; 41.2 years old). The duration of the intervention ranged from 2 weeks to 12 months. Using digital media for delivering information (e.g., digital text or videos to present educational materials or tips) and mediated organisational support and social influences through digital communication features (e.g., emails conveying managers' approval and competition or challenges) were the most represented intervention techniques (n=20). While 11 studies used passive data collection through a mobile phone based application or external activity tracker (e.g., W@W-App, FitBIT, Garmin watch, Darma cushion), only two studies self-reported sedentary behaviours with a digital log (i.e., online diary). Overall, seven studies reported significant differences between groups, with the intervention group showing significant decreases in occupational sitting time (from -0.17 to -1.35 hours/workday). Two studies reported significant differences between groups in total daily sitting time (-0.98 and -4.66 hours/day).

**Conclusions:** Findings reported large variability of digital and behavioural change features that may enhance work and daily sitting time reductions. However, more research is needed to contribute to the understanding of digital solutions for reducing sitting behaviour among (home-) office workers in this new hybrid paradigm.

# Stakeholder's experiences of tailoring strategies to support implementation of the Dose Adjustment for Normal Eating (DAFNE) structured patient education programme for people with type 1 diabetes: a mixed methods study

**Dr. Fiona Riordan<sup>1</sup>**, Dr. Claire Kerins<sup>1</sup>, Prof. Luke Wolfenden<sup>2</sup>, Dr. Sheena McHugh<sup>1</sup>

<sup>1</sup>University College Cork, Cork, Ireland, <sup>2</sup>School of Medicine and Public Health, College of Health, Medicine, and Wellbeing, the University of Newcastle, Callaghan, Australia

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** Tailored implementation strategies are effective in supporting implementation of healthcare interventions. However, which tailoring approaches are most feasible and acceptable to stakeholders as well as the outcomes important to them are not well understood. Dose Adjustment for Normal Eating (DAFNE) is an evidence-based patient education programme recommended as part of diabetes management, but little is known about current implementation and how best to support delivery. As part of a multiple case study, we are working with Irish DAFNE centres to tailor strategies, evaluate stakeholder's experiences of the tailoring process, and understand what guidance and evidence they use and value during the process.

**Methods:** DAFNE teams complete a site survey on implementation culture, climate, and readiness before participating in three group discussions to prioritise determinants and select and operationalise strategies, first, based on their own preferences, and subsequently guided to consider criteria and evidence. Using a mixed methods convergent design, their experiences of the tailoring process are evaluated using multiple data sources (research logs, non-participant observation, and post-tailoring surveys and interviews). A triangulation protocol will be used to integrate the findings. Data will be combined using joint displays for within and cross-case analysis.

**Results:** In total, 18 hospitals have been invited to participate in the tailoring process, 5 centres have completed the tailoring process and 3 are ongoing. Team prioritised current determinants important to address now, including lack of available resources (e.g., lack of admin. support), access to knowledge and information (e.g., familiarity with course content), and networking and communication (e.g., long-standing relationships). Preliminary results indicate the tailoring process is acceptable and feasible allowing educators 'to sit and discuss DAFNE specifically', albeit additional guidance and evidence appears not to be used when prioritising determinants.

**Conclusions:** This study will advance our current understanding of approaches to tailoring which are feasible and acceptable to clinical stakeholders, and (2) stakeholder decision-making; what guidance and evidence they use and value during the tailoring process. The findings will be valuable for implementation researcher community, yielding insight into best practices for developing tailored strategies to enhance implementation of evidence-based programmes, including those focused on behavioural nutrition.

# Learning outcomes from Implementation of an Online Training Resources and Program Package for a Family Healthy Weight Program in the US– Building Healthy Families

**Mrs. Ali Malmkar<sup>1</sup>**, Dr. Kate Heelan<sup>1</sup>, Prof. Jennie Hill<sup>2</sup>, Ms. Caitlin Golden<sup>3</sup>, Dr. R. Todd Bartee<sup>1</sup>, Dr. Bryce Abbey<sup>1</sup>, Dr. Gwenndolyn Porter<sup>3</sup>, Dr. Paul Estabrooks<sup>2</sup>

<sup>1</sup>University of Nebraska at Kearney, Kearney, USA, <sup>2</sup>University of Utah, Salt Lake City, USA, <sup>3</sup>University of Nebraska Medical Center, Omaha, USA

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** Packaging program materials and training resources as well as the use of community learning collaboratives (LC) have been proposed as methods to improve community implementation capacity to address obesity among rural children. To test the hypothesis that the use of a turn-key, train-the-trainer, implementation package with a community LC can improve program coordinator learning outcomes and family program attendance to a greater degree when compared to coordinators that receive the turn-key package alone.

**Methods:** Communities were assigned to either a LC (n=4) or Package Only (PO, n=3) study condition. LC communities received the Building Healthy Families (BHF) Online Training Resources and Program Package (BHF Resources) and attended bimonthly sessions to discuss and collaboratively resolve implementation barriers while PO communities only received access to the BHF Resources. As part of BHF, coordinators complete overall and role specific (e.g., program logistics, nutrition, lifestyle, physical activity) training modules with video guidance and detailed lesson plans, PowerPoints, handouts, and objectives for each program component. Knowledge checks (KC) followed each training module that focused on core BHF principles and session specific content to improve implementation fidelity. Coordinators completed an overall KC, which required a score of 80% or higher to unlock weekly educational session guides which included optional KCs.

**Results:** Scores on the overall KCs ranged from 73% to 100% and did not differ based on condition. There was a significant difference in the percentage of KCs completed between LC (79.8%) and PO (56.3%) communities ( $p<0.05$ ). The LC communities scored significantly higher on the session specific KC's ( 95.2% v 89.3%,  $p<0.05$ ). Average attendance across program sessions was 58.8% and differed by LC (72.7%) and PO (40.1%,  $p<0.05$ ). Interestingly, a strong relationship ( $r=0.82$ ,  $p<0.05$ ) was found between KC percent completed and participant attendance.

**Conclusion:** These findings demonstrate the benefit of a LC in supporting the community implementers in the completion of, and performance on, KCs. These findings also support the hypothesis that attendance is related to implementation team preparation as measured by KC completion and performance.



# Clinical Trial of a mHealth intervention component to Increase Self-Monitoring of Physical Activity and Eating Behaviors Among Adolescents: A Feasibility Study

**Dr. Justin Moore<sup>1</sup>**, Mrs. Camelia Singletary<sup>1</sup>, Ms. Alexandra Peluso<sup>1</sup>, Dr. Joseph Skelton<sup>1</sup>, Dr. Brie Turner-McGrievy<sup>2</sup>, Dr. Rahma Ajja<sup>1</sup>, Dr. Edward Ip<sup>1</sup>, Dr. David Miller<sup>1</sup>

<sup>1</sup>Wake Forest University School of Medicine, Winston-Salem, USA, <sup>2</sup>University of South Carolina, Columbia, USA

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** This study was designed to test the feasibility of utilizing a tailored suite of mobile health (mHealth) components to augment an existing evidence-based in-person pediatric weight management program.

**Methods:** The intervention consisted of six mHealth components designed to increase patient/caregiver exposure to traditionally delivered clinical content: (1) a mobile-enabled website, (2) dietary/physical activity tracking, (3) caregiver podcasts, (4) animated videos for adolescent patients, (5) interactive messaging, and (6) tailored clinical feedback informed by a web-based dashboard. Target enrollment was 80 youth with obesity (13-18 years) and caregiver dyads to be randomized to standard care (Brenner FIT) or standard care plus mHealth components (Brenner mFIT). Only enrolled participants who completed baseline measures were randomized, and follow-up measures were completed at 3- and 6-months. Feasibility was assessed in terms of screening, recruitment, randomization, retention, fidelity, and the assessment process. The number of patients screened per month, the number enrolled per month, the proportion of those enrolled who are eligible, and the number who remain enrolled in the study by condition were all tracked.

**Results:** Most measures of feasibility were low. Overall, 1162 dyads were pre-screened for eligibility based on age criteria. Of those, 435 were screened for full eligibility by study staff. Of 435, 173 dyads were eligible for enrollment based on inclusion criteria. Twenty-five dyads (50 participants) consented. Thirty-three participants completed baseline psychosocial questionnaires, 16 participants completed at least two 24-hour dietary recalls, and 20 (youth) participants returned accelerometers. Of the 15 consenting dyads, fifteen completed baseline measures, with seven randomized into the intervention group and eight were randomized into the control group. Ten dyads were retained at three months, with seven retained at six months. All seven of dyads randomized to the intervention logged into the website, all seven set at least one goal, six linked their activity tracker, and four youth downloaded at least one video and seven caregivers downloaded a podcast.

**Conclusions:** Overall, our results suggest that the assessment protocol was overly burdensome, the intervention had moderate acceptability, and the study as designed was not feasible to complete, at least in the context of a global pandemic.

# Identifying the Landscape of Research Related to Physical Activity and Quality of Life in Breast Cancer Survivors: Topic-Modeling Analysis

**Miss Suryeon Ryu<sup>1</sup>**, Dr. Zan Gao<sup>1</sup>

<sup>1</sup>University of Minnesota - Twin Cities, Minneapolis, USA

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** C. Cancer prevention and management

**Purpose:** While breast cancer is the most prevalent cancer type among females, the survival rate has increased tremendously in the past decades due to early detection and improved cancer treatments. However, living with and beyond cancer can be distressing. A large volume of physical activity (PA) interventions have been implemented to improve breast cancer survivors (BCS)' quality of life (QoL). Despite the importance of QoL, previous studies have not yet investigated the primary research topics and trends in this area of inquiry. Thus, this study aims at examining the major topics and recent 5-year trends in research related to BCS' PA and QoL.

**Methods:** A total of 743 research titles and abstracts were retrieved from the Web of Science database based on the following keywords: breast cancer survivor, quality of life, and physical activity/exercise. The search was restricted to English articles and Science Citation Index Expanded or Social Sciences Citation Index from 2001 to November 2022. The text-mining package (i.e., yTextminer) was used to analyze the top 10 topics and research trends. In detail, this study used topic-modeling techniques (i.e., Latent Dirichlet allocation and Dirichlet-multinomial regression).

**Results:** The results demonstrated that the key topics as follows: (1) prevalence, predictors, and association of comorbid conditions (e.g., fatigue, pain, and depression); (2) intervention effect on fatigue, muscle strength, and aerobic capacity (e.g., home-based); (3) facilitators and barriers (e.g., social cognitive theory); (4) intervention effect on psychological health (e.g., community-based); (5) weight intervention (e.g., risk factor); (6) diet intervention (e.g., health eating); (7) survivorship care (e.g., menopausal symptom and bone); (8) Tai-Chi intervention (e.g., mental health) ; (9) yoga intervention (e.g., fatigue, pain, depression, and sleep); and (10) rehabilitation intervention (e.g., shoulder and motion). In addition, topics 4,6,7,8, and 10 presented trends upward (hot topics), whereas topics 1,2,3, and 5 demonstrated downward trends (cold topics).

**Conclusions:** Findings from this study provide empirical evidence to support an understanding of current and future research trends in BCS' PA and QoL.

# Are fitness and body composition related to active commuting to school in preschool children: The PREFIT project

Dr. Emilio Villa-González<sup>1</sup>, **Dr. YAIRA BARRANCO-RUIZ<sup>1</sup>**, Dr. Joaquín Sánchis-Moysi<sup>2</sup>, Dr. Idoia Labayen<sup>3</sup>, Dr. Jorge Marín-Puyalto<sup>4</sup>, Dr. Miguel Ángel Rojo-Tirado<sup>5</sup>, Dr. Enrique G. Artero<sup>6</sup>, Dr. Magdalena Cuenca García<sup>7</sup>, Dr. Pere A. Borràs<sup>8</sup>, Dr. Celia Álvarez-Bueno<sup>9</sup>, Dr. Diego Moliner-Urdiales<sup>10</sup>, Dr. Palma Chillón<sup>11</sup>

<sup>1</sup>PROFITH: PROMoting FITness and Health through physical activity Research Group, Sport and Health University Research Institute (iMUDS). Department of Physical and Sports Education, Faculty of Education and Sport Sciences, University of Granada, Melilla, Spain, <sup>2</sup>Department of Physical Education and Research Institute of Biomedical and Health Sciences (IUIBS), University of Las Palmas de Gran Canaria, Las Palmas de Gran Canaria, Canary Islands, Spain, <sup>3</sup>Department of Nutrition and Food Science, University of the Basque Country, Vitoria, Spain, <sup>4</sup>Department of Physiatry and Nursing, Faculty of Health and Sport Science (FCSD), University of Zaragoza, Huesca, Spain, <sup>5</sup>LFE Research Group, Department of Health and Human Performance, Faculty of Physical Activity and Sports Science, Polytechnic University of Madrid, Madrid, Spain, <sup>6</sup>Department of Education, Faculty of Education Sciences; SPORT Research Group (CTS-1024), CERNEP Research Centre, University of Almería, Almería, Spain, <sup>7</sup>GALENO Research Group, Department of Physical Education, Faculty of Education Sciences, School of Education, University of Cádiz, Puerto Real, Cádiz, Spain, <sup>8</sup>Physical activity and sport sciences research group, Schools for Health Europe Network Research Group, University of the Balearic Islands, Mallorca, Balearic Islands, Spain, <sup>9</sup>Health and Social Research Center, Universidad de Castilla-La Mancha, Cuenca, Spain, <sup>10</sup>LIFE research group, Universitat Jaume I, Castellón de la Plana, Spain, <sup>11</sup>PROFITH: PROMoting FITness and Health through physical activity Research Group, Sport and Health University Research Institute (iMUDS), Department of Physical Education and Sports, Faculty of Sport Sciences, University of Granada, Granada, Spain

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Previous studies have revealed a positive association between active commuting to school (ACS), physical fitness (PF), and body composition. The existing evidence has focused mainly on school children and adolescents; however, little is known about preschoolers. This study aimed to compare physical fitness (PF) and body composition in a large sample of Spanish preschool children (3- to 5-year-old) according to the habitual mode of commuting to and from school.

**Methods:** A total of 2,571 Spanish preschool children from 10 towns/cities of Spain participated in this study ( $4.53 \pm 0.84$  years; 47.3% girls). Participants' parents or guardians completed a questionnaire at home reporting their children's habitual mode of commuting to the school, afterward categorized into active or passive commuters. PF level was assessed with the validated PREFIT battery, including cardiorespiratory fitness (CRF) (20m shuttle-run test), upper-body muscular strength (handgrip strength test), lower-body muscular strength (standing long-jump test), speed-agility (4x10m shuttle-run test), and balance (one-stand leg test). Percentiles of the participant's PF were calculated according to these fitness categories: very low ( $X < P10$ ), low ( $P10 \leq X < P25$ ), medium ( $P25 \leq X < P75$ ), and high ( $P75 \leq X$ ). Body composition was also analyzed through the calculation of the Body Mass Index (BMI) (body weight (Kg)/ and height (m)<sup>2</sup>).

**Results:** Half of the participants (50.1%) were passive commuters (primarily boys, 52%). Most participants (74.4%) showed normal weight, and  $\approx 50\%$  presented a medium PF level in all fitness components. No differences were found between active and passive commuters regarding BMI. However, active commuters showed higher CRF levels ( $19.8 \pm 11.3$  vs.  $18.9 \pm 11.1$  shuttles;  $p=0.04$ ) compared to passive commuters. No differences were observed in other PF components.

**Conclusion:** Most of the Spanish preschoolers evaluated showed a normal weight and a medium PF level. Also, those who actively commuted to school presented better CRF levels than passive commuters. Further

studies are needed to investigate the relationship between active commuting to school behavior and health variables such as fitness and body composition in preschool children.

# Effects of a telematic postural education program (the PEPE study) on back care knowledge in schoolteachers.

**Dr. Josep Vidal-conti<sup>1</sup>**, Dr. Aina Maria Galmés-Panadés<sup>1</sup>

<sup>1</sup>Physical Activity and Sport Sciences Research Group (GICAFE). Institute for Educational Research and Innovation (IRIE). University of the Balearic Islands, Palma, Spain

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Low back pain (LBP) is a prevalent musculoskeletal disease that affects a large percentage of the working population, including teachers. The WHO has identified the school as an effective environment for improving child health. For this reason, the figure of the teacher is a fundamental piece in the process of knowledge acquisition about postural education and prevention of LBP among schoolchildren. The present study aims to determine the effect of a telematic postural education program on back care knowledge in primary school teachers.

**Methods:** The PEPE study (Proyecto de Educación Postural en la Escuela) was performed in Majorca (Spain), with 85 primary school teachers, of whom 17.6% were physical education teachers and 82.4% were classroom teachers. The sample was selected from different clusters (schools) using convenience sampling and randomly distributed into an experimental group (5 schools) or a control group (5 schools). Participants were evaluated two times, at baseline and after 16 weeks of intervention. The study was based on two different structured and self-administered questionnaires: Low Back Pain Knowledge Questionnaire (LKQ), to investigate into specific knowledge about LBP; and COSACUES-AEF Questionnaire, that aims to measure the knowledge that young people have about health and back care related to the practice of activity and physical exercise. The effects of intervention between groups on the outcome were analysed by using the SPSS General Linear Model (GLM) for the repeated measure procedure.

**Results:** The knowledge of participants at baseline was 17.3 in LKQ (range scale 0–24) and 4.3 in COSACUES (range scale 1–10). Type of teacher group (physical education teachers vs. classroom teachers) showed significant differences in COSACUES ( $p=0.011$ ) and no differences in LKQ ( $p=0.217$ ). The knowledge of participants improved after the intervention in both groups, but no significant differences were achieved.

**Conclusions:** Our results further strengthen the evidence of the need to enhance knowledge related to LBP and postural education in primary school teachers. Nevertheless, this telematic intervention has not managed to improve back care knowledge in schoolteachers.



# Reliability of the Breakfast Consumption Spanish Questionnaire for children and adolescents

Mr. Pablo Campos-Garzón<sup>1</sup>, Dr. Romina G. Saucedo-Araujo<sup>1</sup>, Dr. Manuel Herrador-Colmenero<sup>1,2</sup>, **Dr. Yaira Barranco-Ruiz<sup>1,3</sup>**

<sup>1</sup>PROFITH "PROmoting FITness and Health through physical activity" Research Group, Sport, and Health University Research Institute (iMUDS), Department of Physical Education and Sports, University of Granada, Granada, Spain, <sup>2</sup>La Inmaculada Teacher Training Centre, University of Granada, Granada, Spain, <sup>3</sup>Faculty of Education and Sport Sciences, University of Granada, University Campus of Melilla, Melilla, Spain

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Breakfast is commonly considered one of the most important meals of the day and an essential part of a healthy diet. In fact, children who have breakfast before going to school show better academic results, have more engagement, and improvements in memory and attention during lessons. Currently, there are several methodologies to analyze young people's breakfast habits. Short food questionnaires seem to be the most appropriate because they are quick and easy to administer or self-administer. Therefore, the aim of the study was to assess the reliability (i.e., constancy, coherence, and consistency) of the Breakfast Consumption Spanish Questionnaire (BCS-Q) in a sample of Spanish children and adolescents.

**Methods:** A total of 239 participants, 92 were children (10.7±0.7 years old; 48%girls) and 154 adolescents (14.1±1.7 years old; 48%girls) completed twice a questionnaire separated 14 days on the same days of the week and the same schedule between March-April 2018. The BCS-Q included 21-questions where they were asked about the habitual intake of typical foods for breakfast in Spain, which were categorized into (1) dairy group, (2) meat and protein group, (3) dried fruits group, (4) vegetable group, (5) fruit group, (6) cereal and sugar group, and (7) oil and fats group. The reliability of the BCS-Q was analyzed by the test-retest calculating the kappa coefficient ( $\kappa$ ) and the Spearman correlation coefficient (Rho) for the seven food categories. In addition, the analysis was performed separately for children and adolescents.

**Results:** Children showed a poor-to-moderate agreement in the dairy group ( $\kappa$ :0.16-0.52; Rho: 0.16-0.52) and an acceptable-to-good agreement in the rest of the food groups ( $\kappa$ :0.37-0.72; Rho: 0.36-0.72). On the other hand, adolescents showed a poor-to-good agreement in the meat and protein group ( $\kappa$ :0.05-0.61), a moderate-to-very good agreement in the dairy group ( $\kappa$ :0.44-0.83; 0.45-0.83), and an acceptable-to-good agreement in the rest of food groups ( $\kappa$ :0.29-0.69; Rho:0.29-0.69).

**Conclusion:** The Breakfast Consumption Spanish Questionnaire is a reliable tool for assessing breakfast habits in Spanish children and adolescents. Future studies focused on the analysis of breakfast habits of Spanish youth will be able to use this easy and self-administered tool to simplify the comparison between studies.

# Family Meals and Screentime are Associated with Self-Perceived Weight in US Middle School Students

**Dr. Lori Spruance<sup>1</sup>**, Ms. Kate Jenkins<sup>1</sup>

<sup>1</sup>Brigham Young University, Provo, USA

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Research has demonstrated that individuals who perceive themselves as overweight have increased psychological stress and are less likely to engage in healthy promoting activities including eating a healthy diet and engaging in physical activity. Yet, there is a lack of understanding of what factors contribute to perception of weight. The purpose of this study was to explore factors related to self-perceived weight among a sample of diverse middle school students in the United States.

**Methods:** A national convenience sample of American adolescents ages 11 to 14 was recruited through Qualtrics to participate in an online survey. Models were built to explore the relationships between self-perceived weight and various other variables (family meals, screentime, peer influences on physical activity and nutrition). Data were analyzed separately for males and females.

**Results:** The largest race/ethnicity represented in this sample was White/European (33%) followed by Black/African American (22%). Just under half of all participants were eighth grader and there were slightly more males than females that participated in the survey (58%).

More than 70% of participants perceived themselves as being overweight or obese. Self-perceived overweight was associated with the importance of family meals among females. As the importance of meals within their families increased, the likelihood of self-perception of being overweight went down ( $p=0.0002$ ). Self-perceived overweight was associated with screen time for males. As screen time increased, self-perceived weight decreased ( $p<.0001$ ).

**Conclusions:** This study showed that family meals are protective of self-perceived weight status for females. This demonstrates the importance of continuing to encourage family meals to reduce psychological stress and enhance engagement with health promoting activities, like physical activity and healthy dietary intake. Interestingly, higher screen time was associated with decreased odds of perception of being overweight/obese, despite being well-documented in the literature that screentime increases overweight and obesity risk.

# The Relationship between eHealth literacy, physical activity and sedentary behaviors among Chinese college students: A cross-sectional study

**Ms. Shan Jiang<sup>1</sup>**, Prof. Amy S. Ha<sup>1</sup>

<sup>1</sup>The Chinese University of Hong Kong, Hong Kong, Hong Kong

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** eHealth literacy was used to evaluate skills in finding, accessing, and using health information online to enhance one's level of knowledge, competence, and behavior in relation to a healthy lifestyle. Previous studies have shown that promoting eHealth literacy can facilitate healthy behaviors, such as nutrition and sleep. However, there's an unclear correlation between college students' eHealth literacy and physical activity (PA) or sedentary behavior (SB), and few research has investigated the moderating effect of individual factors. This study was to examine the relationship between eHealth literacy, PA, and SB among college students with majors in health (Chinese medicine, sports science) and non-health (science, social science).

**Methods:** A snowball sampling method was adopted to recruit 1210 students to complete questionnaire surveys online. Individual factors (e.g., gender, university major, age, education level, birthplace), International Physical Activity Questionnaire - Short Form, and Chinese version of the eHealth Literacy Scale were assessed. A path analysis was conducted using Mplus 8.3 to determine correlations between eHealth literacy, PA, and SB with a potential influence of individual factors.

**Results:** 1124 participants, aged 18 to 28 (male: 56.58%), responded to survey with a response rate of 93%. The mean eHealth literacy score was 32.63 (SD 6.40), and scores differed significantly with major. 22% of young adults were physically inactive without adherence to WHO guidelines, and male college students had higher PA and lower SB than females ( $p < .001$ ).

A path analysis showed that the total effects of eHealth literacy on walking were 0.1, 0.15 on moderate to vigorous physical activity (MVPA), and -0.08 on SB. There was a correlation between PA and SB ( $\beta = -0.18$ ,  $p < .001$ ). Higher eHealth literacy predicted students' MVPA for social science ( $\beta = 0.28$ ,  $p < .01$ ) and science students ( $\beta = 0.15$ ,  $p < .01$ ) significantly. But there's no significance of the relationship of eHealth literacy, MVPA, and SB in health-related majors.

**Conclusions:** College students with higher eHealth literacy were more active and less sedentary. Majors and gender were associated with eHealth literacy and PA. Hence, more health education programs at universities are needed for non-health majors and female students.

# Acceptability and engagement with a Child and Family Health text message service: The Healthy Beginnings for HNE Kids program

**Ms. Tessa Delaney<sup>1,2,3</sup>**, Ms. Nayerra Hudson<sup>1</sup>, Ms. Jessica Pinfold<sup>1</sup>, Ms. Margaret Hayes<sup>1</sup>, Dr. Paul Craven<sup>1,2,3</sup>, Prof. John Wiggers<sup>1,2,3</sup>, Prof. Luke Wolfenden<sup>1,2,3</sup>, Ms. Sarah Young<sup>1,2,3</sup>, Ms. Sinead Redman<sup>1</sup>, Mr. Daniel Groombridge<sup>1</sup>, Ms. Karen Gillham<sup>1</sup>, Dr. Rachel Sutherland<sup>1,2,3</sup>

<sup>1</sup>Hunter New England Local Health District, Wallsend, Australia, <sup>2</sup>School of Medicine and Public Health, The University of Newcastle, Wallsend, Australia, <sup>3</sup>Hunter Medical Research Institute, New Lambton Heights, Australia

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**SIG - Primary Choice:** G. Children and families

**Purpose:** Interventions delivered direct to parent mobile phones (mHealth) present a significant opportunity to supplement usual face-to-face health care offered by Child and Family Health (CFH) services. Despite this, little is known about end user acceptability and engagement with CFH mHealth models of care. To assess maternal acceptability and engagement with 'Healthy Beginnings for HNE Kids', a text message program designed to support families with age and stage development and best practice infant feeding behaviours from birth to five years.

**Methods:** Computer assisted telephone interviews were undertaken with mothers of infants aged 6-8 months in the Hunter New England region of NSW Australian from May to December 2022 (data collection ongoing). Guided by the 'theoretical acceptability framework' women were asked to report their 'affective attitude' (program likeability, approval and interest), 'intervention coherence' (if text messages were easy to understand) and 'self-efficacy' (confidence to breastfeed) on a 5-point likert scale ('strongly agree' to 'strongly disagree'). Acceptability of timing and dose of text messages and program engagement (frequency of reading messages and clicking links) were also assessed.

**Results:** At present, 90 women have completed the survey (data collection ongoing). The program found high levels of 'affective attitude' with 93% of women 'liking' the program, 96% indicating it 'met their approval' and 88% finding the text messages 'interesting' (agreed/strongly agreed). All participants found the text messages easy to understand and 63% believed it increased their confidence to breastfeed (agreed/strongly agreed). Almost all women found the number and frequency of text messages (95%) and the time-of-day messages were received acceptable (96%). Most women reported to reading the text messages 'always' or 'very often' (76%), however only 44% clicked on the website links 'always' or 'very often'.

**Conclusions:** The findings suggest there is high program acceptability (affective attitude, intervention coherence, self-efficacy and timing and dose of messages) and end user engagement with a Child and Family Health text message model of care. Such models of care may be appealing to policy makers interested in increasing reach and optimizing care provided by CFH services.

# Association between the use of weight management strategies and weight change among Australian adults over 12 months

**Dr. Ben Singh**<sup>1</sup>, Prof. Timothy Olds<sup>1</sup>, Mr. Ty Ferguson<sup>1</sup>, Prof. Wendy Brown<sup>2</sup>, Dr. Lisa Matricciani<sup>1</sup>, Prof. Adrian Esterman<sup>1</sup>, Prof. Carol Maher<sup>1</sup>

<sup>1</sup>Alliance for Research in Exercise Nutrition and Activity (ARENA), University of South Australia, Adelaide, Australia, <sup>2</sup>University of Queensland, Brisbane, Australia

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** To: i) describe the weight management strategies used by a sample of Australian adults; ii) examine whether use of weight management strategies was associated with weight change over 12 months; and iii) examine the psycho-sociodemographic characteristics of those who used each strategy.

**Methods:** Data were from a 12-month cohort study, involving a community-based sample of Australian adults (n=368, mean age=40.1, SD=5.8). Demographic characteristics were self-reported at baseline. Participants were encouraged to weigh themselves, preferably daily but at least weekly using Fitbit Aria body weight scales (Aria 2 or Aria Air scales, Fitbit Inc., San Francisco, CA). Data were remotely gathered using custom-developed "FitnessLink" software. The use of weight management strategies were obtained using a self-report survey at eight timepoints during the 12-month period. The relationship between weight management strategies, change in weight over the 12-month period and psycho-sociodemographic characteristics was assessed using linear mixed effect models and univariate multinomial logistic regression.

**Results:** Most participants (81%) reported using at least one weight management strategy over the 12 months. The most common weight management strategies were being physically active or exercising (reported by 77%), restricting calories (63%), fasting (41%), counting calories (28%), using supplements (24%) and using diet pills (6%). Exercising or being physically active for weight control was the only strategy significantly associated with weight change (between group difference relative to those not reporting the strategy: -1.2 kg,  $p<0.01$ ). Participants who reported accepting their bodyweight were less likely to report the use of weight management strategies (OR=0.38,  $p<0.01$ ). Compared with females, males were less likely to count calories (OR=0.49,  $p<0.01$ ).

**Conclusions:** Overall, the use of weight management strategies was common in a sample of Australian adults. Public health weight management approaches should include strategies that are associated with effective weight management, and also address the perceptions that individuals have about their bodyweight.



# Parent views on food in schools: a review of the literature

**Miss Alexandra Manson<sup>1</sup>**, Prof. Rebecca Golley<sup>1</sup>, Dr. Brittany Johnson<sup>1</sup>

<sup>1</sup>Caring Futures Institute, College of Nursing and Health Sciences, Flinders University, Adelaide, Australia

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Currently little is known about what parents think about the different ways that food is provided in schools around the world. There are no systematic reviews synthesising parent/caregiver views on lunchbox and school provided meal service models. To ensure school food systems cater to the needs of families, these perspectives should be understood. This mixed papers systematic review aimed to identify parents/caregivers perspectives on system characteristics of importance within school food provision models internationally.

**Methods:** A systematic search was performed in May 2022 across three databases, screened by one reviewer. Qualitative, quantitative and mixed-methods studies were eligible if they reported parent perspectives on the food environment or provision during school hours. Results were collated according to the Bayesian methods to translate quantitative results to qualitative findings and summarised narratively.

**Results:** Eighteen studies, including eight qualitative, four quantitative and six mixed methods studies were included in the review. Studies were predominantly from Australia (n=5), US (n=3), UK (n=3) and Europe (n=2). Studies described perspectives on lunchbox provision and school meal models. Regardless of the school food provision model, key themes included financial cost, adequate nutrition, meeting child preferences and the influence of peers. These characteristics influenced the model adopted and the food provided by families. Challenges of policy and monitoring, school food environments and food preparation were additionally described by parents as challenges in lunchbox food provision. Further, parents positioned themselves as responsible for ensuring their child is fed well and considered lunchboxes an enabler for monitoring intake. Compromise was also a consistent theme discussed throughout the studies, with parents making compromises between certain aspects according to their family priorities.

**Conclusions:** While parents have different priorities, cost, nutrition, and enjoyment of food by children are common parent priorities for school food internationally. Challenges were identified throughout the lunchbox literature, demonstrating the difficulties which can be experienced in this model. School food systems should strive to prioritise low cost, quality food options in a positive food environment to facilitate acceptable food provision, while striving to alleviate provision barriers experienced by parents through providing nutritious, affordable meals in all schools.

# What is the cost of implementing Smartphone Cardiac Rehabilitation, Assisted self-Management (SCRAM) through centralised and satellite models in routine practice?

**Mr. Narayan Subedi**<sup>1</sup>, Dr. Lan Gao<sup>1</sup>, Dr. Jonathan Rawstorn<sup>1</sup>, Dr. Harriet Koorts<sup>1</sup>, Prof. Ralph Maddison<sup>1</sup>

<sup>1</sup>Deakin University, Burwood, Melbourne, Australia

Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** To identify and compare the costs of implementing SCRAM via two delivery models (*centralised* and *satellite*) in routine healthcare services.

**Methods:** This study was conducted as part of the SCRAM randomised controlled trial to evaluate the effects of a smartphone-delivered cardiac rehabilitation program across three sites (Sunshine hospital, University Hospital Geelong, and Bendigo Hospital) in Victoria, Australia, in 2019. We proposed two delivery models: *centralised* involving delivery from a single location, and *satellite*, involving – delivery from 17 local healthcare sites. The cost items (human resource – salary of exercise physiologist, registered nurse, administrative officer, logistics – polar heart rate sensor, laptop, and smartphone, and utilities – office rent, server hosting and stationery) were obtained from SCRAM trial records, and review of published data followed by expert consultation. We used publicly available sources for cost estimation, such as PayScale for salary. Eligible consumers were estimated using cardiovascular disease prevalence data and existing referral and utilisation rates to centre-based programs. Sensitivity analysis assessed the impact of cost variation of the input variable on the output, while budget impact analysis assessed affordability.

**Results:** The average annual cost of delivering SCRAM for 2,350 consumers via the *centralised* and *satellite* models was AUD 1,006,353 and AUD 1,267,449, respectively. The *satellite* model was more expensive than the *centralised* model by AUD 261,096. The cost per consumer was AUD 428 for the *centralised* model and AUD 537 for the *satellite* model. Salary for an exercise physiologist and office rent were the two major cost items contributing nearly 75% of the annual cost.

**Conclusions:** This study showed that a *satellite* delivery model was more expensive than a *centralised* delivery for a smartphone-based cardiac rehabilitation program. Both programs offer utility for service delivery, but this information will inform policymakers and CR providers for planning and budgeting resources required for implementing cardiac telerehabilitation in Victoria, Australia and similar settings offering flexibility.

# Screening tools for children's health behaviours in primary healthcare settings: A systematic review

Miss Dimity Dutch<sup>1</sup>, Dr. Lucinda Bell<sup>1</sup>, Dr. Dorota Zarnowiecki<sup>1</sup>, **Dr. Brittany Johnson<sup>1</sup>**, Prof. Elizabeth Denney-Wilson<sup>2</sup>, Dr. Rebecca Byrne<sup>3</sup>, Ms. Heilok Cheng<sup>2</sup>, Ms. Chris Rossiter<sup>2</sup>, Miss Alexandra Manson<sup>1</sup>, Dr. Kamila Davidson<sup>4</sup>, Prof. Rebecca Golley<sup>1</sup>

<sup>1</sup>Caring Futures Institute, Flinders University, Adelaide, Australia, <sup>2</sup>The University of Sydney, Sydney, Australia,

<sup>3</sup>School of Exercise and Nutrition Sciences, Faculty of Health, Queensland University of Technology, Brisbane, Australia, <sup>4</sup>School of Public Health and Social Work, Faculty of Health, Queensland University of Technology, Brisbane, Australia

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Child health behaviour screening tools in primary healthcare have potential as a transformative and effective strategy to support health, growth and development in children. Health behaviour screening is an innovative and alternative approach to growth monitoring and supports the early identification of suboptimal behaviours to target strategies for intervention. This systematic review aimed to examine the effectiveness, acceptability and feasibility of child health behaviour screening tools used in primary healthcare settings.

**Methods:** A systematic search of studies published in English in five databases (CINAHL, Medline, Scopus, PsychInfo and Web of Science) prior to July 2022. Eligible studies were those 1) describing screening tools for health behaviours (dietary, physical activity, sedentary or sleep-related behaviours) used in primary healthcare settings in children birth to 16 years of age, 2) those reporting the acceptability, feasibility or effectiveness on child or practitioner behaviour, or 3) the implementation strategy of the screening tool. Screening and data extraction were conducted in duplicate and results narratively synthesised.

**Results:** The search identified 7145 papers, of which 452 full-text articles were screened for eligibility and 22 studies reporting on 14 unique screening tools were included. Four screening tools measured diet, physical activity, sedentary and sleep behaviours domains, with most screening tools only measuring two or three behaviour domains. 10 studies reported screening tools were effective in changing practitioner self-reported behaviour, knowledge, self-efficacy and provision of health behaviour education. Administration of screening tools varied across studies including mode (paper vs online), timing (prior to or during appointment) and parent or practitioner completion. Implementation strategies described included practitioner training and integration into electronic medical records. Practitioners and parents identified various benefits and challenges to screening, however child views were not captured.

**Conclusions:** Few screening tools exist to facilitate comprehensive screening of children's health behaviours in primary health care. Research investigating parent, child and practitioner views on screening, and effectiveness on improving child health behaviours are needed.

# Are Apps a good idea to support health behaviour change post gestational diabetes ?

**Dr. Anna Roesler<sup>1</sup>**, Dr. Kaley Butten<sup>1</sup>, Dr. Marlien Varnfield<sup>1</sup>, Dr. Pennie Taylor<sup>1</sup>

<sup>1</sup>Commonwealth Scientific Industrial Research Organisation, Adelaide, Australia

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Globally, gestational diabetes (GDM) is associated with increased risk of adverse outcomes for both mothers and their children during and post pregnancy. The primary treatment for GDM and associated adverse health outcomes is lifestyle modification, delivered either face to face or via telemedicine. Currently, mobile health applications (Apps) are utilised during GDM to virtually connect women with the healthcare team to support behaviour change, but following birth such App support ceases. This study aims to explore healthcare providers' views on extending an established GDM App, MoTher, to support maternal health behaviour change following GDM.

**Methods:** Semi structured interviews were conducted with healthcare providers with experience in diagnosis and care of women diagnosed with GDM. Healthcare providers recruited for interview were engaged with the MoTher App used in four hospitals in Brisbane, Australia. Interviews were transcribed and thematically analysed with NVivo 11 software.

**Results:** Fourteen interviews were conducted with healthcare providers, including dietitians (3), diabetes educators (3), endocrinologists/obstetricians (3), nurses (2), midwives (2), and general practitioners (1). The preliminary findings indicate that healthcare providers believe women are left 'abandoned' following GDM. Currently no structured services exist supporting health change and reduction of diabetes risk post birth. App support in the post pregnancy period could partly fill this gap, but consideration of how funding structures can be applied to incorporate digital health tools for practice outcomes is required. Apps for women post GDM need to be simple; positively framed; provide resource links and quality health information; and include important reminders, specifically for the oral glucose tolerance test. Women also need to have ownership of their health information for dissemination and use as required. Therefore, important health information should be retained to optimise personalised care via Apps, however, risks and data safety needs further consideration.

**Conclusions:** Healthcare providers unanimously agree that extending digital health supports post GDM is valuable. This is an opportune time to create health behaviour change and decrease risk of diabetes. These findings, in combination with currently underway research, will guide future digital health support surrounding GDM.

# Amount vs contextual screen use trajectories from age 2 to 11-12 years in relation to cognitive development at age 11-12 years in children from the EDEN birth cohort

**Mr. Shuai Yang<sup>1</sup>**, Dr. Lorraine Poncet<sup>1</sup>, Mrs. Muriel Tafflet<sup>2</sup>, Prof. Hugo Peyre<sup>3,4,5</sup>, Prof. Franck Ramus<sup>3</sup>, Dr. Barbara Heude<sup>1</sup>, Dr. Jonathan Y. Bernard<sup>1,6</sup>

<sup>1</sup>Université Paris Cité, Inserm, INRAE, Centre de Recherche en Épidémiologie et Statistiques, Paris, France,

<sup>2</sup>Unité mixte Inserm-Ined-EFS ELFE, Ined, Aubervilliers, France, <sup>3</sup>Laboratoire de Sciences Cognitives Et Psycholinguistique (ENS, EHESS, CNRS), Ecole Normale Supérieure, PSL Research University, Paris, France, <sup>4</sup>Neurodiderot, Inserm UMR 1141, Paris Diderot University, Paris, France, <sup>5</sup>Département de psychiatrie de l'enfant et de l'adolescent, Hôpital Robert Debré, APHP, Paris, France, <sup>6</sup>Singapore Institute for Clinical Sciences (SICS), Agency for Science, Technology and Research (A\*STAR), Singapore, Singapore

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**SIG - Primary Choice:** G. Children and families

**Purpose:** Whether screen use is related to children's cognitive development lacks evidence from longitudinal studies. We aimed to investigate screen use trajectories from 2 to 11-12 years in association with cognitive development at age 11-12 years in children from the French EDEN birth cohort.

**Methods:** Parents reported whether TV is on during family meals (4-point Likert: never, sometimes, often, or always) at ages 2, 3, 5-6, and 8 years, and their child's screen time at the same ages and up to 11-12 years. Overall, verbal and non-verbal abilities of children were derived from subtests of the Peabody Picture Vocabulary scale and the Wechsler Intelligence Scale for Children (4<sup>th</sup> Edition) at 11-12 years, and standardized (mean=100, SD=15). Screen time and TV-on during family meals trajectories were identified by latent profile and latent class analyses, respectively. Their associations with cognitive development at age 11-12 years were assessed by linear regression models adjusted for baseline sociodemographic, behavioral confounders at age 11-12 years (outdoor play time and sleep duration), and children's cognition at age 2 years. Multiple imputations were performed among children (N=459) with  $\geq 1$  screen use information and  $\geq 1$  outcome measurement.

**Results:** Children's screen time trajectory from age 2 to 11-12 years was classified into 4 groups: low-user (11.8%), average-user (31.2%), later-user (40.7%), and high-user (16.3%). TV-on during family meals trajectory from age 2 to 8 years was classified into 3 groups: never (41.0%), sometimes (33.3%), and often/always (25.7%). Regarding screen time trajectories, there were no differences between groups in overall, verbal and non-verbal abilities. TV-on during family meals was consistently associated with lower cognitive abilities: compared to never, having TV sometimes or often/always on during family meals was associated with lower overall (sometimes:  $\beta$  [95% CI]: -4.1 [-7.5, -0.7]; often/always: -1.6 [-5.6, 2.4]), verbal (sometimes: -1.5 [-4.9, 1.9]; often/always: -1.3 [-5.3, 2.8]), and non-verbal (sometimes: -5.1 [-8.6, -1.6]; often/always: -1.0 [-5.2, 3.1]) abilities.

**Conclusion:** Our study shows that TV-on during family meals, but not screen time, is associated with lower children's cognitive development. Future studies need to better account for the context of screen use, not only screen time.



# Pilot study to strengthen primary prevention of colorectal cancer through motivational and community-based approaches, depending on individual risk level, among individuals receiving colonoscopy

**Mrs. Olivia Pérol<sup>1,2</sup>**, **Mr. Rodolf Mongondry<sup>1</sup>**, Mrs. Magali Dubois<sup>1</sup>, Mrs. Aurélia Maire<sup>1</sup>, Mrs. Alix Goerens<sup>1</sup>, Dr. Pamela Funk<sup>1</sup>, Associate Professor Béatrice Fervers<sup>1,2</sup>, Dr. Anne Cattey-Javouhey<sup>1</sup>  
<sup>1</sup>Centre Leon Berard, Lyon, France, <sup>2</sup>INSERM U1296, Lyon, France

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

## **SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Many colorectal cancers (CRC) could be prevented by modifying individual risk behaviors (sedentary lifestyle, overweight, diet, alcohol). The time of CRC screening is an opportunity to promote and educate about CRC risk factors. The PRECÔTION project proposes an innovative digital program, using informative, motivational and community-based approaches to raise awareness and initiate individual prevention actions according to individual risk. The main objective is to evaluate the feasibility of the program in each risk group. The study will also assess the acceptability of the device, compliance and preliminary effects on lifestyle, physical activity level and knowledge of CRC risk factors.

**Methods:** Participants will be assessed to identify their individual risk factors (physical activity, nutrition, body composition) and their motivation to change their behaviors. The evaluation will determine their CRC risk level and assign them to one of 3 groups (low, moderate, high risk) to benefit from an adapted and personalized intervention.

All participants, will receive physical activity and dietary support via digital media (videos and podcasts) based on a motivational approach. Each video addresses a specific topic, with practical exercises that allow participants to practice immediately and over time.

Participants will be provided an application allowing them to interact with each other. Monthly, participants will have the opportunity to take part in a discovery session of physical activity in community. They will be welcomed to come accompanied by a relative. Participants will also be given an interactive logbook to record their participation in the different tools and to reinforce the motivational dimension. Participants with a moderate to high risk will also benefit from a collective health education session. Participants with a high risk level will receive three individual motivational coaching sessions and a connected watch to track their daily step count.

**Results:** Ongoing recruitment

**Conclusion:** Our project is a first step to test these different tools and to adapt them if needed. In a second phase, we intend to develop a larger scale study to measure the effects of this personalized intervention on health and its impact in terms of prevention to reduce the number of avoidable cancers.

# The role of sociodemographic factors on changes in food habits during transition to retirement

Dr. Hanna Lagström<sup>1,2</sup>, Dr. Mirkka Lahdenperä<sup>3</sup>, Dr. Tasnime Akbaraly<sup>4</sup>, **Prof. Sari Stenholm<sup>1,2</sup>**, Prof. Jenny Head<sup>5</sup>

<sup>1</sup>Department of Public Health, University of Turku, Turku, Finland, <sup>2</sup>Centre for Population Health Research, University of Turku, Turku, Finland, <sup>3</sup>Department of Biology, University of Turku, Turku, Finland, <sup>4</sup>Inserm, U1198, Université Montpellier, Ecole Pratique des Hautes Etudes, Montpellier, France, <sup>5</sup>Department of Epidemiology and Public Health, University College London, London, United Kingdom

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** Transition to retirement is an important turning point in life, which is accompanied by changes in many aspects of life. These changes may also predispose or lead to changes in food habits, but this is scarcely studied. The aim of this study was to examine changes in fish, red meat, vegetables and fruit consumption, as indicators of recommended food habits, before and after retirement transition over a 32-year follow-up.

**Methods:** The data were from the Whitehall II study, a cohort of 10,308 British civil servants aged 35 to 55 years at study induction (years 1985–1988). Since then, data collection have taken place every 2-3 years. The participants reported their employment status at each phase and data was organized into pre-retirement (max. 16 years prior) and post-retirement (max. 16 years after) periods. Food consumption was assessed by the Food Frequency Questionnaire. Changes in food consumption before and after retirement were assessed using liner regression analyses with generalized estimating equations adjusting for gender, retirement age, occupational status, marital status and financial hardship.

**Results:** Before retirement, fish was consumed on average 1.79 (SD 1.75), red meat 5.49 (SD 3.74), vegetables 25.25 (SD 12.42) and fruit 16.50 (10.67) times per week. Fish consumption differed between pre- and post-retirement periods ( $p=0.02$ ) by decreasing before retirement especially among those with financial hardships and staying at the same level after retirement. Weekly red meat consumption differed between pre- and post-retirement periods ( $p=0.02$ ) by staying even before retirement and increasing markedly after retirement, especially among people in the lowest occupational group. Vegetables and fruit consumption increased both pre- and post-retirement, but more strongly during pre-retirement than post-retirement ( $p<0.001$  for both). Single participants increased more vegetable consumption during post-retirement compared to married participants.

**Conclusion:** The transition to retirement was associated with increased consumption of vegetables and fruits. No association was found for the consumption of fish, but slight increase of red meat consumption was observed. There is a need for further studies that more thoroughly investigate the effects of retirement on diet and underlying factors in order to develop health guidance targeted at retiring employees.

# What are the characteristics of people aged 60+ who signed up to a 12-month trial of yoga?

**Prof. Anne Tiedemann**<sup>1</sup>, Dr. Juliana Souza De Oliveira<sup>1</sup>, Prof. Cathie Sherrington<sup>1</sup>, Prof. Stephen Lord<sup>2</sup>, Ms. Giane Caon Camara<sup>1</sup>, Ms. Shannon Colley<sup>1</sup>, Prof. Adrian Bauman<sup>3</sup>, Prof. Kaarin Anstey<sup>4</sup>, Associate Professor Anne Grunseit<sup>5</sup>, Prof. Kirsten Howard<sup>6</sup>, Ms. Romina Sesto<sup>7</sup>, Prof. Roberta Shepherd<sup>3</sup>

<sup>1</sup>Institute for Musculoskeletal Health, The University of Sydney and Sydney Local Health District, Camperdown, Australia, <sup>2</sup>Neuroscience Research Australia, Randwick, Australia, <sup>3</sup>Faculty of Medicine and Health, The University of Sydney, Camperdown, Australia, <sup>4</sup>UNSW Ageing Futures Institute, University of New South Wales, Randwick, Australia, <sup>5</sup>School of Public Health, University of Technology Sydney, Ultimo, Australia, <sup>6</sup>Menzies Centre for Health Policy and Economics, Faculty of Medicine and Health, The University of Sydney, Camperdown, Australia, <sup>7</sup>Yoga To Go, Petersham, Australia

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** Yoga is growing in popularity and provides benefits for physical and mental health outcomes, including balance, mobility, mental well-being and quality of life. The Successful AGEing trial (ACTRN 12619001183178) is the first trial internationally to evaluate the effect of yoga-based exercise on falls among people aged 60+. We aim to describe the characteristics of the SAGE trial participants and provide insight into the attributes of older people who are attracted to yoga programs, to inform future implementation.

**Methods:** Community-based participant recruitment occurred between October 2019 and October 2021 in NSW, Australia. Inclusion criteria were: aged 60+; living independently at home; not currently participating in yoga or had not regularly participated during the past year; able to travel to an intervention location for face-to-face classes or able to access online classes via the internet. Exclusion criteria were: cognitive impairment (scoring  $\leq 4$  on the Memory Impairment Screen); insufficient English; inability to walk 10 metres unassisted; progressive neurological disease (eg, Parkinson's disease) or a medical condition precluding exercise (eg, unstable cardiac disease). Participants were randomly allocated to either: (1) the group-based, supervised, 80-session SAGE yoga exercise program, emphasising standing balance postures, or to (2) a seated yoga relaxation program, delivered in two group-based sessions and then carried out independently at home. The primary outcome was the rate of falls in 12 months after randomisation, measured via monthly surveys.

**Results:** 700 people (mean age 66, SD 5.8) were recruited for the trial. 572 (82%) participants were female and 367 (52%) had taken part in yoga previously. In terms of their general health and reported medical conditions, participants were healthier than the broader Australian population at this age: they took an average of 2 medications (SD 1.8), 178 (25%) participants reported no medical conditions, 40 (6%) had diabetes, 80 (11%) had asthma and 19 (3%) had heart disease. However, 178 (25%) participants self-rated their balance as fair/poor, and 229 (33%) reported 1 or more falls in the past year, which is consistent with population estimates.

**Conclusions:** This trial of yoga recruited a relatively healthy sample of older people, most of whom were female.

# A theory-driven, qualitative exploration of university students' awareness of sedentary behaviour

**Dr. Brenda Berendsen<sup>1</sup>**, Ms. Lieke van den Eijnde<sup>2</sup>, Dr. Dennis de Ruijter<sup>3</sup>

<sup>1</sup>Dept. of Nutrition and Movement Sciences, Maastricht University, Maastricht, Netherlands, <sup>2</sup>Smart Health, Rotterdam, Netherlands, <sup>3</sup>Dept. of Health Promotion, Maastricht University, Maastricht, Netherlands

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** University students spent approximately 10 hours per day in sedentary behaviour (SB), which is associated with chronic diseases and academic achievement. Awareness of unhealthy behaviour is a precondition for behaviour change. In order to systematically develop interventions aimed at interrupting SB, we explored awareness of university students of SB using in-depth interviews.

**Methods:** This qualitative, in-depth study explored four aspects of awareness, i.e. knowledge, risk perception, cues and cognizance, in six full-time university students at Maastricht University of 21±1 years via interviews grounded in the I-change model. The interviews assessed these four aspects of awareness in relation to SB. To further explore cognizance, participants wore an activPAL3 accelerometer continuously for 7 consecutive days. The time spend sedentary and occurrences of prolonged sedentary bouts were compared with data from the interview. Interviews were transcribed ad verbatim, and coded in NVivo using a coding tree.

**Results:** Three of six students did not know the term SB. Two students were aware of the advice to interrupt SB. All students had a low risk perception of developing physical diseases related to SB. In general, environmental characteristics in university buildings and homes were identified as cues for SB. The workload was mentioned as an internal cue to sit by three students. On average, students self-reported a lower average sedentary time and a higher number of sedentary bouts longer than 30 minutes compared to objective data. Educational activities at university were perceived as promoting SB by all students. Main strategies to reduce SB were planning breaks in studying time and educational activities, exercising in the evenings, walking with pets, and using standing desks.

**Conclusions:** Some university students are aware of the definition of SB, but generally not aware of their own SB and associated risks. Strikingly, after being told by the interviewer that the negative effect of SB might not be compensated with long bouts of PA, students still proposed exercising after studying as a strategy to reduce the risks of SB. This, and the low cognizance level imply that interventions with feedback and guided goal setting may be required to promote interruptions in SB.

# Identification of foods commonly used by older adults in England, France and Norway for protein enrichment to prevent undernutrition.

**Dr. Øydis Ueland<sup>1</sup>**, Dr. Miriam Clegg<sup>2</sup>, Ms. Alexia Geny<sup>3</sup>, Dr. Lisa Methven<sup>2</sup>, Dr. Guro Rognså<sup>1</sup>, Ms. Rachel Smith<sup>2</sup>, Dr. Claire Sulmont-Rossé<sup>3</sup>, Dr. Virginie Van Wymelbeke-Delannoy<sup>3</sup>, Ms. Ida Synnøve Grini<sup>1</sup>  
<sup>1</sup>Nofima, Ås, Norway, <sup>2</sup>University of Reading, Reading, United Kingdom, <sup>3</sup>INRAE, Dijon, France

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** Identification of commonly used dishes suitable for protein enrichment by older adults in a home setting.

**Background:** The risk of undernutrition is a major problem for older adults as they have similar nutritional requirements per/kg bodyweight as younger adults but are typically smaller eaters. Older adults have a higher need for protein and so developing nutritional interventions that increase protein intake are essential. Considering that older people do not change their food habits that easily, fortifying their regular meals with protein provides a relevant and flexible strategy to improve the nutritional value of their diet. A first step towards successfully enabling older adults to enrich their own foods is to identify dishes that are commonly prepared and consumed by older people spanning different food cultures.

**Methods:** During autumn 2021, 65 older adults across England, France and Norway, (aged 70-90 years, 20 in each country), were asked to complete food diaries for four days (three weekdays, and one weekend day) in the span of two weeks. Respondents lived in their own home, cooked their own meals, did not follow very restricted diets, or suffer from allergies. Data collected were type and amount of food, drinks, and condiments consumed, time of food consumption, and cooking methods.

**Results:** Many similar dishes were reported by the respondents in the three countries, although it varied for which meal the dishes were most commonly consumed. Based on summaries of the most frequently mentioned dishes in the three countries and for different meals, the following food matrices were selected for recipe optimization: for breakfast, lunch, afternoon tea, evening meal, dessert, snack products (Granola, oat-meal porridge, pancakes, French toast, cake/muffins), and for lunch, dinner (pureed soup, Bolognese, mashed potatoes).

**Conclusion:** The dishes selected for recipe optimization should cover foods consumed throughout the day to provide older adults at risk of undernutrition a means to enrich their meals without compromising sensory or usage characteristics of the dish. In addition, the recipes should cover different food matrices to cater for different preferences of the older adults.



# Aspects of nutritional deficits and cognitive outcomes - Triangulation across time and subject domains among students and teachers in TIMSS

**Prof. Frøydis Nordgård Vik<sup>1</sup>**, Prof. Trude Nilsen<sup>2</sup>, Prof. Nina Cecilie Øverby<sup>1</sup>

<sup>1</sup>University of Agder, Kristiansand, Norway, <sup>2</sup>University of Oslo, Oslo, Norway

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Studies of the relationships between breakfast intake and academic achievements among adolescents are scarce. The research questions are:

- 1) How has students' prevalence of breakfast intake changed between 2015 and 2019 and how has teachers' perceptions of students' lacking basic nutrition changed between 2015 and 2019?
- 2) What are the associations between breakfast skipping and academic achievements in mathematics and science in 2015 and in 2019, and what are the associations between teachers' perceptions of students' lack of basic nutrition and academic achievements in these topics, in 2015 and in 2019?
- 3) To what extent may breakfast skipping explain changes in achievement in science and mathematics from 2015 to 2019?

**Methods:** A representative sample of Norwegian 9<sup>th</sup> graders based on Trends in International Mathematics and Science Study (TIMSS), N= 4499 (2015) and N=4685 (2019) and their teachers. This study is a trend study using structural equation modelling, triangulation and mediation analysis.

**Results:** We found that the prevalence of breakfast intake among students have worsened (27%) from 2015 to 2019; fewer students eat breakfast. The teachers' perceptions of students' lacking basic nutrition have also worsened (7%) from 2015 to 2019. We found a significant association between breakfast skipping and lower achievements in both mathematics and science among Norwegian 9<sup>th</sup> graders, both in 2015 and 2019. This was reported both by the students themselves and their teachers. Further, mediation analyses showed that being hungry when arriving at school explained 4.1 out of 13 points of the decrease in science achievement and 4.7 points out of 8 points in mathematics achievement. The associations are still significant when adjusted for gender, SES, and minority.

**Conclusions:** This study revealed a significant positive association between breakfast intake and school achievements among Norwegian 9<sup>th</sup> graders. This was found for both mathematics and science achievements, in 2015 and 2019, reported both by the students and their teachers. Mediation analyses showed that breakfast skipping explained 1/3 of the decrease in science achievement and more than half of the decrease in mathematics achievement from 2015-2019. Actions from the educational - and health system to address these issues are warranted.

# One's meat another's poison? Social and personal norm perceptions across different meat consumers types

**Miss Sofia M. M. Wolfswinkel<sup>1</sup>**, Dr. Sanne Raghoobar<sup>2</sup>, Dr. Hans Dagevos<sup>3</sup>, Prof. Emely de Vet<sup>1</sup>, Associate Professor Maartje P. Poelman<sup>1</sup>

<sup>1</sup>Consumption and Healthy Lifestyles group, Wageningen University & Research, Wageningen, Netherlands,

<sup>2</sup>Consumption and Healthy Lifestyles group, Education and Learning Sciences Group, Wageningen University & Research, Wageningen, Netherlands, <sup>3</sup>Wageningen Economic Research Wageningen University & Research, Wageningen, Netherlands

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** To promote the protein transition that enhances public and planetary health, it seems crucial that prevailing meat consumption norms shift towards more plant-based norms in Western societies. Social and personal norms are considered a barrier to meat consumption reduction. The perception of these norms may vary across meat consumers. Therefore, understanding the current perceptions of meat consumption norms is important, particularly by acknowledging meat consumer heterogeneity. This study aims to investigate the extent to which different meat consumers types perceive social norms and personal meat consumption norms, and dynamic meat reduction norms.

**Methods:** British meat eaters (n=1205, 25-65 years) participated in an online cross-sectional survey. Meat (substitute) consumption was measured with the adapted Oxford Meat Frequency Questionnaire. Descriptive, injunctive and personal norm perceptions were measured for meat consumption (e.g., "It is likely that others would choose meat at the [supermarket/restaurant/worksite cafeteria]"). Dynamic norm perceptions (e.g., "An increasing number of people around me are starting to lower their meat consumption") were measured for meat reduction. All norm perceptions were measured with two items, on a 7-point Likert scale. Two-step cluster analysis was conducted to identify types of meat consumers. ANOVAs were conducted to assess differences in norm perceptions between meat consumer types.

**Results:** Based on meat (substitute) consumption, four types of meat consumers were identified: Meat lovers (n=398), Exceeders (n=103), Flexitarians (n=158), Moderates (n=546). Significant ( $p < .001$ ) differences were found in descriptive ( $F(3, 1291) = 14.5$ , partial  $\eta^2 = 0.04$ ), injunctive ( $F(3, 1201) = 11.2$ , partial  $\eta^2 = 0.03$ ), personal ( $F(3, 1201) = 19.6$ , partial  $\eta^2 = 0.05$ ), and dynamic ( $F(3, 1201) = 28.4$ , partial  $\eta^2 = 0.07$ ) norm perceptions between the meat consumer types. Flexitarians portrayed the lowest meat consumption norms and the highest dynamic norms, Meat Lovers and Exceeders opposite to Flexitarians, and Moderates perceive norms stronger than Flexitarians but weaker than Meat Lovers and Exceeders ( $p < .05$ ). To illustrate, Flexitarians indicated the highest dynamic norm perception ( $M = 5.1$ ,  $SD = 1.3$ ), followed by Exceeders and Moderates ( $M = 4.2$ ,  $SD = 1.5$ ;  $M = 4$ ,  $SD = 1.6$ ), and Meat Lovers ( $M = 3.7$ ,  $SD = 1.6$ ).

**Conclusion:** Findings show that normative perceptions about meat eating differed across meat consumers. This heterogeneity across meat consumers should be acknowledged in future social norm interventions aiming for meat reduction.

# Evaluation of stimulating local stakeholder collaboration to implement the Combined Lifestyle Intervention (CLI) in the Netherlands

**Ms. Gioia Muru<sup>1</sup>**, Dr. Femke van Nassau<sup>1</sup>, Dr. Joske Nauta<sup>1</sup>

<sup>1</sup>Amsterdam UMC, location VUmc, Amsterdam, Netherlands

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** The Combined Lifestyle Intervention (CLI), covered by the basic health insurance since 2019, aims to achieve and maintain a healthy lifestyle through behavior change. However, the implementation is not yet reaching its potential. The purpose of this study was to evaluate facilitators and barriers for setting up new- or strengthen existing local stakeholder collaboration in order to ultimately foster better implementation of the CLI.

**Methods:** The qualitative design included stakeholder interviews, field notes from network meetings and document analyses of implementation plans. Thematic analysis was used to code the interviews and documents resulting in 4 themes.

**Results:** In the collaboration with different stakeholders, it was important everyone's interest was known and aligned. In setting up new collaborations performing a needs assessment was therefore essential. It was also critical to set preconditions before starting to implement the CLI, which included setting up contracts with health insurers, making agreements on overhead costs and finding a suitable referral and declaration system. The third topic was communication, which indicated the need for more visibility of the CLI for healthcare professionals as well as the target group to stimulate the referral process. Lastly, the need for tailoring the CLI to different target groups was expressed.

**Conclusion:** The study showed that strong collaboration between key stakeholders contributed to the implementation of the CLI. However, these collaborations require structural investment from all parties. In addition, preconditions and a communication plan (as a part of a implementation plan) are also needed to support implementation of the CLI.

# Fidelity, Attitudes, and Influence Typologies (FAIT): Practical Approach to Informing Identification of Implementation Champions and Facilitation

Dr. Julie Rutledge<sup>1</sup>, **Dr. Taren Swindle<sup>2</sup>**, Dr. Dong Zhang<sup>2</sup>, Ms. Janna Martin<sup>2</sup>, Mrs. Peyton Percle Murray<sup>1</sup>, Dr. Geoffrey Curran<sup>2,3</sup>

<sup>1</sup>Louisiana Tech University, Ruston, USA, <sup>2</sup>University of Arkansas for Medical Sciences, Little Rock, USA,

<sup>3</sup>Central Arkansas Veterans Healthcare System, Little Rock, USA

Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** Implementation facilitation has been described as a “black box” with over 72 distinct roles and 22 complex skills. Tools to inform implementation facilitation can offer tangible approaches for demystifying the process and inform selection of key community partners (i.e., Champions) to increase the uptake of health-based interventions. The current study sought to: (1) describe development of a novel classification approach for types of end users and (2) apply the approach to identify implementation champions in an early care and education (ECE) nutrition promotion trial focused on the We Inspire Smart Eating (WISE) curriculum.

**Methods:** Expanding on Diffusions of Innovation, three key factors (attitude, fidelity, influence) were identified and used to develop the Fidelity, Attitudes, and Influence Typologies (FAIT). (1) Development of FAIT occurred initially in a small-scale, cluster randomized Hybrid Type III implementation trial conducted in 38 early care and education classrooms implementing WISE. External facilitators (N=3) and a data collection supervisor used a modified Rapid Assessment Procedure Informed Clinical Ethnography to complete immersive observations and thematic content analyses of interviews to identify characteristics of teachers' behavior at varying levels of implementation fidelity. (2) For application of FAIT constructs to identify ECE Champions, teachers' (N=89) attitude and influence were measured on self-report surveys using Likert scales at baseline of an implementation trial (attitude=14 items; influence=3 items); 82% of teachers invited to be champions agreed and were trained.

**Results:** (1) FAIT includes 8 typologies delineated by combinations of characteristics: (a) achieving *fidelity* targets or not (i.e., Adopting vs. Non-Adopting), (b) valence of *attitudes* toward the innovation (i.e., Supporter vs. Resister), and (c) *influence* in the context (i.e., Active vs. Passive). Potential Champions were identified after the WISE training based on their attitude toward WISE and their self-reported organizational and/or peer influence. (2) A total combined attitude and influence score was calculated (N=89,  $M=69.35$ ,  $SD=9.91$ ), and teachers with higher scores (e.g., more positive attitudes toward WISE and higher influence) were invited to be Champions.

**Conclusions:** FAIT provides a guide to target the efforts of implementation facilitation and identify strong community partner Champions to increase fidelity to evidence-based practices of nutrition interventions.

# Prevalence, Attitudes, and Characteristics of Users of Digital Tools for Physical Activity: Results from Nationwide Surveys in Germany

**Ms. Chen-Chia Pan<sup>1,2,3</sup>**, Dr. Karina Karolina De Santis<sup>1,2</sup>, Dr. Saskia Müllmann<sup>1,2</sup>, Prof. Hajo Zeeb<sup>1,2,4</sup>

<sup>1</sup>Leibniz ScienceCampus Digital Public Health Bremen, Bremen, Germany, <sup>2</sup>Leibniz Institute for Prevention Research and Epidemiology - BIPS, Bremen, Germany, <sup>3</sup>Institute for Public Health and Nursing Research, University of Bremen, Bremen, Germany, <sup>4</sup>Health Sciences Bremen, University of Bremen, Bremen, Germany

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Interest in digital technologies and health apps has rapidly increased in research, clinical practice, and consumer markets. Digital tools that support physical activity (PA), such as fitness trackers and smartwatches, have great potential to be incorporated into behavior change interventions. However, there is a knowledge gap in epidemiological research on the use of digital tools for PA in the real world. This study investigated the prevalence, attitudes, and characteristics of users of digital tools for PA in Germany.

**Methods:** Two cross-sectional telephone-interview surveys were conducted in October 2020 and November 2022. Nationwide panels of 1000 internet users selected from the general population living in Germany reported their sociodemographic characteristics, perceived eHealth literacy (on the eHEALS scale), and their use of and attitudes toward digital technologies for health promotion. The responses on each item were analyzed in IBM-SPSS24 and summarized using relative frequencies.

**Results:** The participants in the first survey were 1014 internet users, 52% were female, with an average age of 45 years, and 61% completed up to secondary education. Most participants were employed and lived in 1-2 person, urban households with a country-average income. Only 21% (n=220) of participants reported using digital media or software to support PA. The majority (85%) agreed that using such digital tools for PA is easy for them. Most (77%) believed digital tools could assist them in being active, and 64% reported using digital tools for PA at least once a week. Although over 80% reported high perceived eHealth literacy, 57% felt confident using information from the internet to make health decisions. Once the second survey data are available, we aim to compare the pattern of use and attitudes toward digital tools for PA between both surveys.

**Conclusions:** Internet users in Germany perceive digital tools are useful for PA and easy to use. However, the actual use of such technologies was low in 2020. Digital interventions aiming at behavior change in PA should be tailored toward the general population. Future studies should evaluate if using digital tools improves PA outcomes in the real world.



# Packaging of a Family Healthy Weight Program

**Dr. Bryce Abbey<sup>1</sup>**, Dr. Kate Heelan<sup>1</sup>, Dr. Jennie Hill<sup>2</sup>, Dr. R. Todd Bartee<sup>1</sup>, Mrs. Ali Malmkar<sup>1</sup>, Dr. Paul Eastabrooks<sup>2</sup>

<sup>1</sup>University of Nebraska at Kearney , Kearney , USA, <sup>2</sup>University of Utah , Salt Lake City, USA

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** Building Healthy Families (BHF), a Family Healthy Weight Program (FHWP) that is an adaptation of Epstein's Traffic Light Diet (TLD) and has been implemented in a Midwestern micropolitan city and successfully achieved clinically and statistically significant reductions in child BMIz scores. FHWP's reduce child weight status, but for families living in micropolitan cities (<50,000) and rural areas, the availability of inter-disciplinary healthcare teams recommended to deliver FHWP is low—so adapted interventions with well packaged materials and training resources are necessary to fit the needs of families, and organizations interested in reducing obesity in these regions. The purpose of this project is to describe the development of BHF Online Training and Resource Program package for implementation in micropolitan/rural communities.

**Methods:** We packaged a FHWP for “turn -key” implementation by creating the BHF Online Training Resources and Program package by incorporating several instructional design features and adoption and implementation strategies to focus on effectiveness across all user groups. Online training modules were created for each implementation team role including; program coordinator and nutrition, physical activity, lifestyle and recruitment coordinators. These modules use instructional design focused on ensuring the content elements of the FHWP are followed. Additionally, the packaged program includes presentation materials, handouts, and lesson plans that increase the likelihood that the delivery of the program will be consistent across communities. Finally, a data portal was built to allow users to track local program effectiveness.

**Results:** The result is an Online Training Resources and Program package that includes a modular approach providing training modules for program facilitators, knowledge checks to ensure mastery of program components, recruitment resources for community, school and clinical settings, all delivery materials, embedded fidelity assessments for quality assurance, and a data portal to track participant success.

**Conclusion:** The development of the FHWP resources was the result of focusing on the prioritized outcomes of multiple end users. The resources and program package allows users to implement a FHWP in their communities without the need for expert implementation teams. The Online Training Resources and Program package allows for broad dissemination of FHWP in micropolitan/rural communities.

# From healthy eating to prepubertal anorexia nervosa in children: what is the impact of nutrition ?

Mrs. Apolline Coen<sup>1</sup>, **Prof. Isabelle Thibault**<sup>1</sup>, Dr. Caroline Pesant<sup>1</sup>

<sup>1</sup>Université de Sherbrooke, Sherbrooke, Canada

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** The objective of this study is to examine whether risk factors, especially the body mass index (BMI), predict if the subjects belong to the disordered eating (DE) group or to the prepubertal anorexia nervosa (PAN) group. To our knowledge, this is the first study which addresses the question for better understand the continuum of eating attitudes and behaviors, especially in children. This is important, because this developmental stage is a key period to prevent eating disorders.

**Methods:** Data was collected from a sample of 222 children (mean age : 11.1; s.d. : 1.3) who took part of two longitudinal studies which used the same measures. One of the studies was conducted in specialized care program for eating disorders. The other study aimed to examine the risk factors of DE in children. For this study, the participants were divided into 3 groups: the no DE/PAN group, the at risk of DE group, and the PAN group. ChEAT and EDI were used to assess DE group. The PAN group was diagnosed based on DSM-5 and Tanner criteria. Multinomial logistic regression analyses was used to predict the groupings (no DE/PAN, at risk of DE, PAN) from measures (percentile BMI, EDI-3, CDI, MASC) related to some risk factors (depression, anxiety, feeling of ineffectiveness, etc.).

**Results:** In univariate models, depressive and anxious symptoms, inefficacy, affective and interpersonal problems and need to control are risk factors which significantly ( $p \leq 0,05$ ) increase the risk (OR between 1.03 to 1.21) of DE or PAN. But, in the adjusted models for percentile BMI, the groups at risk of DE and PAN were not differentiated on the majority of risk factors. More important, it seems that BMI percentile was the principal factor which influence the groupings.

**Conclusions:** This study contribute to emphasize the importance of nutrition (and BMI) like risk factors to make the distinction between DE and PAN. Our results show that the percentile BMI explains in part the effect of psychosocial risk factors. These results are coherent with the fact that starvation increases the depression or anxiety in anorexia nervosa.

# Do boys differentiate from girls in disordered eating ?

Ms. Evan Marchand<sup>1</sup>, **Prof. Isabelle Thibault<sup>1</sup>**, Prof. Anne-Marie Tougas<sup>1</sup>, Dr. Caroline Pesant<sup>1</sup>

<sup>1</sup>Université de Sherbrooke, Sherbrooke, Canada

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Little is known about disordered eating (DE) in children but results of some research shows that it is almost as prevalent in boys as girls. Moreover, actual studies do not focus on other differences between boys and girls, except for the fact that boys do more compulsive exercise than girls to control their appearance. The first aim of this study is to examine the distinctions between boys and girls with symptoms of DE, especially with physical activity. The second objective is to analyze the distinctions between the sexes concerning risk factors of DE in children.

**Methods:** The sample is composed of 201 children: 94 boys (mean age : 11.8, s.d. 0.9) and 107 girls (mean age : 11.6, s.d. 1.0). Children were recruited in elementary schools with their parent's consent to the research. The children complete a series of questionnaires (EDI-3, CDI, MASC) with research auxiliaries. Anova and binary logistic regression was performed to test the difference between sex and examined the risk factors which explained the risk for DE in each sex.

**Results:** For the first objective, results showed that for children who present DE, the drive for thinness and body dissatisfaction was the most important symptoms of DE in boys and girls. No distinctions were discovered between sexes for muscle dysmorphia. These results showed that boys and girls exhibited similar symptoms of DE and this emphasized that physical activity to control their appearance is not only present in boys. The results of the second objective showed that feelings of ineffectiveness and overcontrol were the most important risk factors of DE in boys (20.9% of variance). For girls, the principal risk factors were overcontrol and anxiety (45.6% of variance).

**Conclusions:** These results demonstrated that risk factors are quite different according to sex, and that little is known for risk factors of DE in boys. Also, future studies should focus on the role of physical exercise in DE.

# Baseline assessment of restaurant sugary beverage intake among children and caregiver attitudes prior to city-level healthy default beverage ordinance in New Orleans, LA

**Dr. Melissa Fuster<sup>1</sup>**, Dr. Megan Knapp<sup>2</sup>, Ms. Hannah Smith<sup>1</sup>

<sup>1</sup>Tulane University School of Public Health and Tropical Medicine, New Orleans, LA, USA, <sup>2</sup>Xavier University of Louisiana, New Orleans, LA, USA

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** In January 2022, New Orleans, LA (NOLA) became the first city in Southern United States (US) to pass an ordinance requiring restaurants to offer healthy default beverages (HDB) with children's meals, to curb SSB consumption in this high-risk population for obesity and related conditions. This study is a baseline assessment of sugary beverage intake among NOLA children 2-12 years of age, caregiver attitudes, and associated demographic characteristics prior to the implementation of the ordinance in January 2023.

**Methods:** Data were collected via surveys administered through an online panel in September 2022 among NOLA caregivers of children between the ages of 2-12 who eat restaurant meals (eat-in, delivery, or take-out) at least once a month (n=516). This preliminary analysis applied bivariate procedures (Chi-squared, Spearman correlation) to examine the associations between child SSB intake, frequency of restaurant meals, parent/caregiver demographic characteristics (gender, income, race/ethnicity, and education), and attitudes associated with SSB intake and restaurant regulation. Further multivariate analysis will incorporate child demographics (age, sex).

**Results:** Most children consumed SSBs on a weekly basis (11% 1/week, 24% 2-3/week, 14% 4-6/week), with a higher frequency of SSB consumption associated with a higher occurrence of restaurant meal consumption, lower income, and lower education ( $p<0.05$ ). More than half of the caregivers (53.6%) reported children consumed restaurant meals on a weekly basis (1-3/week), with higher frequencies associated with being a male parent/caregiver and having higher income and education ( $p<0.05$ ). One-fifth of the respondents (21%) agreed that SSBs are an important part of family meals and 24% agreed that restaurants should not offer SSBs with children's meals. Perceptions of SSB importance in family meals and disagreement about restaurant restrictions in SSB provisions with children's meals were associated with a higher frequency of SSB intake.

**Conclusions:** Our results found a high frequency of SSB consumption among children and significant associations between SSB consumption and restaurant meals. These findings support the need for HDB regulations in restaurants to decrease the frequency of SSB consumption among children, especially in areas where rates of childhood obesity and overweight are high, as in the case of Louisiana and the Southern US.

# Association between muscle function and bone health in Indian children and adolescents: The need for physical fitness and nutrition programming

**Dr. Anuradha Khadilkar**<sup>1,2</sup>, Ms. Sonal Kasture<sup>1</sup>, Dr. Rubina Mandlik<sup>1</sup>, Assistant Professor Jasmin Bhawra<sup>3</sup>, Associate Professor Tarun Reddy Katapally<sup>4</sup>

<sup>1</sup>Department of Growth and Endocrinology, Hirabai Cowasji Jehangir Medical Research Institute, Jehangir Hospital, Pune, India, <sup>2</sup>School of Health Sciences, Savitribai Phule Pune University, Pune, India, <sup>3</sup>Toronto Metropolitan University, Toronto, Canada, <sup>4</sup>Western University, Ontario, Canada

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Muscle function (MF), which is closely linked with physical fitness, is crucial to promoting bone health and preventing osteoporosis and sarcopenia – two major contributors to global non-communicable disease burden. However, the association of MF and body composition on bone health has not been investigated in Indian children and adolescents. This study aims to assess the relationship between MF measured by Jumping Mechanography (JM) and key indicators of bone health measured by Dual energy X-ray Absorptiometry (DXA).

**Methods:** A cross-sectional study was conducted in Pune, India with 717 (360 boys; 357 girls) urban students aged between 5 – 19 years. Students were recruited from 2 schools belonging to similar socioeconomic strata, with parental consent. Objective data on the following measures were collected by trained research staff: MF parameters (maximum power [Pmax], maximum voluntary force [Fmax]), anthropometry (height, weight), bone health indicators (bone mineral content, bone area, bone mass and areal bone mineral density), and body composition parameters (lean mass, fat mass, fat-free mass, total mass). To determine the association between MF and bone health, Pearson's correlation analyses and hierarchical linear regression were performed using IBM SPSS (version 26.0.0).

**Results:** Mean age of the group was  $12.4 \pm 3.9$  years. Mean height, weight and body mass index (Z score) were  $144.6 \pm 17.8$ cm ( $-0.1 \pm 0.9$ ),  $38.7 \pm 15$  kg ( $-0.2 \pm 0.9$ ) and  $17.7 \pm 3.7$  kg/m<sup>2</sup> ( $-0.2 \pm 1$ ), respectively. Positive association of Pmax and Fmax was observed with all bone parameters ( $p < 0.01$ ). Significant factors associated with bone health also included age, height, lean mass and Fmax ( $p < 0.05$  for all).

**Conclusions:** MF was consistently associated with bone health as measured by a range of objective indicators. MF in children and adolescents needs to be improved by physical activity and nutrition that promotes physical fitness. To optimize bone health by facilitating MF of Indian children, research and policy needs to shift its focus towards equitable physical activity and nutrition programming in schools.



# Examining Parents' Experiences and Challenges of Feeding Preschool Children with Avid Eating Behaviour

**Dr. Katie Edwards<sup>1</sup>**, Prof. Jacqueline Blissett<sup>1</sup>, Dr. Helen Croker<sup>2</sup>, Prof. Claire Farrow<sup>1</sup>, Dr. Moritz Herle<sup>3</sup>, Dr. Alice Kininmonth<sup>4</sup>, Dr. Clare Llewellyn<sup>4</sup>, Dr. Abigail Pickard<sup>1</sup>, Prof. Emma Haycraft<sup>5</sup>

<sup>1</sup>Aston University, Birmingham, United Kingdom, <sup>2</sup>World Cancer Research Fund, London, United Kingdom,

<sup>3</sup>King's College London, London, United Kingdom, <sup>4</sup>University College London, London, United Kingdom,

<sup>5</sup>Loughborough University, Loughborough, United Kingdom

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Current public health advice regarding children's eating is generic and does not tackle the considerable variability in children's appetite traits and eating behaviour. Behaviours that characterise avid eating have been linked to child overweight and obesity (e.g., greater enjoyment of, and responsiveness to, food). Parent feeding practices are modifiable components of a child's food environment and thus may be key levers for behaviour change in tailored interventions to support the development of children's healthy eating. This qualitative study aimed to explore primary caregivers' experiences of feeding children with avid eating behaviour and to understand any challenges that caregivers experience in this context.

**Method:** Fifteen semi-structured interviews were conducted with primary caregivers of a preschool child (3-5 years) who was identified by responses on a questionnaire as having avid eating behaviour. Interviews explored how children's avid eating manifests and any challenges that caregivers face when feeding their child. Interviews also examined which feeding strategies caregivers use to limit their child's food intake, and whether they perceive these strategies to be effective.

**Results:** Interview data has been collected and transcribed, and results will be discussed. Due to the novelty of qualitative research in this area, analysis will focus on understanding the core concepts and themes which are present in the data and will illuminate the experiences and challenges of parenting a child with avid eating behaviour.

**Conclusion:** This study will provide an in-depth understanding of caregivers' experiences of feeding children with avid eating behaviour. These findings will help to determine targets for the development of tailored interventions to support caregivers with children who are at greater risk of the development of obesity in food abundant environments.

# Effectiveness of the Healthy Online Parental Education (HOPE) on child fruit and vegetable intakes and parental feeding practices in low-income families: a pilot randomized controlled trial

**Dr. Hyunjung Lee**<sup>1,2</sup>, Prof. Wilna Oldewage-Theron<sup>2,4</sup>, Assistant Professor John Dawson<sup>2,3</sup>

<sup>1</sup>Texas A&M University, College Station, USA, <sup>2</sup>Texas Tech University, Lubbock, USA, <sup>3</sup>New Mexico State University, Las Cruces, USA, <sup>4</sup>University of the Free State, Bloemfontein, South Africa

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** This study was to evaluate a theory-based eHealth intervention, called Healthy Online Parental Education (HOPE), aimed at improving child fruit and vegetable intakes and parental feeding practices in families with low-income backgrounds in West Texas, USA.

**Methods:** An 8-week randomized control and intervention pilot study was conducted among 73 parents with young children (12-36 months) between October 2021 and February 2022. The HOPE intervention was informed by the Social Cognitive Theory and utilized multicomponent strategies. The intervention group ( $n = 37$ ) received weekly educational videos and text messages and completed three online cooking activities. The control group ( $n = 36$ ) received printed materials about general dietary recommendations for children. Child consumption of fruit and vegetables (servings/day) was captured by an electronic 24-hour dietary record. Parental feeding practices were assessed using the Comprehensive Feeding Practices Questionnaire. Linear models were performed to assess mean changes in the study outcomes from baseline to post intervention using R version 4.1.1.

**Results:** At post intervention, children in the intervention group significantly increased their mean fruit (from 0.57 to 1.47,  $p = 0.0000000006$ ) and vegetable (from 0.45 to 0.98,  $p = 0.00005$ ) intakes than baseline. There were no changes in daily fruit (from 0.47 to 0.46,  $p = 0.92$ ) and vegetable (from 0.44 to 0.27,  $p = 0.17$ ) intakes in the control group. Children in the intervention group showed greater increases in the mean changes of daily fruit ( $p = 0.00057$ ) and vegetable ( $p = 0.0037$ ) intakes than the control group. Parents in the intervention group showed significantly greater improvements in comprehensive feeding practices than the control group ( $p = 0.0069$ ). At post intervention, parents in the intervention group reported higher parent modeling ( $p = 0.00005$ ) and lower overt control practices, such as use of food as a reward ( $p = 0.0013$ ), pressure-to-eat ( $p = 0.0016$ ), and food restriction ( $p = 0.00053$ ) than baseline.

**Conclusions:** Empowering families through eHealth interventions is a promising approach for increasing child fruit and vegetable consumption and changing parental feeding practices. Further testing in a full-scale trial is needed to determine whether behavior changes are sustainable over time.

# Health cues and visibility enhancements fail to change food choices determined by preferences and habits

**Ms. Eeva Rantala**<sup>1,2,3</sup>, Dr. Elina Järvelä-Reijonen<sup>2</sup>, Dr. Kati Pettersson<sup>1</sup>, Dr. Janne Laine<sup>1</sup>, Ms. Paula Vartiainen<sup>2</sup>, Dr. Johanna Närväinen<sup>1</sup>, Prof. Jussi Pihlajamäki<sup>2,4</sup>, Prof. Kaisa Poutanen<sup>1</sup>, Prof. Pilvikki Absetz<sup>5</sup>, Dr. Leila Karhunen<sup>2</sup>

<sup>1</sup>VTT Technical Research Centre of Finland, Espoo, Finland, <sup>2</sup>Institute of Public Health and Clinical Nutrition, University of Eastern Finland, Kuopio, Finland, <sup>3</sup>Finnish Institute for Health and Welfare, Helsinki, Finland,

<sup>4</sup>Department of Medicine, Endocrinology and Clinical Nutrition, Kuopio University Hospital, Kuopio, Finland,

<sup>5</sup>Faculty of Social Sciences, Tampere University, Tampere, Finland

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Easier recognition and enhanced visibility of healthy options supposedly increase healthy choices, but real-world evidence remains scarce. Addressing this knowledge gap, we promoted healthy foods in a workplace cafeteria with three choice architectural strategies—priming posters, point-of-choice nutrition labels, and improved product placement—and assessed effects on visual attention and food choices.

**Methods:** Following a quasi-experimental pre–post design, the study comprised 5-day control and intervention conditions with identical menus. We monitored visual attention (i.e., the number and duration of fixations on posters/labels, healthy foods, and less healthy foods) and food choices (i.e., the number of total, healthy, and less healthy items chosen) with mobile eye tracking, interviewed customers about perceived influences on food choices, and weighed cafeteria-level food consumption (i.e., the amount of total, healthy, and less healthy foods taken from the serving line). Individual-level data represents 22 control participants (*M* 43 years, 64% men) and 19 intervention participants (*M* 46 years, 53% men) recruited at the cafeteria entrance. Cafeteria-level data represents 556/589 meals sold over the study conditions. As the samples included partly same and partly different individuals, we examined between-condition differences in visual attention and food choices with partially overlapping samples *t*-test and its non-parametric counterpart. The consumption analysis compared total, % healthy, and % less healthy food consumption between study conditions. Perceived influences on food choices were analysed with deductive qualitative content analysis informed by the Food Choice Questionnaire.

**Results:** Posters/labels captured participants' visual attention (~13% of fixations on defined areas of interest before food choices), but the intervention had insignificant effects on visual attention to foods and on food choices (*ps* > .05). Similarly, cafeteria-level consumption remained unchanged. Interviews revealed 17 perceived influences on food choices, the most common being sensory appeal, familiarity, and healthiness. Healthiness, however, often was an unspecified motive that could lose to competing influences.

**Conclusions:** the intervention proved capable of attracting visual attention, yet ineffective in increasing healthier choices among working age consumers who prioritised sensory appeal and familiar foods. The work contributes with a unique, mixed-methods approach and a real-world setting that enabled a multi-dimensional effects evaluation with high external validity.

# Determinants of Discontinuance of Active Participation in Sports Activities: A Life Course Perspective

**Ms. Xiaoyue Chen<sup>1</sup>**, Associate Professor Astrid Kemperman<sup>1</sup>, Prof. Harry Timmermans<sup>1</sup>

<sup>1</sup>Eindhoven University of Technology, Eindhoven, Netherlands

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Physical inactivity remains a global public health challenge today. Determining why people stop habitually participating in sports is significant to develop targeted intervention strategies for sports promotion and healthy living. However, most previous studies on sports dropout are cross-sectional in nature and focus on adolescents. As sports participation is dynamic throughout life, a life-course perspective is needed to provide a more comprehensive understanding. This study adopts a life-course perspective to explore the determinants that trigger the transition from active participation in sports to becoming inactive.

**Method:** An online survey was developed to collect retrospective longitudinal data on life trajectories and habitual sports behaviours in the Netherlands. Participants were 629 adult panellists from an existing representative panel of the Dutch population. Based on previous sports participation theories and life-course approaches, 26 determinants in 4 categories, including socio-demographics, sports motivations, life events, and neighbourhood characteristics, were identified as potential explanatory variables. A two-level binary logistic regression model was estimated to capture the effects of these determinants on sport dropout.

**Results:** Results show that dropout from sports is age-specific, with those aged 13-23 more likely to stop sporting. Also, individuals who are less educated or who work less than 20h/w are more likely to quit sports. Another finding is that people are less likely to discontinue sports participation when they have health and weight loss goals. Life events have different effects. Stop living with physically active people appears the most important event to make people stop sporting, followed by having a baby, and then owning the first car. Compared with education-related events, work-related events are more likely to cause people to stop sporting. Moreover, the probability of dropout from sports may increase with the unsafe feeling of doing physical activities in the neighbourhood and decrease with the lack of green spaces.

**Conclusions:** Determinants from socio-demographics, sports motivations, life events, and neighbourhood characteristics appear to play differential roles in sports discontinuance over the life course. The findings have implications for supporting sports participants to continue exercising by addressing the barriers.

# Understanding Correlates of Physical Activity Identity in Cancer Survivors

**Ms. Golnaz Ghazinour**, Ms. Allyson Tabaczynski, Ms. Natalie Cuda, Dr. Linda Trinh

<sup>1</sup>University of Toronto, Toronto, Canada

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** C. Cancer prevention and management

**Purpose:** Physical activity (PA) is becoming recognized as an essential component of supportive care for cancer survivors given that it mitigates the effects of cancer treatment. However, many cancer survivors do not meet PA guidelines ( $\geq 150$  minutes/week of moderate-to-vigorous PA [MVPA]). PA identity is an important predictor of long-term PA maintenance as it helps to buffer against environmental and self-regulation challenges to PA. Nevertheless, little is known about the contributors to strong PA identity in cancer survivors. Accordingly, the purpose of this study was to understand the demographic, medical, and social cognitive correlates of PA identity in cancer survivors.

**Methods:** An online, cross-sectional survey was administered to cancer survivors worldwide. Questionnaires were used to assess demographic and medical information; PA using a modified version of Godin Leisure-Time Exercise Questionnaire; and M-PAC processes for instrumental attitudes, affective judgements, perceived capability and opportunity, self-regulation, habit, and identity. Using four identity statements scaled 1 (strongly disagree) – 5 (strongly agree) with an identity score of 12 as the mid-point, cancer survivors were classified as having 'high PA identity' (i.e., score  $>12$ ) or 'low PA identity' (i.e., score  $<12$ ). Binary logistic regression analysis was used to examine demographic, medical, and social cognitive correlates of PA identity across high and low PA identity classifications while controlling for MVPA participation.

**Results:** Cancer survivors ( $N=318$ ;  $M_{age}= 48.90 \pm 15.92$  years) were mainly female (69.2%), White (89.9%), had some higher education (82.7%), diagnosed with breast cancer (28.0%), and had completed treatment (79.9%). Controlling for meeting MVPA guidelines, higher PA identity was significantly associated with higher positive affective judgement ( $OR=1.13$ , 95%  $CI=1.02-1.25$ ,  $p=0.03$ ), higher PA intention ( $OR=1.49$ , 95%  $CI=1.19-1.87$ ,  $p<0.001$ ), better self-regulation ( $OR=1.08$ , 95%  $CI= 1.02-1.15$ ,  $p=0.009$ ), and greater PA habit ( $OR=1.28$ , 95%  $CI=1.17-1.40$ ,  $p<0.001$ ).

**Conclusion:** Social cognitive processes (i.e., affective judgment), self-regulation (e.g., planning), PA intention, and habit were significant predictors of higher PA identity. Future research is needed to investigate the reflexive and regulatory mechanisms through which PA identity contributes to long-term PA maintenance. Interventions should target these M-PAC processes and strengthen PA intention and habit to enhance PA identity and participation in cancer survivors.



# Barriers and facilitators for participation in community-based physical activity interventions among patients with cardiovascular diseases: A scoping review

Mrs. Joanne Palsma<sup>1</sup>, Dr. Judith Jelsma<sup>2,3,4</sup>, Prof. Rienk Dekker<sup>1</sup>, Dr. Inge van den Akker-Scheek<sup>5</sup>, **Dr. Joyce Vrijsen<sup>5</sup>**

<sup>1</sup>University of Groningen, University Medical Center Groningen, Department of Rehabilitation, Groningen, Netherlands, <sup>2</sup>Amsterdam UMC location Vrije Universiteit Amsterdam, Department of Public and Occupational Health, Amsterdam, Netherlands, <sup>3</sup>Amsterdam Public Health Research Institute, Health Behaviors & Chronic Diseases, Amsterdam, Netherlands, <sup>4</sup>Amsterdam Public Health Research Institute, Quality of Care, Amsterdam, Netherlands, <sup>5</sup>University of Groningen, University Medical Center Groningen, Department of Orthopedics, Groningen, Netherlands

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Community-based physical activity interventions are beneficial for patients suffering from cardiovascular diseases (CVDs). However, the implementation of these interventions remains a challenge. Therefore, the aim of this scoping review is to explore the barriers and facilitators for participation in community-based PA interventions among patients suffering from CVDs.

**Methods:** An electronic search was performed in PubMed and Cochrane for all studies published up to July 1st, 2021. Articles with a quantitative or qualitative design were eligible for inclusion if: (a) patients with CVDs were included; (b) the intervention included community-based PA; and (c) the article reported information on barriers and facilitators for (non-)participation and/or adherence. Articles not published in English were excluded. Subsequently, identified barriers and facilitators were categorized into five levels, using the social-ecological framework (SEF).

**Results:** Thirteen studies were included, of which 3 qualitative and 10 quantitative studies. These studies identified various barriers and facilitators related to participation at multiple levels of the SEF: (a) intrapersonal (e.g., personal factors, employment, psychological factors, body functions), (b) interpersonal (e.g., social support), (c) institutional (e.g., program factors), and (d) policy (e.g., transportation, costs).

**Conclusions:** This scoping review provides a comprehensive overview of barriers and facilitators for participation in community-based PA interventions among patients suffering from CVDs. This overview is useful to guide clinicians and researchers in future development and implementation of community-based PA intervention specifically for patients with CVDs. Strategies to improve participation and adherence to community-based physical activity interventions in this group should start with more education and proper instructions to improve knowledge and self-efficacy. Additionally, interventions could be improved by for example providing a tailored approach or group-based interventions in the own neighborhood of the patient. Finally, costs of interventions should be lowered or reimbursed to increase participation and adherence.

# Exploration of Youth Experiences with a School-based, Comprehensive Food Education Program: Short and Long-term Impact

**Ms. Christine St. Pierre<sup>1</sup>**, Ms. April Sokalsky<sup>1</sup>, Dr. Jennifer M. Sacheck<sup>1</sup>

<sup>1</sup>The George Washington University Milken Institute School of Public Health, Washington, DC, USA

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** School-based food education programs are an increasingly common strategy to promote fruit and vegetable (FV) intake among children and shape dietary habits that persist into adulthood. Evidence points to modest program influence on children's FV intake in the short-term, but little is known about effects on broader dietary habits through adolescence. We therefore sought to understand current and alumni participant perspectives on 1) their experiences with a food education program in elementary school, 2) translation of the program to their home environment, and 3) program impact on dietary habits over time.

**Methods:** We used an instrumental case study approach, with the program serving as the unit of case analysis, illustrating the experience of participation in a comprehensive food education program over multiple years. We conducted semi-structured focus groups with current elementary students and alumni participants now in secondary school or university, recruited through purposive and network sampling. Focus groups were audio-recorded, transcribed verbatim, manually coded, iteratively analyzed, and distilled into nine emergent themes supported by analysis of class observations, informal interviews with program staff, and field notes.

**Results:** Nine focus groups were held with n=39 current participants (9.6 ± 1.1 years, 41% female) and n=39 program alumni (14.4 ± 2.5 years, 56% female) from urban settings. Three emergent themes were identified in each of three time periods of program impact: immediate, medium-term, and long-term. Participant perceptions of immediate program impact were characterized by *enjoyment*, *experiential learning*, and *fostering community*. In the medium term, participants attributed program participation to *changes in individual and family food intake*, *involvement in household food practices*, and *desire for more fresh food options at school*. Among alumni participants, the following enduring themes emerged: *appreciation for fresh, homemade food*, *openness to trying new foods*, and *confidence to make informed food choices*.

**Conclusions:** Our findings provide deeper understanding of how participants in a school-based food education program view their experience and a first look into salient program influences that endure into adolescence. Many themes closely align with the domains of food literacy, indicating opportunities for developing assessment tools to quantitatively capture near and long-term program impact.

# Barriers and facilitators for discussing lifestyle in clinical practice among hospital healthcare professionals

**Dr. Joyce Vrijsen<sup>1</sup>**, Ms. Marlinde van Dijk<sup>2,3,4</sup>, Ms. Sanne Westerveld<sup>1</sup>, Mrs. Leonie te Loo<sup>2,3,5</sup>, Prof. Rienk Dekker<sup>6</sup>, Dr. Judith Jelsma<sup>2,3,4</sup>, Dr. Inge van den Akker-Scheek<sup>1</sup>

<sup>1</sup>University of Groningen, University Medical Center Groningen, Department of Orthopedics, Groningen, Netherlands, <sup>2</sup>Amsterdam UMC location Vrije Universiteit Amsterdam, Department of Public and Occupational Health, Amsterdam, Netherlands, <sup>3</sup>Amsterdam Public Health Research Institute, Health Behaviors & Chronic Diseases, Amsterdam, Netherlands, <sup>4</sup>Amsterdam Public Health Research Institute, Quality of Care, Amsterdam, Netherlands, <sup>5</sup>Inholland University of Applied Sciences, Faculty of Health, Sports and Social Work, Haarlem, Netherlands, <sup>6</sup>University of Groningen, University Medical Center Groningen, Department of Rehabilitation, Groningen, Netherlands

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** Despite the proven advantages of a healthy lifestyle, discussing lifestyle is currently not implemented in routine clinical practice in hospitals. Therefore, the aims of this study were twofold: 1) to get insight in the current practice of discussing lifestyle by healthcare professionals in two Dutch university medical centers and 2) to identify barriers and facilitators for discussing lifestyle in routine clinical practice among healthcare professionals.

**Methods:** Semi-structured interviews were conducted with healthcare professionals (i.e. physicians (in training), dieticians, physiotherapist, (specialized) nurses) from different departments (Orthopedics, Internal Medicine, Cardiology and Nephrology) of two Dutch university medical centers. Interviews were audio recorded and transcribed. An inductive thematic analysis was conducted by three researchers independently to identify the barriers and facilitators for discussing lifestyle.

**Results:** Thirty-three healthcare professionals were interviewed. The findings show that majority of healthcare professionals have a positive attitude towards discussing lifestyle. A variety in methods exists in approaching and motivating patients, but also in discussing lifestyle with patients which they try to tailor to the knowledge, preferences and medical issues of the patients. Barriers and facilitators were categorized into three themes: 1) patient-related factors (e.g., knowledge and skills, motivation, previous experiences, financial factors), 2) healthcare professional-related factors (e.g., knowledge and skills, motivation, collaboration referral options, feedback after referral, responsibility, time, previous experiences, necessity lifestyle change) and 3) hospital related factors (e.g., general attitude, organizational structure).

**Conclusions:** This study showed that the majority of healthcare professionals have a positive attitude towards discussing lifestyle in clinical practice. However, this is not yet routinely done and a variety of methods exists in how this is conducted. In order for healthcare professionals to discuss lifestyle more routinely in clinical practice, strategies should focus on educating healthcare professionals in discussing lifestyle with patients with different backgrounds, setting up collaborations with referral options, and imbedding lifestyle medicine in hospital care.

# Determinants of long-term physical activity participation in New Zealand adolescents across sociodemographic groups: a descriptive study

**Mr. Tom Bergen**<sup>1,2</sup>, Dr. Alice Kim<sup>1</sup>, Dr. Anja Mizdrak<sup>1</sup>, Prof. Louise Signal<sup>1</sup>, Associate Professor Geoff Kira<sup>2,3</sup>, Associate Professor Justin Richards<sup>2,3</sup>

<sup>1</sup>University of Otago, Wellington, New Zealand, <sup>2</sup>Sport New Zealand (Ihi Aotearoa), Wellington, New Zealand,

<sup>3</sup>Victoria University of Wellington, Wellington, New Zealand

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** The purpose of this study was to describe the nature of physical activity participation in Aotearoa New Zealand (NZ) adolescents by exploring relevant variables that are determinants of long-term physical activity across different sociodemographic groups.

**Methods:** Data was collected on from the Active NZ Young People's survey which uses a complex survey design utilising household clusters and stratification by region, ethnicity, and age groups. Sociodemographic characteristics (age, gender, ethnicity, deprivation, physical disability status) were assessed in samples of adolescents (12-17 years old) between 2017 and 2020 in Aotearoa, New Zealand. The determinants chosen for analysis were total weekly time spent physically active, physical literacy, social support levels, number of settings participated in, number of physical activity participations and physical activity accessibility levels. All variables were weighted to create national estimates with 95% confidence intervals. Numeric determinants for each sociodemographic group were summarised as mean values and categorical determinants were summarised into population proportions.

**Results:** As age increased, physical activity participation levels decreased alongside all other determinants of long-term physical activity. Māori and Pacific populations scored consistently higher in each determinant category than European, Asian, and other ethnicities. Determinant values were on average lower than the population mean in those that were aged 15-17 years, Female or Gender Diverse, Asian, living with medium to high deprivation levels or physical disabilities.

**Conclusions:** This study reveals that determinants of long-term physical activity vary greatly across all adolescents and that certain sociodemographic groups have much lower levels than the average. Tailoring future public health interventions towards enhancing a wide range of these determinants simultaneously, especially for those in late adolescence, may prove influential to enhancing nationwide physical activity participation and wellbeing across the lifespan.

**Keywords:** Physical activity, behaviour, trajectory, predictors, adolescent, wellbeing.

# Social Media: A Potential Health Communication Tool to Get More People Active Outside?

**Miss Amanda Folk<sup>1</sup>**, Dr. Dunja Antunovic<sup>1</sup>, Dr. Chelsey Thul<sup>1</sup>, Dr. Daheia Barr-Anderson<sup>1</sup>

<sup>1</sup>University of Minnesota Twin Cities, Minneapolis, USA

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Green physical activity (GPA), or any physical activity that takes place among natural elements, is a leisure-time activity with myriad benefits (e.g., physical health, mental health and wellbeing, active citizenship). Less than half of U.S. individuals participated in GPA in the last year—with knowledge and social support as common barriers. Social media (SM) is widely used and a potential health communication tool that may act as a way to remove these barriers, increase self-efficacy for GPA and, perhaps, increase GPA itself. Describe SM use in a sample of U.S. adults interested in or currently participating in GPA and explore associations between SM use and GPA.

**Methods:** A survey queried participants who follow GPA-related SM (N=179) on sociodemographics, SM use (hours/week), SM importance (via Social Media Use Integration Scale), GPA-specific self-efficacy (via Outdoor Recreation Self-Efficacy Scale), and GPA (via Godin-Shepherd Leisure Time Exercise Questionnaire modified for GPA [i.e., “exercise” was replaced with “green physical activity”]). Using SAS 9.4, sociodemographic and SM variables were summarized. Multiple linear regression models were used to examine associations between SM use and GPA while controlling for gender, sexual identity, race, education, and employment.

**Results:** Average SM use across the sample (age=33.0 ± 8.8; 86.0% non-cis-gender male) was 13.6±8.6 hours/week, while average total GPA was 5.4±4.1 hours/week. The sample had a high overall self-efficacy score for GPA (156.9±20.3, out of a possible 187) and a moderate SM importance score (36.4±9.5, out of a possible 60). There was an association between SM use and GPA self-efficacy (p=0.001). Additionally, for every hour of SM use per week is, on average, associated with almost 7 more minutes of GPA per week (p<0.01).

**Conclusion:** Seven minutes of GPA over the course of a week is a small effect and, for this sample who engages in a high level of GPA, not clinically significant. However, general SM use was measured instead of GPA-specific SM, due to the lack of a reliable way to measure topic-specific exposure. The statistically significant results indicate further examination of GPA-specific content on SM and its effect on GPA self-efficacy and GPA is warranted.



# Mapping digital food environment on social media

**Mr. Kaiyang Qin**<sup>1</sup>, Assistant Professor Saar Mollen<sup>1</sup>, Associate Professor Eline Smit<sup>1</sup>, Assistant Professor Wilma Waterlander<sup>2</sup>

<sup>1</sup>Department of Communication Science University of Amsterdam, AMSTERDAM, Netherlands, <sup>2</sup>Department of Public and Occupational Health University of Amsterdam, AMSTERDAM, Netherlands

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** The digital food environment represents a growing exposure to unhealthy food. The present study aims to map the digital food environment on social media by exploring users' characteristics and interactions with two sources of (unhealthy) food content: food advertisements (ads) and food posts. The following questions will be investigated: How do users' interactions with food content relate to the frequency of unhealthy food content exposure, and whether food companies play a role in it? Are people with specific characteristics more likely to be exposed to unhealthy food content?

**Methods:** We will implement a survey study combined with a novel data donation approach, which allows participants to download their social media data and share it for research purposes. Participants will donate their YouTube data regarding video ads and posts viewing, likes, searches, subscribed channels, and a company list showing which food companies users are targeted as potential customers. Participants will also complete questionnaires regarding their (social) media algorithm awareness, perception of food norms, experience with personalized ads, and demographics. We will recruit 300 participants, and the results will be ready around May 2023. We will code the videos as healthy or not healthy, and the likes, searches, channels, and companies on the list as food-relevant or not food-relevant. We will perform correlation analyses among the interactions (e.g., frequency of the likes), unhealthy food video exposure (i.e., the viewings), the number of food companies that targeted users as customers, and the score of questionnaires and follow-up regression analyses for answering the first question. We will do a latent class analysis to reveal groups with specific characteristics that may be more likely to be targeted by food companies and exposed to the food content.

**Conclusion:** The implications of the present study are twofold. First, it may provide insight into the characteristics of the digital food environment on social media. These insights may be important for regulations of food content, such as Ads from food companies. Second, it may shed light on how researchers can utilize social media data based on the data donation approach to investigate food-relevant topics.

# Behavior mechanisms to increase objectively-measured physical activity among Hispanic women: A systematic review

**Dr. Elizabeth Lorenzo<sup>1</sup>**, Ms. Jeni Page<sup>1</sup>, Ms. Anne Howard<sup>1</sup>, Dr. Rebeca Wong<sup>1</sup>, Dr. Blake Rasmussen<sup>1</sup>, Dr. Elizabeth Lyons<sup>1</sup>

<sup>1</sup>University of Texas Medical Branch, Galveston, USA

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Effective interventions to increase and sustain Hispanic women's objectively-measured physical activity (PA) are lacking. This review synthesizes existing literature to determine the behavior mechanisms that drive Hispanic women's PA, which is critical for intervention development.

**Methods:** Searches were conducted in January/February 2022 using terms related to Hispanic AND female AND (exercise OR physical activity) in PubMed, CINAHL, SSCI, Cochrane Library and PsychINFO databases. Studies with 100% Hispanic women and an intervention to increase objectively-measured PA published in English in peer-reviewed journals were included without date limitations. Studies with pregnant women and/or chronic conditions were excluded.

**Results:** Searches resulted in 4,374 records after 3,567 duplicates were removed. Seventy-three full-text studies were assessed for eligibility after titles were screened, and one study was identified via reference lists. Thirteen studies met inclusion criteria; however, 9 were unique and 4 provided additional findings (i.e., short-term, long-term, mediation). Sample sizes totaled 2,303 Hispanic women with mean ages ranging 28.4-44.6 years. Most studies included a wide age range for inclusion (18-65 years) and only two limited the range (i.e., 18-40, 35-64 years). Seven studies (78%) included author-specified behavior mechanisms targeted by the intervention and 4 studies (44%) measured and tested for change in 11 different behavior mechanisms. Two studies included mediation analyses (22%) to determine if family participation, family rewards and punishments, friend participation, social support (combined family and friend support), self-efficacy, behavior processes, cognitive processes, and PA enjoyment mediated an increase in PA at 6-months. Family participation, family rewards and punishments, and friend participation were tested again at 12-months. None of the behavior mechanisms included in a mediation analysis were in >1 study. Only family participation and self-efficacy mediated PA at 6-months ( $p<.05$ ) and none mediated PA at 12-months.

**Conclusions:** There was limited evidence that family participation and self-efficacy may mediate short-term improvements in PA among Hispanic women. Future PA interventions should be designed to target, measure, and test behavior mechanisms to determine which mediate short-and long-term improvements in PA. Otherwise, it is impossible to optimize PA interventions to include only the critical intervention components necessary to effectively increase Hispanic women's PA.

# Psychological Needs Satisfaction, self-determined motivation and physical activity in Chinese college athlete: comparison across gender and competition level

**Dr. Yan Liang, Dr. Yan Liang**

<sup>1</sup>East of China Normal University, Shanghai, China, <sup>2</sup>Université Rennes 2, Rennes, France

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** This study applies self-determination theory to test the relationships amongst basic psychological needs, level of self-determined motivations and physical activity in Chinese college athletes.

**Methods:** A total of 301 Chinese college athletes aged between 18 to 25 completed a test battery on motivational aspect based on self-determination theory. International physical activity questionnaire was used to measure the physical activity in leisure-time and exercise training. The Exercise Regulation Questionnaire-2 and the Psychological Needs Satisfaction Scale are completed to access exercise motivations and three basic psychological needs in sports context.

**Results:** Structural Equation Model analyse results indicate that self-determined motivations mediate the relationships between basic psychological needs satisfaction and physical activity. For leisure-time physical activity, autonomy ( $\beta=0.056$ ,  $p=0.019$ ; Bootstrap 95% CI = 0.012—0.102), competence ( $\beta=0.043$ ,  $p=0.019$ ; Bootstrap 95% CI = 0.005—0.098) and relatedness ( $\beta=0.029$ ,  $p=0.019$ ; Bootstrap 95% CI = 0.005—0.061) positively predict physical activity in leisure time through autonomous motivation. For training exercise, autonomy ( $\beta=0.043$ ,  $p=0.004$ ; Bootstrap 95% CI = 0.013—0.082) positively predicts physical activity in training exercise through controlled motivation, and competence ( $\beta= -0.025$ ,  $p=0.049$ ; Bootstrap 95% CI = -0.063—0) and relatedness ( $\beta= -0.043$ ,  $p=0.004$ ; Bootstrap 95% CI = -0.078—-0.012) negatively predict physical activity in training exercise through controlled motivation. Moreover, multi-group analysis results reveal that relationship between autonomous motivation to leisure-time physical activity ( $\Delta\chi^2=3.877$ ,  $df=2$ ,  $p=0.049$ ) is stronger for male college athlete ( $\beta=0.179$ ,  $P<0.05$ ) than female college students ( $\beta= -0.038$ ,  $P>0.05$ ), and the relationship between relatedness to controlled motivation ( $\Delta\chi^2=3.2947$ ,  $df=4$ ,  $p=0.007$ ) is stronger for low competition level college athletes ( $\beta=0.197$ ,  $P<0.01$ ) than high competition level athletes ( $\beta=0.136$ ,  $P>0.05$ ).

**Conclusions:** Our findings support the applicability of SDT in understanding the physical activity in Chinese college athletes, and further distinguish the different SDT process in physical activity between leisure-time and training contexts. Gender and competition level difference also moderated mechanisms among SDT process. Future recommendations are related to the further examination of potential differences in various sports contexts, as well as the different mechanism on the other demographic characteristics.

# Food as a way of learning and integration: the experience of the "Healthy Start" initiative in Oslo

Associate Professor Laura Terragni<sup>1</sup>, Associate Professor Gun Roos<sup>1</sup>

<sup>1</sup>OsloMet, Oslo, Norway

Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** Food is an important part of our everyday life, identity, and wellbeing. Food can create social ties and enhance belonging to a new place. Immigrant populations often encounter social and health challenges in their resettlement process. Promoting food related initiatives among immigrant populations may facilitate integration and adoption of healthier diets in a new food environment. The aim of this project was to use the "Healthy Start" food and nutrition communication in a Norwegian as second language course for immigrants population striving to enter the labor market to improve language skills and familiarity with nutrition recommendations.

**Methods:** A class consisting of 11 women and 1 man, aged 19-55 years participated in a 5-week nutrition education programme, divided of 10 classes. In addition to using theoretical parts of the Healthy Start education material we invited the class to share recipes of dishes that common in their homes and to participate in creating a recipe booklet in Norwegian. We used participant observation and qualitative interviews in the Healthy Start to evaluate outcomes of participating in the course.

**Results:** Food was a topic that all participants could relate to and sharing their experiences with food enhanced participation and learning. By sharing their food and recipes the participants seemed to strengthen their language and communication skills. "Healthier adaptation" of their original recipes and awareness about use of healthier alternatives emerged. Sharing their own food culture with others created stronger networks between the participants to the course.

**Conclusions:** Combining nutrition and language education can enhance language skills awareness on healthy eating. Replicating and scaling up this or similar initiatives may contribute to build capacity in a supportive learning environment and facilitate intercultural communication and integration.

# Digital Solutions to Improve Healthy Food Access in Food Pantries

Dr. Joel Gittelsohn<sup>1</sup>, Dr. Daniel Barnett<sup>1</sup>, Ms. Samantha Sundermeir<sup>1</sup>, Dr. Nina Martin<sup>2</sup>, **Ms. Emma Lewis<sup>1</sup>**, Ms. Bengucan Gunen<sup>3</sup>, Dr. Melissa Reznar<sup>4</sup>, Ms. Lisa Poirier<sup>1</sup>

<sup>1</sup>Johns Hopkins Bloomberg School of Public Health, Baltimore, USA, <sup>2</sup>Johns Hopkins Applied Physics Laboratory, Laurel, USA, <sup>3</sup>Drexel University Dornsife School of Public Health, Philadelphia, USA, <sup>4</sup>Oakland University School of Health Sciences, Oakland, USA

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Food pantries play a key role in addressing food insecurity and food access challenges in the United States. The covid-19 pandemic exacerbated many limitations of the charitable food system, including the need to offer safer means of food distribution, vulnerability of older pantry volunteers, and key gaps in situational awareness by emergency managers. We sought to identify: (1) what forms of support food pantry workers need in order to safely and effectively do their jobs; (2) what digital strategies food pantry directors currently use for pantry management; and (3) what mobile app features would support food pantries, and address other food supply chain/donor challenges?

**Methods:** We report on three interrelated activities: (1) a food pantry intervention conducted mostly pre-COVID-19 (Fresh Shelves, Healthy Pantries (FSHP)) in Baltimore; (2) a scoping review that explored the current status of digital applications for food pantries; and (3) a recently funded intervention trial to develop a mobile app for food pantries. Within each phase of the 3-part RCT FSHP intervention (n=7 pantries), a combination of multi-modal change strategies focusing on the target food group for the phase was implemented, including policy, staff education and engagement, and client education and environmental changes. We followed up with a scoping review of digital strategies used to support food assistance programs. Finally, we were recently funded to develop and pilot an app to support food pantries in management of volunteers, client needs, and communications with emergency management officials.

**Results:** FSHP demonstrated feasibility; mean healthfulness scores for intervention client bags significantly increased from 58.2 to 74.9 ( $p<0.001$ ). Our review identified 19 desirable digital features; the most popular feature was online shopping (n=14), followed by inventory management, and client tracking. We have been funded to develop a mobile app and to pilot and evaluate its feasibility and impact on food pantry staff preparedness, stocking, and client uptake of healthful foods and beverages, in 20 food pantries and 360 pantry clients in a RCT.

**Conclusion:** The work of our team with food pantries will support improvements in the charitable food system, potentially leading to improved dietary quality and reduced food insecurity.



# The association between evening physical activity and sleep quality among physically active youth aged 12-17 years from the FLASHE study.

**Ms. Karen Sauve<sup>1,2</sup>**, Dr. Olivia De-Jongh González<sup>1,2</sup>, Dr. Louise C. Mâsse<sup>1,2</sup>

<sup>1</sup>School of Population and Public Health, University of British Columbia, Vancouver, Canada, <sup>2</sup>BC Children's Hospital Research Institute, Vancouver, Canada

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Current sleep hygiene recommendations advise against engagement in moderate-vigorous physical activity (MVPA) in the evening; however, few studies have examined how engagement in MVPA in the evening relates to sleep among youth. This study examined whether participation in MVPA in the evening (6-10pm) had an effect on sleep quality among 12-17-year-olds who met daily MVPA guidelines (accumulate at least 60 minutes of daily MVPA).

**Methods:** This cross-sectional study is a secondary analysis of data from the FLASHE(1) study. Web-based survey data regarding sleep quality and MVPA timing were collected from 1661 US youth. The analytical sample (N=1416) retained the youth who met the daily MVPA guidelines and the group was split into those who engaged in MVPA in the evening at least 1 night/week versus those who did not. Sleep quality, classified as good or poor, measured whether youth typically slept through the night or were awake for part of the night, respectively. Covariate-adjusted logistic regression models with multiple imputation were used to determine the effect of engaging in MVPA in the evening on sleep quality. Sensitivity analysis examined whether the number of nights youth engaged in MVPA in the evening had a differential impact on sleep quality.

**Results:** The majority (77%) of youth reported participating in evening MVPA at least 1 evening/week and 87% typically experienced good sleep quality. The evening MVPA group included more males ( $p=0.006$ ) and a greater proportion of youth with "almost none or a little" reported sedentary behavior ( $p<0.001$ ). Sleep quality did not significantly differ among those who reported engaging in MVPA at least 1 night/week versus those who did not do any MVPA in the evening. The results did not differ when the number of nights youth reported engaging in MVPA at night was varied (2, 3, 4+ evening MVPA).

**Conclusions:** Our study did not find evidence to restrict opportunities for youth to engage in MVPA to specific times of day. Further work is required to understand the effects of evening MVPA on other objective and subjective sleep attributes in youth and to determine specific behavioural interventions to improve sleep in this population.

# Implementing school meals in Australia: understanding public attitudes

**Prof. Danielle Gallegos**<sup>1,2</sup>, Ms. Emma Esdaile<sup>1,2</sup>, Ms. Alexandra C. Manson<sup>3</sup>, Dr. Brittany Johnson<sup>3</sup>, Prof. Rebecca Golley<sup>3</sup>

<sup>1</sup>School of Exercise and Nutrition Sciences, Queensland University of Technology, Brisbane, Australia,

<sup>2</sup>Woolworths Centre for Childhood Nutrition Research, Queensland University of Technology, Brisbane,

Australia, <sup>3</sup>Caring Futures Institute, College of Nursing and Health Sciences, Flinders University, Adelaide, Australia

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Australia is one of only a few high-income countries that has not implemented comprehensive, universal school meals. Historically the issue is divisive but as concerns over the growth and wellbeing of children and young people continue, school meals are being viewed as an opportunity to support both health and education outcomes. Creating a paradigm shift in policy approaches requires an understanding of public attitudes. This research explores the discourses circulating on online media sites in response to increasing calls to provide school meals in Australia.

**Methods:** Reader comments on 'comment boards' attached to school meal relevant articles published on Australian news and current affairs websites, and their reposting on social media, were analysed for public discourses. The primary question was "How do readers represent the 'solution' of school meals?" and "Are school meals encouraged or rejected?". Articles were reviewed from January 2017 to December 2022. Analysis included preliminary coding of comments for major themes using the Framework method. These themes were further analysed using critical discourse analysis and interpretive affective-discursive analysis for the presence of emotion.

**Results:** Preliminary findings indicate predominant themes related to "shifting responsibility for feeding children from parents to state"; "impacts on children"; and "protecting child, parent and teacher agency". Like school food in general, the implementation of school meals in Australia remains divisive.

**Conclusions:** Transformational policy change faces many barriers, not least the elusive synergy between public and political will. This research highlights the need to understand the underpinning public discourse and to specifically address these when promoting national debate regarding school meals. For school meals in Australia to be implemented the concerns of the public, including students, parents, teachers, tax-payers need to be taken into consideration.

# The effect of sport on health in people aged 60+: a systematic review and meta-analysis

Dr. Juliana Oliveira<sup>1,2</sup>, Dr. Stephen Gilbert<sup>1,2</sup>, Dr. Marina B Pinheiro<sup>1,2</sup>, **Prof. Anne Tiedemann<sup>1,2</sup>**, Dr. Liane B Macedo<sup>3</sup>, Miss Laisa B Maia<sup>4</sup>, Miss Wing S Kwok<sup>1,2</sup>, Associate Professor Leanne Hassett<sup>1,5</sup>, Prof. Cathie Sherrington<sup>1,2</sup>

<sup>1</sup>Institute for Musculoskeletal Health, The University of Sydney and Sydney Local Health District, Sydney, Australia, <sup>2</sup>Sydney School of Public Health, Faculty of Medicine and Health, The University of Sydney, Sydney, Australia, <sup>3</sup>Faculty of Health Sciences of Trairi, Universidade Federal do Rio Grande do Norte, Santa Cruz, Brazil, <sup>4</sup>Department of Physiotherapy, Universidade Federal dos Vales do Jequitinhonha e Mucuri, Diamantina, Brazil, <sup>5</sup>Sydney School of Health Sciences, Faculty of Medicine and Health, The University of Sydney, Sydney, Australia

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** To summarise the evidence of benefits of sport for health among people aged 60+.

**Methods:** We conducted a systematic review and meta-analysis of randomised controlled trials (RCTs). Data Sources included Medline, CINAHL, SPORTDiscus, the Physiotherapy Evidence Database from inception to April 2021. Studies were selected for inclusion if they were RCTs investigating the effect of any type of sport on health-related outcomes in people aged 60+ compared to non-active control, no intervention or usual care. The outcomes of interest included physical activity, social functioning (participation), physical functioning, cognitive and emotional functioning, well-being and quality of life. We calculated pooled effect sizes using random-effects models. Standardised mean differences (SMD) and mean difference (MD) were calculated. The GRADE system was used to assess the certainty of the evidence for analyses with  $\geq 3$  studies.

**Results:** Nine trials (628 participants) reported in 15 articles were included. Participation in sport improved cardiorespiratory fitness ( $n=5$  trials; MD=2.07ml.kg/min, 95% CI 0.89ml.kg/min to 3.25ml.kg/min; low certainty evidence), physical function ( $n=4$ ; SMD=0.62, 95% CI 0.05 to 1.18; very low certainty evidence), fat mass ( $n=6$ ; MD=0.99kg, 95% CI 0.30kg to 1.39kg; low certainty evidence) and mental health ( $n=2$ ; SMD=0.28, 95% CI 0.06 to 0.51) among older people. We found no significant effects of sport on overall physical activity participation, strength, balance, lean mass, and bone mineral density (BMD). One study investigating quality of life reported a positive, but non-significant effect of sport. No studies investigated social functioning as an outcome. Three trials reported no adverse events (AEs), but most trials reported AEs and sport injuries (67% trials), and the average incidence was 249 injuries per 1000 hours of exposure, which is high but expected for older population.

**Conclusions:** Sport may have a positive impact on health outcomes in people aged 60+. There was uncertainty on the effect of sport on strength, balance, lean mass and BMD. Further research is needed to investigate the optimal type and dose of sport to maximise the long-term benefits among older people. Sport organisations should take into consideration appropriate injury prevention strategies when promoting sport participation among older people.

# Is parenting confidence associated with child physical activity, self-regulation and temperament in young children?

**Ms. Cynthia Smith<sup>1</sup>**, Dr. Susan Paudel<sup>1</sup>, Dr. Jill Hnatiuk<sup>1,3</sup>, Dr. Sharinne Crawford<sup>2</sup>, Dr. Kylie Hesketh<sup>1</sup>

<sup>1</sup>Institute for Physical Activity and Nutrition, Deakin University, Burwood, Australia, <sup>2</sup>Judith Lumley Centre, La Trobe University, Bundoora, Australia, <sup>3</sup>Manitoba Centre for Health Policy, University of Manitoba, Winnipeg, Canada

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Previous research suggests that confident parents utilise more positive parenting practices, and may have more active children. However, there is limited evidence on how child characteristics may be related to parents' general and physical activity-specific parenting confidence. This study investigated associations between child characteristics and physical activity (PA) levels, and mothers' general, and PA-specific parenting confidence.

**Methods:** Baseline data from 909 mothers of 2-year-old children in the Let's Grow randomised controlled trial were utilised (collected Feb 2021-May 2022). Children's PA was measured using both parent-report (time spent in active play) and device-assessed (ActiGraph GT3X+ accelerometers worn for  $\geq 4$  days) methods. Child self-regulation (SR) was measured using a four-item scale adapted from the Fast Track Project; child temperament was measured with two questions adapted from the Child Temperament Project. Higher scores for SR and temperament indicated fewer problematic traits. General parenting confidence was assessed using the 16-item Me-as-a-Parent scale. PA-specific parenting confidence was assessed using a previously developed four-item scale. Higher scores on both scales indicated greater confidence. Linear regression adjusted for mothers' age, education and other siblings assessed associations for device-assessed and self-reported activity.

**Results:** Total weekly child PA was 218 ( $\pm 33.47$ ) minutes and 919.60 ( $\pm 315.78$ ) minutes for device-assessed and parent-report respectively. Device-assessed activity was positively associated with PA-specific parenting confidence ( $\beta=0.01$ , CI95=0.00,0.10), but not general parenting confidence. For every ten-minute increase in parent-reported child PA there was a small but significant increase in both general parenting confidence ( $\beta=0.01$ , CI95=0.00,0.03) and PA-specific parenting confidence ( $\beta=0.03$ , CI95=0.02,0.04). Child SR was positively associated with general ( $\beta=1.89$ , CI95=1.62,2.15) and PA-specific parenting confidence ( $\beta=0.27$ , CI95=0.14,0.40). Child temperament was also positively associated with general parenting confidence ( $\beta=2.29$ , CI95=1.94,2.63) and PA-specific parenting confidence ( $\beta=0.17$ , CI95=0.11,0.34).

**Conclusions:** This study suggests that child characteristics and PA levels may have an impact on both general and PA-specific parenting confidence among mothers. Higher self-regulation abilities in children may result in more confident mothers who are able to utilise more positive parenting practices, and promote more PA for their children, however, longitudinal or intervention designs are required to confirm this.

# Changes in nutrition knowledge, eating behaviors and sedentary activities among World Trade Center Responders with PTSD Participating in a Nutrition Intervention

**Dr. CHRISA ARCAN<sup>1</sup>**, Dr. Wei Hou<sup>2</sup>, Ms. Xiaohua Yang<sup>2</sup>, Ms. Kathryn Hughes<sup>2</sup>, Ms. Amanda Reichardt<sup>2</sup>, Dr. Sean A. P. Clouston<sup>2</sup>, Dr. Benjamin J. Luft

<sup>1</sup>Virginia Commonwealth University, RICHMOND, USA, <sup>2</sup>Stony Brook University, Stony Brook, USA

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Responders to the 9/11 World Trade Center (WTC) disaster suffer from overweight/obesity and high levels of post-traumatic stress disorder (PTSD). This study examines participant reported changes in nutrition knowledge, home food availability, sedentary behaviors, and physical activity among WTC responders in the WTC-Nutrition intervention with physical activity education.

**Methods:** Longitudinal analysis of data from the WTC Nutrition study, a 10-week pilot randomized controlled trial (MedDiet n=31 vs. Control usual counseling n=31), among WTC responders (age 45-65 years) with PTSD and overweight or obesity (N=62; males: 87%). Data were collected at baseline, post-intervention, and 3-month follow up. Participants completed an online survey assessing multiple psychosocial factors and 14-item Mediterranean diet survey; height/weight and waist circumference were measured and body mass index (BMI) was calculated. For continuous outcomes, between-group comparisons were conducted using nonparametric Wilcoxon rank sum tests, and pre-post within-group comparisons were conducted using Wilcoxon signed rank tests.

**Results:** Both groups experienced significant increase in median Mediterranean Diet score and improvements in waist circumference and body mass index. At baseline, only about one third of participants were knowledgeable about the recommended intake of trans fats or saturated fats and only 6% about fruits and vegetables. The largest improvement from baseline to post-intervention was knowledge about recommended unsaturated fat consumption (14% to 20%). Only 20% and 15% responded correctly on MyPlate recommendations for starchy foods and fruits and vegetables, respectively. At baseline, participants reported spending 6.5 hours/day watching TV with a decrease of 1.5 hours at post intervention. Participants reported spending on average 180 minutes/week engaging in moderate exercise with an increase of 60 minutes/week at follow up.

**Conclusion:** The WTC-HP Nutrition study involved a high-dose remote communication/education coupled with personal counseling targeting nutrition-related personal, behavioral, and home environmental factors including physical activity tips. Both groups showed improvements in their MedDiet score, waist circumference, BMI, nutrition knowledge, healthy food availability at home, and time watching TV and engaging in moderate exercise. A larger study is needed to confirm the findings and examine potential moderating factors.

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# Women's empowerment four-years after completing a holistic health program

**Dr. Victoria Chinn<sup>1</sup>**, Ms. Jessica Shaw<sup>2</sup>

<sup>1</sup>Te Herenga Waka/Victoria University of Wellington, Wellington, New Zealand, <sup>2</sup>Te Whatu Hauora/Health New Zealand, Wellington, New Zealand

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** This study explores women's experience of empowerment four years after completing Next Level Health (NLH), a 6-month holistic health program that worked in partnership with women to develop small health-promoting behaviours across the areas of physical activity, sleep, nutrition, eating behaviour, self-care and stress management. Findings from this study respond to the global agenda for women's empowerment and lacking evidence regarding holistic health programs designed for women.

**Methods:** Past participants of NLH (n=55) were contacted 4-years post-intervention and invited to participate in the follow-up study. Participants completed a series of questions as either an online survey (Qualtrics) or interview (Zoom) and received a \$40.00 NZD voucher of their choosing for their time. The questionnaire included 15 open-ended questions that addressed four topics: health, wellbeing and related behaviours; empowerment over health; evaluation of NLH; and any current barriers/needs regarding their health. Women's responses were analysed by thematic analysis guided by the research question, "How have women experienced health-related empowerment since completing NLH?". The survey responses were first reviewed and coded (Nvivo) to identify preliminary themes. The preliminary themes were then further deepened and refined upon reviewing and coding the interview transcripts. This study was approved by the Victoria University of Wellington Human Ethics Committee (#28812).

**Results:** 44 women participated in the follow up study including 34 survey respondents and 10 interviewees. Three themes emerged regarding women's experience of empowerment after NLH: *Strengthening their support networks, ongoing development of health literacy, and constructing their own definition of health.*

**Conclusions:** The resulting themes highlight the importance of women's active role in designing behavioural goals and applying a holistic health perspective. The findings from this study contribute to a small pool of evidence that reports on the long-term impacts of empowering health programmes for women.



# Behavior change for sustainable development through experiential learning approach – getting aware of facilitators and barriers

**Associate Professor Beatrix Alгурén**

<sup>1</sup>University of Gothenburg, Gothenburg, Sweden

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Sustainable development and transformational change have become more critical than ever. Higher education for sustainable development (ESD) aims to achieve that students not only understand sustainability problems but find solutions for them. The purpose of the present study was to increase knowledge on facilitators and barriers of pro-environmental behavior and the impact on experiential learning activity (ELA) for ESD on students learning.

**Methods:** Reports from 39 students on their two-weeks behavior change for SD project were analyzed by the means of thematic content-analysis.

**Results:** Four main areas of behavior change were identified: increased physical activity (connected to less car driving), saving resources (e.g. recycling or less consumptions), sustainable food (e.g. ecological products or less meat consumption) and less screen time. Barriers and facilitators could be internal or external factors and were behavior specific. While *lack of alternatives* was most common barrier for changing food behavior (27%), *sickness* and *weather* were most common barrier for increasing physical activity (27%).

*Strategy/thoughtful planning* was important facilitators for all behavior but mostly named in relation to physical activity and food behavior change (27 and 30%). *Social* factors (e.g. friends, families) could be both facilitating and hindering for almost all behaviors.

**Conclusions:** Through experiential learning with a two-weeks individual behavior change project, students got novel insight and understanding on their individual behavior not only in relation to SD, but also understanding facilitators and barriers for making behavior change happens. This experiential learning project stimulated especially the development of self-awareness competency and not only capacity for change but the actually performance of change.

# Designing physical activity interventions for women aged 50+: a qualitative study of participant perspectives

Ms. Geraldine Wallbank<sup>1,2</sup>, **Dr. Abby Haynes<sup>1,2</sup>**, Prof. Anne Tiedemann<sup>1,2</sup>, Prof. Catherine Sherrington<sup>1,2</sup>, Associate Professor Anne C. Grunseit<sup>3,4</sup>

<sup>1</sup>School of Public Health, Faculty of Medicine and Health, The University of Sydney, Sydney, Australia,

<sup>2</sup>Institute for Musculoskeletal Health, The University of Sydney and Sydney Local Health District, Sydney, Australia, <sup>3</sup>School of Public Health, Faculty of Health, University of Technology, Sydney, Australia, <sup>4</sup>Prevention Research Collaboration, Sydney School of Public Health, The University of Sydney, Sydney, Australia

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** This study sought to analyse the perspectives of participants on physical activity in general and the *Active Women over 50* information and support program to optimise the design of physical activity interventions for this demographic.

**Methods:** Twenty women who completed the *Active Women over 50* trial were purposively recruited for maximum variation in age, employment, carer responsibility, medical conditions and physical activity. Individual semi-structured interviews explored their perspectives on physical activity, program components and suggestions for future iterations of Active Women over 50. Data were analysed thematically.

**Results:** Our analysis found that participants' capacity to be physically active was shaped by an interplay of factors operating at individual, social and systemic levels. Four themes relating to physical activity in general and to the program were identified: Age and gender matters, Physical activity is social, Strategising for physical activity and the Self-responsibility discourse. Taking these themes together it seems at this midlife stage, physical activity and program participation was challenged by personal, life-stage, cultural factors and the tension between those factors and a self-responsibility discourse. Social support and finding a suitable strategy for generating and sustaining motivation were deemed integral aspects of being active. Physical activity programs for women aged 50+ need to adopt an integrative approach to promote physical activity as part of overall health and life.

**Conclusions:** A range of strategies is key to supporting women over 50 to be more physically active reflecting the variety of circumstances and levels of agency experienced. Programs could address the diversity of individual circumstances and motivators for physical activity by offering a range of flexible strategies and options, facilitating physical activity social networks, and building in accountability and feedback for being active. Sensitive program framing is critical to engage women supportively in addressing contextual challenges and taking responsibility that avoids self-blame. Such strategies do not need to be resource-intensive but could be incorporated into a scaled program.

# Development and psychometric evaluation of a measure assessing sustainability determinants of evidence-based public health interventions in the early childcare setting

**Mr. Adam Shoesmith<sup>1,2,3</sup>**, Dr. Alix Hall<sup>1,2,3</sup>, Prof. Luke Wolfenden<sup>1,2,3</sup>, Associate Professor Rachel C. Shelton<sup>4</sup>, Associate Professor Serene Yoong<sup>5</sup>, Dr. Cassandra Lane<sup>1,2,3</sup>, Dr. Nicole Nathan<sup>1,2,3</sup>  
<sup>1</sup>University of Newcastle, Callaghan, Australia, <sup>2</sup>Hunter New England Population Health, Wallsend, Australia, <sup>3</sup>Hunter Medical Research Institute, New Lambton Heights, Australia, <sup>4</sup>Columbia University, New York, USA, <sup>5</sup>Deakin University, Burwood, Australia

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** To develop and psychometrically evaluate a self-report measure of determinants influencing sustainment of evidence-based public health interventions in the early childcare setting from the executive perspective.

**Methods:** The measure was developed across two phases: (1) item development, face and content validity; and (2) psychometric evaluation:

*Phase 1:* Measure domains were informed by constructs from the Integrated Sustainability Framework. The initial item pool was based on review evidence and an iterative process involving eight content experts in the fields of implementation science, psychometrics and education. Item reduction occurred until a comprehensive item list covering relevant framework domains was achieved. Ten content experts, independent of those involved in developing the initial item list assessed content validity. Face validity was assessed by five service delivery experts responsible for implementing public health programs in educational settings, four educators and two educational executives. Items underwent pre-testing by five representatives of the target population to minimise misunderstanding and measurement error through ensuring item clarity, comprehensibility and relevance to the target population.

*Phase 2:* A cross-sectional, national Computer Assisted Telephone Interview survey was conducted with managers or executive staff from early childcare centres across Australia. Participants answered the 29-item measure using a five-point Likert scale, with response options ranging from 1="Completely disagree" to 5="Completely agree". Structural validity, concurrent validity, known groups validity, internal reliability, and floor and ceiling effects will be assessed.

## **Results:**

*Phase 1 (complete):* The initial measure contained 29 items covering four domains of the Integrated Sustainability Framework. Average Scale Content Validity Index was 0.91 indicating high content validity.

*Phase 2 (in progress):* We obtained 482 completed surveys. Full completion of items was 84% (n=405). Preliminary descriptive data found that the lowest scoring domains were Processes (mean=3.8 [0.86]); and Outer Contextual Factors (mean=3.90 [0.96]). Inner Contextual Factors (mean=4.1 [0.77]), and Characteristics of the Intervention (mean=4.2 [0.62]) ranked the highest. Psychometric testing is currently underway.

**Conclusions:** This measure will facilitate more accurate assessment of factors influencing sustainment of interventions in early childcare settings. Such data is essential for developing sustainment strategies and monitoring possible influences of intervention sustainment.

# “Trying to find something that I can stick to”: older people’s perspectives on physical activity and its promotion by health professionals

**Ms. Kate Purcell**<sup>1,2</sup>, Ms. Roslyn Savage<sup>1,2</sup>, Ms. Kerry West<sup>1,2,3</sup>, Prof. Anne Tiedemann<sup>1,2</sup>, Associate Professor Leanne Hassett<sup>1,2</sup>, Dr. Abby Haynes<sup>1,2</sup>, Prof. Cathie Sherrington<sup>1,2</sup>

<sup>1</sup>Institute for Musculoskeletal Health, Sydney Local Health District, Camperdown, Australia, <sup>2</sup>School of Public Health, Faculty of Medicine and Health, The University of Sydney, Sydney, Australia, <sup>3</sup>Physiotherapy Department, The Children’s Hospital at Westmead, Sydney Children’s Hospitals Network, Westmead, Australia

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** Despite the well-known benefits of physical activity, participation is low and declines with age. Promotion of physical activity by health professionals is effective in increasing participation. We sought to inform the development of implementation strategies to support person-centred physical activity promotion by health professionals. This was achieved by exploring older people’s views and experiences of participation in physical activity, and its promotion by health professionals.

**Methods:** We conducted telephone or video interviews with 14 people aged 50+ years. Participants were recruited from rheumatology departments at two hospitals in Sydney, Australia and from a consumer panel at the University of Sydney. Interviews were recorded and transcribed. Thematic analysis involved three authors developing codes independently, then working to agree on a framework which was used to code all transcripts. Themes were developed collaboratively between authors by reviewing codes and discussing overarching concepts.

**Results:** Five main themes were identified: 1) staying active to maintain a healthy body and mind; 2) searching for suitable options in the face of deteriorating health; 3) enjoyment and social aspects of activity as motivators; 4) staying active - motivation, routine and accessibility; and 5) COVID-19 impacts. All participants agreed that health professionals should routinely promote physical activity to their clients but several queried whether this was feasible given they were overburdened and short of time. Some participants reported advice about physical activity was regularly provided and highly valued, others felt that it was unnecessary because they were already active. Some reported that advice focused only on specific exercises, rather than holistic advice about incorporating physical activity in their daily lives. Preferred strategies to enhance promotion of physical activity by health professionals included better listening skills, collaborative goal setting and better knowledge of and connections to local, age-appropriate physical activity opportunities.

**Conclusion:** Positive health outcomes, enjoyment, social interaction, motivation, routine and accessibility were critical influences to physical activity participation over time. Promotion of physical activity by health professionals was valued. Health professionals could enhance physical activity in older people by employing person-centred behaviour change approaches and providing information and referral to suitable local opportunities.

# Mediating Effect of Health Literacy on the Relationships of Cognitive and Physical Functions with Health-related Quality of Life in Older Adults

**Prof. Bik Chu Chow**<sup>1,3</sup>, Dr. Tuyen V. DUONG<sup>2,6</sup>, Dr. Jojo JIAO<sup>3</sup>, Dr. Holger HASSEL<sup>4</sup>, Prof. Timothy C. Y. KWOK<sup>5</sup>

<sup>1</sup>Department of Sport, Physical Education and Health, Hong Kong Baptist University, HONG KONG, Hong Kong, <sup>2</sup>School of Nutrition and Health Sciences, Taipei Medical University, Taipei, Taiwan, <sup>3</sup>Dr. Stephen Hui Research Centre for Physical Recreation and Wellness, Hong Kong Baptist University, Hong Kong, Hong Kong, <sup>4</sup>Institute of Applied Health Sciences, Coburg University of Applied Sciences and Arts, Coburg, Germany, <sup>5</sup>Department of Medicine & Therapeutic and School of Public Health, The Chinese University of Hong Kong, Hong Kong, Hong Kong, <sup>6</sup>International PhD Program in Medicine, College of Medicine, Taipei Medical University, Taipei, Taiwan

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** In this research, a model of the relationships of cognitive and physical function with health literacy that contributes to the health-related quality of life of older adults in Hong Kong was developed. The hypothesis that health literacy (HL) may act as a partial mediator between cognitive function (CF) together with physical functions (PF) and health-related quality of life (HRQoL) was tested.

**Methods:** Subjects were older adults, between the age of 50 and 80 years, who were recruited through local community centers and social media forum from March to July 2021. Totally, 490 older adults completed the survey. Four survey instruments included the 12-item Short-Form Health Literacy Survey Questionnaire (HLS-SF12) for HL assessment; Montreal Cognitive Assessment (MoCA) for CF; the Senior Fitness Test (SFT) for PF; and the 12-item Short Form Health Survey version 2 (SF-12v2) for HRQoL. Path analysis was conducted to test for the mediating effects of HL on the relationship of CF and PF towards HRQoL, based on the proposed theoretical model.

**Results:** Results indicated that three significant direct effects, including CF predicting PF ( $\beta=.115$ ,  $SE=.012$ ,  $p<.001$ ), PF predicting HL ( $\beta=.101$ ,  $SE=.022$ ,  $p<.001$ ), and HL predicting HRQoL ( $\beta=.457$ ,  $SE=.049$ ,  $p<.001$ ), were observed. Meanwhile, the direct effect of PF for predicting HRQoL ( $\beta=.150$ ,  $SE=.025$ ,  $p<.001$ ) as well as its indirect effect for predicting CL ( $\beta=.046$ , 95% CI [.028, .067]) were significant.

**Conclusion:** In conclusion, the hypothesized mediational model highlighted the effect of health literacy on improving older adults' health-related quality of life under the influences of both cognitive and physical functions together was supported. Further empirical research and health promotion intervention programs that aim to improve health literacy that leads to better quality of life for the elderly population are viable.

# Population health survey findings of childhood overweight and obesity, and child and family healthy lifestyle behaviours, in a disadvantaged multi-cultural community in Sydney, Australia: data to inform the 'Growing Healthy Kids in South West Sydney (SWS)' intervention

**Dr. Margaret Thomas**<sup>1</sup>, Ms. Michelle Camilleri<sup>2</sup>, Dr. Shanley Chong<sup>4</sup>, Dr. Vilas Kovai<sup>3</sup>, Prof. Bin Jalaludin<sup>3</sup>, Ms. Mandy Williams<sup>3</sup>

<sup>1</sup>The University of Sydney, Sydney, Australia, <sup>2</sup>Nepean Blue Mountains Local Health District, Sydney, Australia, <sup>3</sup>South Western Sydney Local Health District, Sydney, Australia, <sup>4</sup>Western Sydney Local Health District, Sydney, Australia

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** South West Sydney (SWS) with around 900,000 people has many migrant and refugee families and high socioeconomic (SE) disadvantage. With no reliable, comprehensive information available, a population-based cross-sectional telephone survey of parents/carers of children 5-16 years gathered data on overweight and obesity, child and family healthy lifestyle behaviours, perceptions and attitudes, to inform an eight-year community-based intervention.

**Methods:** The survey identified SWS families with children 5-16 years using a randomly generated mobile telephone sample frame. 1815 parents/carers answered 70 questions, and 692 of these 30 additional questions about: child's weight and height, demographics, child and family lifestyle behaviours, perceptions and attitudes. Descriptive analyses using SAS examined associations of BMI and demographic factors with attitudes, perceptions and behaviours. Data were weighted to the SWS population.

**Findings:** Overweight was 19.7%, obesity 17.6%, and combined 37.3%, significantly higher than the NSW average (23%). 51.1% of children were a healthy weight. Low SE status was associated with higher obesity, and overweight and obesity combined: 53% in lowest income household, 32.7% for highest income (95% CI: 27.3-38%). No SES differences were found for overweight.

88% of parents reported their child's diet as healthy but 39% of children ate packaged snack foods  $\geq 1$  per day and 18% drank  $\geq 1$  cup discretionary drinks per day, higher for low SES children. Obese children were more likely to be offered snacks as a reward and their parents more likely to report intending to reduce child's snacks and drinks. 50% of parents of obese children reported that the child was a healthy weight.

76% of children did not meet physical activity guidelines and overweight children were the least active. 79% met screen guidelines but data may be limited by parent self-report. Only 12% of obese and 9% of overweight children had attended an appointment for weight issues.

**Conclusions:** Rates of overweight and obesity, and unhealthy lifestyle behaviours are high, particularly among low SES SWS children and families. The results have informed the 'Growing Healthy Kids in SWS' intervention, designed to provide more support for parents and work with communities to improve children's healthy eating and physical activity behaviours.



# A comparison of the lower gut microbiota of physically active vs physically inactive community dwelling older adults

**Miss Catarina Ramos**<sup>1</sup>, Dr. Daniele Magistro<sup>1</sup>, Miss Nicola Camp<sup>1</sup>, Miss Anya Whitham<sup>1</sup>, Dr. Will Kinnear<sup>1</sup>, Dr. Kirsty Hunter<sup>1</sup>

<sup>1</sup>Sport, Health and Performance Enhancement (SHAPE) Research Centre, Department of Sport Science, Nottingham Trent University, Nottingham, United Kingdom

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** The gut microbiota (the trillions of microorganisms present in the digestive tract) has the ability to shape metabolism, influence other organs and affect several physiological processes. Its composition and functionality change throughout the lifespan and, as the host ages into older adulthood, its composition deviates towards a less healthy one, with higher abundance of pathogens and reduced abundance of health-related bacteria (dysbiosis). Previous studies have shown that physical activity (PA)/exercise can alter the gut microbiome composition towards a healthier one, however, little is known about its effects in older adults, healthy or otherwise. Therefore, the aim of this study was to compare the gut microbiome of physically active vs physically inactive healthy older adults and to observe if there are any associations between body composition, active lifestyle and the gut microbiome composition.

**Methods:** This observational, cross-sectional study involved 100 healthy, community dwelling, UK older adults aged between 65- 85 years. Participants completed two questionnaires: a health questionnaire and a Food Frequency Questionnaire (FFQ). They then visited the laboratory and a series of tests were undertaken: a fasted fingerprick blood sample was taken to analyse the plasma lipidic profile, C-Reactive Protein, and glucose homeostasis; a faecal sample to assess the lower gut microbiota composition using 16s rRNA sequencing; several functional tests and a 6-minute walking test to assess physical function, mobility and cardiorespiratory fitness. Participants then wore an accelerometer for 7 days to monitor their physical activity levels and sedentary time.

**Results:** Data analysis is underway and will be presented at the conference.

**Conclusions:** The results of this study will add to our understanding of whether an active lifestyle is associated with the gut microbiota composition of older adults. The ultimate aim of this research theme is to determine if we can use PA as a tool to promote healthy ageing via the gut microbiome, therefore improving the quality of life of this population.

# Developing and pilot-testing an intergenerational, cognitively enriched lifestyle intervention for MCI-patients and their (grand)children

**Dr. Julie Latomme<sup>1</sup>**, Dr. Tim Van Langenhove<sup>2</sup>, Prof. Greet Cardon<sup>1</sup>

<sup>1</sup>Ghent University, Ghent, Belgium, <sup>2</sup>Ghent University Hospital, Ghent, Belgium

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** In 2018, 50 million people were affected with dementia and this is forecasted to triple by 2050. An important way to “curb this tidal wave of dementia” is to prevent cognitive decline in high-risk groups such as older adults with mild cognitive impairment (MCI). Recent work has shown that the combination of PA and cognitive activity may have beneficial effects on older adults’ cognitive health, but studying new and effective ways to do so in MCI-patients is needed in dementia prevention. An intergenerational program (IGP) involving old and young generations together in one program might be an innovative and effective strategy. Only a few IGPs have been used to promote PA and most of them lack a theoretical basis or do not sufficiently meet the target groups’ needs. This study aims to develop and pilot-test a novel IGP for MCI-patients to improve their cognitive, physical and psychosocial health.

**Methods:** The IGP will be developed using a theoretical framework in combination with a co-creation approach, actively involving MCI-patients in the intervention development. More specifically, ten interviews will be conducted with MCI-patients in which two existing interventions will be presented and evaluated: (1) an intergenerational PA lifestyle intervention for grandparents (65+) and their grandchildren, (2) a cognitively enriched walking intervention for older adults. Based on the information gathered in these interviews, one of these two interventions (or a combination of both) will be adapted to MCI-patients, using the ADAPT guidance as the theoretical framework. Qualitative data-analysis in NVivo will be conducted to evaluate the interviews. Thereafter, the program will be pilot-tested which will provide in depth information on its feasibility and acceptability. In this way, the program can be further fine-tuned and optimized before conducting an RCT.

**Results:** No results are available yet, as the development and pilot-testing of the intervention will take place in February-March 2023 and May-June 2023, respectively. The first results will be available in April 2023.

**Conclusion:** This study aims to develop and pilot-test an intervention that aims to improve cognitive, physical and psychosocial health in MCI-patients which might have important implications for future research.

# Reaching and Engaging Parents with Parental Feeding and Child Nutrition Information on Facebook: A Retrospective Content Analysis

**Dr. Maria Henström**<sup>1,2</sup>, Ms. Tayla Esplin<sup>3</sup>, Ms. Emma Schwartzkoff<sup>2,4</sup>, Dr. Kerith Duncanson<sup>2</sup>, Dr. Gordana Popovic<sup>3</sup>, Mr. Richard Ball<sup>2,4</sup>

<sup>1</sup>Karolinska Institutet, Huddinge, Sweden, <sup>2</sup>University of Newcastle, Callaghan, Australia, <sup>3</sup>University of New South Wales Sydney, Sydney, Australia, <sup>4</sup>Mid North Coast Local Health District, Port Macquarie, Australia

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Online social platforms are potentially useful for disseminating public health interventions, especially to parents who seek child nutrition information online. However, to optimise social media interventions, health professionals need to understand how to reach and engage the target audience. The Parents in Child Nutrition Informing Community (PICNIC) peer-education nutrition program uses social media to educate parents/carers of young children (0-2 years) about feeding practices that influence children's eating behaviours. Four or five posts per week are shared on the PICNIC Facebook page (>2'000 followers in Apr-2022). This study aimed to describe PICNIC's social media post characteristics, and identify features that determine post performance in terms of organic (non-paid) reach and engagement.

**Methods:** Post performance data were exported from the PICNIC Facebook page for posts uploaded from Jan-2020 to Apr-2022. Intervention posts (n=436) were evaluated in an iterative coding process using an eleven-domain social media coding framework adapted from existing frameworks/tools to fit PICNIC's content and strategies. Associations between coded post characteristics and organic reach (number of users reached) and engagement (comments/shares/reactions/clicks) were explored using the Least Absolute Shrinkage and Selection Operator (LASSO) regression method in R. Page followers at time of posting were included in the analyses to account for program growth over time.

**Results:** Photo format posts reached more users than video posts, but video posts drew 36% more silent engagement (clicks) than photo posts. Posts based on original content had higher reach than re-posted or re-shared posts. Posts linking to the PICNIC website were associated with lower reach. Post characteristics that were independent positive predictors of user engagement included original posts, instructive communication techniques, and feeding messages about food restriction or fussy eating. Instructive posts (using illustrative 'how-to' messages) had 22% higher total engagement compared to informative posts.

**Conclusion:** This study identified that parents in an online child feeding program engaged more with social media posts that were instructive or in video-format, with content relating to food restriction or fussy eating. Social media platforms evolve constantly, so eHealth interventions utilizing these platforms require continuous post performance evaluation to optimise reach and engagement with the target audience.

# Early years practitioners' perspectives on the use of interactive electronic technology in young children: a qualitative study

**Dr. Liane B. Azevedo<sup>1</sup>**, Miss Megan Downes<sup>1</sup>, Dr. Sara Eastburn<sup>1</sup>, Prof. Paul Bissel<sup>2</sup>

<sup>1</sup>University of Huddersfield, Huddersfield, United Kingdom, <sup>2</sup>University of Chester, Chester, United Kingdom

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** F. Early care and education

**Purpose:** Interactive electronic devices (IEDs), such as tablets and smartphones, are standard in young children's lives. Evidence on the benefits and adverse impact of IEDs amongst young children is inconsistent. A positive association with literacy development, problem-solving, and self-efficacy has been reported in young children, mainly when the content is co-viewed with parents. However, the evidence on socio-emotional, self-regulatory, and behavioural problems is inconclusive. The aim of this study is to understand and contrast the views of early years practitioners working from nurseries in low and high-income areas on the use of IEDs.

**Methods:** We conducted semi-structured interviews with four early years practitioners (EYP) from two nurseries located in low (n=2) and high (n=2) income areas in the Northwest of England. Managers and EYPs with more than 20 years of teaching experience took part in the interview. The data were analysed thematically using a framework approach.

**Results:** EYPs from both nurseries agreed that interactive electronic devices could be a valuable resource for early years learning to improve vocabulary, particularly for children with special education needs, and to illustrate learning. However, they argued that it should not be used in isolation and requires interaction with humans.

EYPs, particularly from the nursery in the low-income area, felt that interactions between parents and children are "not as high quality" as they used to be, as parents are constantly on their phones. An EYP stated that children learn from parents and the environment, and the lack of interconnection could affect their development. They were concerned that IEDs are used as a "babysitter" when children are distressed rather than "talking through" an emotion. Other concerns were the impact on school readiness and sleep. They highlighted the need for understanding the effect of IEDs on early years development and training for EYPs and parents.

**Conclusion:** EYPs suggest that although IEDs might benefit some areas of children's learning, frequent parent use of these devices and lack of interaction with the world might affect children's social and emotional development. Further studies should focus on understanding IEDs on development outcomes in the early years.

# Dance On: A Mixed-method Study into the Feasibility and Effectiveness of a Dance Programme to Increase Physical Activity in Adults and Older Adults

## activity levels and wellbeing in adults and older adults

**Dr. Sarah Astill**, Dr. Laura Britten, Dr. Ilaria Pina, Dr. Camilla Nykjaer

<sup>1</sup>University of Leeds, Leeds, United Kingdom

Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** A. Ageing

**Purpose:** Physical activity (PA) has beneficial effects on physical and mental health outcomes in older adults. However, a consistent decline in PA participation has been noted with increasing age, with older adults consistently being reported as the least physically active population. Previous evidence showed that dance is an appropriate form of PA in older adults as it integrates body's movement with physical, cognitive, and social elements. This study investigated the feasibility and efficacy of a weekly dance programme over a 12-month period on PA levels and wellbeing.

**Methods:** A mixed-method intervention design was used. Community-dwelling older adults aged 55+ years were recruited from local community groups in Yorkshire (UK). The programme comprised of a 60-minute mixed genre dance class per week. Changes with carried forward data in self-reported measures of PA (min/week) and wellbeing with EuroQol visual analogue scale (EQ VAS) across four different time points (baseline, 3, 6 and 12 months) were assessed using the Friedman test. Feasibility was also assessed through class attendance and focus groups (N=6-9) with participants. A thematic analysis of qualitative data was conducted.

**Results:** A total of 685 participants (589-89.1% females and 72-10.9% males) took part in the study. The mean age was  $75 \pm 10$  years, and 38% of the participants were classed as highly deprived as per the index of multiple deprivation. There was a statistically significant increase in both PA ( $X^2(3) = 192.42$ ,  $P < 0.001$ ) and EQ VAS scores across the four time points ( $X^2(3) = 19.66$ ,  $P < 0.001$ ). The mean adherence rate was consistent across the 12-month period of intervention (70%). Themes from the focus groups included reasons for participating in the programme, perceptions of how the dance programme affected the participants, and facilitators to participation in the programme.

**Conclusions:** The good adherence and favourability indicate that the dance programme is feasible as an intervention in community-dwelling participants from socially economically diverse communities. The dance intervention showed a positive effect on PA levels and wellbeing. A randomised-controlled trial with a control group is required to test this intervention further.

# Investigating the impact of an activity-enabling uniform intervention on primary school-aged children's subjective well-being and health-related quality of life: a cluster randomised controlled trial

Dr. Emma Pollock<sup>1,2</sup>, Dr. Nicole Nathan<sup>1,2,3,4</sup>, Dr. Alix Hall<sup>1,2,3,4</sup>, **Ms. Nicole McCarthy<sup>1,2,3</sup>**, Prof. Luke Wolfenden<sup>1,2,3,4</sup>

<sup>1</sup>Hunter New England Population Health, Hunter New England Local Health District, Wallsend, Australia,

<sup>2</sup>Hunter Medical Research Institute, New Lambton Heights, Australia, <sup>3</sup>School of Medicine and Public Health, The University of Newcastle, Newcastle, Australia, <sup>4</sup>Priority Research Centre for Health Behaviour, The University of Newcastle, Newcastle, Australia

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Physical activity may improve children's mental health and well-being. However, globally, 81% of youth are not meeting the recommended 60 minutes of moderate-to-vigorous physical activity per day. Despite schools being an ideal setting to improve children's physical activity, many children are forced to wear traditional school uniforms (e.g., dresses, black leather shoes) that may limit their opportunities to be physically active at school. The aim of this study was to explore the impact of an activity-enabling uniform intervention on primary school-aged children's subjective well-being and Health-Related Quality of Life (HRQoL).

**Methods:** A cluster randomised controlled trial was conducted in 13 primary schools in New South Wales, Australia with children in grades 4-6. Schools were allocated to either intervention or control groups (i.e., usual practice) following baseline data collection. Children from intervention schools were asked to wear their existing sports uniform each day at school. Children's self-report subjective well-being was assessed using the 5-item World Health Organisation (WHO) Five Well-Being Index. Raw scores range from 0 (i.e., absence of well-being) to 25 (i.e., maximal well-being), which are converted into a percentage scale. Children's self-report HRQoL was measured using the Child Health Utility 9D (CHU9D), whereby generated scores range from full health=1 to dead=0. Linear mixed models will be used to compare children's subjective well-being and HRQoL between intervention and control groups. Analyses will be performed following intention-to-treat principles. Data is scheduled to be analysed on completion of final data collection (December 2022).

**Results:** Baseline data were collected from 684 children from 13 schools; 637 of which completed data for the well-being and 581 for the quality of life outcomes. The mean age of children (SD) was 9.83 (0.77). At baseline, the mean (SD) score for children's subjective well-being and HRQoL was 65.96 (20.46) and 0.72 (0.22), respectively. Planned analyses will demonstrate differences in subjective well-being and HRQoL between the intervention and control schools at follow-up.

**Conclusions:** Activity-enabling school uniforms is a simple approach that may lead to important benefits for children's school-day physical activity levels as well as broader well-being and HRQoL outcomes.



# The interaction between goal types and goal motives and the subsequent effect on performance and related outcomes.

**Miss Katie Garstang**<sup>1</sup>, Dr. Laura Healy<sup>1</sup>, Dr. Daniele Magistro<sup>1</sup>, Dr. Simon Cooper<sup>1</sup>, Dr. Patricia Jackman<sup>2</sup>  
<sup>1</sup>Nottingham Trent University, Nottingham, United Kingdom, <sup>2</sup>University of Lincoln, Lincoln, United Kingdom

Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** While goal setting research has traditionally suggested that challenging and specific goals are beneficial for performance, contemporary evidence has suggested that other goal types might be advantageous under some conditions, such as when pursuing goals related to new, complex tasks. Furthermore, the motivation underpinning goal pursuit (i.e., autonomous and controlled goal motives) has consistently been related to different outcomes relating to goal pursuit. The present study addresses a gap in existing research by examining the interaction between goal types and goal motives, in relation to outcomes such as performance outcomes during a simple and complex task.

**Methods:** Using a between-within (goal type: specific, open, learning x task complexity: simple vs complex) study design, participants, ( $n = \sim 90$ ), will complete the Corsi Block Tapping test (CBT) and the Walking Corsi test (WalCT). The CBT will be completed first to establish a baseline performance score to be pursued during the WalCT. Participants will subsequently be randomly allocated to a specific, open, or learning goal to be pursued in the WalCT, in which they will complete both simple and complex conditions in a counterbalanced order. Before each attempt at the task, participants will report their motives for their goal, perceptions of goal difficulty, importance, efficacy, and expected goal attainment. Following each trial will be completed measures relating to challenge/threat appraisal, future interest to participate, and perceived complexity.

**Results:** Data collection is ongoing. The data will be analysed using a MANOVA to assess the effects of goal types and motives on WalCT performance, future interest to participate, challenge/threat appraisal, and an ANOVA repeated measures, within-between interaction to assess the effect during the simple and complex condition.

**Conclusions:** As one of the first studies to examine goal types in relation to goal motives, the outcomes of this study will enhance how to better performance through effective goal setting. Additionally, the assessment of the interaction between goal types and goal motives under a simple and complex condition offers novel insight into how the context of a task influences goal attainment and one's belief in themselves to complete the task.

# Understanding drop-out from an office-based standing desk intervention: an exploratory investigation

Associate Prof. Philippe Gradidge<sup>1</sup>, **Mrs Merling Phaswana**<sup>1</sup>

<sup>1</sup>University of the Witwatersrand, Johannesburg, South Africa

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** The aim of this exploratory study, which has not yet been conducted, is to investigate the perceptions and experiences of a group of standing desk intervention participants that dropped out of the trial.

**Methods:** The site of study will be the University of the Witwatersrand, South Africa. The participants will be convenient sample of adult office workers recruited from the standing desk trial underway at the University of the Witwatersrand, as and when they withdraw from the study. We assume that at least ~40 participants would have dropped out of the intervention arm in the next 6-months. A final sample of 40 would be sufficient to gain insight into the reasons for drop-out from the standing desk intervention. The study has been approved by the Human Research Ethics Committee (Medical), University of the Witwatersrand (ethics certificate number: M190224). The in-depth interviews will be conducted in the early quarter of 2023. Participants will be invited to participate in the in-depth interviews by telephone and email invitation. The researchers will inform the participants of the study's purpose during the telephonic recruitment. We will record the number of participants that are recruited and those participants that are not interested in contributing. During the in-depth interviews, participants will be encouraged to think about facilitators and barriers to participating in the standing desk intervention in their place of employment. A series of interviews will take place until sufficient participant perceptions have been recorded. All in-depth interviews will be recorded with verbal and written consent of the participants on a portable recorder. Transcribed documents will be analysed using Atlas.ti 9, applying the revised coding framework. Codes will be allocated to the transcripts, while the text will be read and reviewed line-by-line for interpretation.

**Conclusions:** We intend to use the data to inform the development of strategies that will more effectively increase the adherence to standing desk interventions and thereby address the problem of prolonged sitting in the South African workplace.

# Effects of a school-based intervention on cognitive functions and mental health in Swedish adolescents - a pilot study

**Dr. Gisela Nyberg**<sup>1,2</sup>, Dr. Susanne Andermo<sup>1,2</sup>, Dr. Lisette Farias<sup>2</sup>, Dr. Björg Helgadóttir<sup>1</sup>

<sup>1</sup>The Swedish School of Sport and Health Sciences, Stockholm, Sweden, <sup>2</sup>Karolinska Institutet, Stockholm, Sweden

Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** G. Children and families

**Purpose:** Effective methods are needed to promote mental well-being, prevent mental health problems and to improve cognition in schools. Therefore, the aim of this study was to evaluate the effects of a school-based intervention on cognitive functions and mental health in Swedish adolescents.

**Methods:** This cluster-randomised controlled pilot trial included adolescents aged 14-15 years from six schools (2 intervention/4 control) around Stockholm, Sweden with a variation in socioeconomic background. The intervention was performed during an extended school day, 60 minutes three times per week, during one school year and included: a) physical activities, b) homework support with activity breaks and c) walking and listening to audiobooks. Outcomes were measured at baseline in the autumn 2021 (n=193) and after the intervention in the spring 2022 (n=172). The mental health outcomes, health-related quality of life (HRQoL) and psychosomatic health were measured with questionnaires (KIDSCREEN-27 and Psychosomatic Problems Scale). Cognitive functions (working memory, episodic memory and perceptual speed) were measured by a computer-based test battery. Group differences were analysed with ANOVA analysis, adjusted for baseline values.

**Results:** There was a significant difference between the intervention and control group in perceptual speed for the whole group ( $p=0.036$ , mean difference (MD)=18.8,  $n=171$ ) and for boys ( $p=0.049$  MD=35.2,  $n=83$ ) after the intervention. There were no significant differences between groups in mental health outcomes for the whole group, after the intervention. However, for boys there was a significant difference between groups in psychosomatic health problems ( $p=0.02$ , MD=-2.3,  $n=76$ ). There were no significant differences between groups in the other variables.

**Conclusions:** This pilot study shows positive intervention effects on perceptual speed and psychosomatic health, in particular among boys. A larger randomised study is needed in order to evaluate intervention effects further. Also, the intervention components need to be adapted to better suit girls' needs and preferences.

# Motivational and community approach to physical activity in oncology: creation of a digital platform for patients, professionals and sport partners

**Mr. Rodolf Mongondry<sup>1</sup>, Mrs. Olivia Perol<sup>1</sup>, Mrs. Solène Poirey<sup>1</sup>**

<sup>1</sup>Centre Léon Bérard, Lyon, France

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** The Centre Léon Bérard (CLB), a member of the UNICANCER federation, has created a digital platform dedicated to Adapted Physical Activity (APA), with the main objective of facilitating the follow-up of patients throughout their care and putting them in touch with other patients and the establishment's sports partners in order to develop a community and motivational approach to physical activity.

**Methods:** To carry out this project, we set up three groups of users of the future platform: patients, CLB professionals and sports partners.

We then carried out brainstorming sessions with each group to gather their expectations and needs with regard to the platform. Then, two scoping workshops were set up with digital health experts, motivation experts and representatives of each user group to prioritise the needs.

- → Patients: to have a better visibility on their APA programme, to carry out exercises in autonomy (videos, games, challenges, ...) and to be able to interact with each other, with CLB professionals and partners
- → CLB professionals: develop a tool to facilitate the follow-up and personalisation of the patient's APA programme
- → Partners: to facilitate the transition from hospital to city in the management of the patient, with better communication with CLB professionals and to be more visible to patients

## **Results:**

The launch of the platform is planned for January 2023.

- → Patients will have more resources to be actors of their APA pathway and they will also have the possibility to exchange with their peers according to their needs.
- → For CLB professionals, this tool will facilitate the coordination of the patient's pathway. It will also be a way to encourage patients to practice.
- → Partnerships will be more visible to patients and will have access to patients' previous activity data

The platform will improve the follow-up of patients over time, with a patient file fed directly by the patient and by external partners.

This platform is supported by the Ministry of Health and Sports and will be used by the 17 other UNICANCER establishments.

**Conclusions:** This was developed with an inclusive approach, involving the different users, and opens a new era of digital support in cancer care.

# physical activity patterns and sedentary time in primary schools situated in a low socio-economic status neighborhood in Amsterdam – The Netherlands.

**Dr. Joske Nauta**, Mrs. Mandy Schweitzer, Mrs. Ilse Kat, Mrs. Kirsten Moll, Mr. Kick Koenders, Dr. Mirka Janssen

<sup>1</sup>Amsterdam University of Applied Sciences, Amsterdam, Netherlands

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** In Amsterdam – the Netherlands – we know that children living in low-income households have a lower health status and report lower physical activity levels than their peers in middle- or high-income households. Seven primary schools located in neighborhoods with a low social-economic status are currently developing their own active school using the 'Creating Active Schools Framework'.

This study was conducted to assess the current physical activity and sedentary behavior patterns during and after school of the pupils in these seven primary schools.

**Methods:** In this cross-sectional study, we collect data in seven schools located within an Amsterdam neighborhood with a low social economic status score. Within each school, 4 classes are eligible for participation. Children wear an accelerometer from Monday morning until Friday afternoon to assess physical activity levels. Parents of participating children are asked to complete a questionnaire on baseline characteristics, wellbeing and out of school physical activity behaviors. The mean sedentary time (ST), low physical activity (LPA) time and Moderate to Vigorous physical activity (MVPA) time will be calculated. The association between the outcomes of the accelerometer data and gender and health related outcomes reported by parents will be assessed.

**Results:** The data will be collected between March and May 2023. We will present the average LPA and MVPA during and after school time. The duration of the ST bouts during and after schooltime. And associations between ST, LPA and MVPA and gender and health related outcomes.

**Conclusions:** The results of this study will be used to support local school teams in the development and implementation of local action plans towards a school day that involves less sitting and more physical activity.

# Design and development of a digital mHealth service to support the prevention of overweight and obesity in the first 2000 days.

**Dr. Rachel Sutherland**<sup>1,2,3,4</sup>, Mrs. Nayerra Hudson<sup>2</sup>, Mrs. Tessa Delaney<sup>1,2</sup>, Mrs. Jessica Pinfold<sup>2</sup>, Mrs. Lynda Davies<sup>2</sup>, Mr. Daniel Groombridge<sup>2</sup>, Prof. Luke Wolfenden<sup>1,2,3,4</sup>, Prof. John Wiggers<sup>1,2,3,4</sup>, Dr. Paul Craven<sup>2</sup>, Mrs. Sinead Redman<sup>2</sup>

<sup>1</sup>University Of Newcastle, Newcastle, Australia, <sup>2</sup>Hunter New England Population Health, Newcastle, Australia,

<sup>3</sup>National Centre for Implementation Science, Newcastle, Australia, <sup>4</sup>Hunter Medical Research Institute, Newcastle, Australia

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Universal provision of preventive health services for families is a key to optimise health outcomes and prevent the onset of overweight and obesity in the first 2000 days of a child life. Whilst services such as Child and Family Health Nursing Services (CFHNS) are available to support young children's development, ongoing engagement with face-to-face services declines significantly over time. Interventions delivered direct to parent/carer mobile phones (mHealth) presents a significant opportunity to supplement usual face-to-face care and revolutionise delivery of health care at a population level. Despite this, there are currently no mHealth interventions targeting child health and development covering the first 2000 days, implemented as part of routine care in Australia. This presentation outlines the development of an mHealth initiative being delivered universally to parents/carers to support the prevention of overweight and obesity across the first 2000 days. Phase 1 seeks to evaluate the acceptability, feasibility, appropriateness and cost of a highly scalable mHealth service from the perspective of clinicians and parents/carers when delivered as a service embedded within a health organisation.

**Methods:** Designed using the COM-B model of behaviour change, an mHealth (text-message) service has been co-designed by a multidisciplinary team to support parents/carers to make informed health choices aligned to age and stage milestones and consistent with best practice and policy guidelines. The intervention currently supports sustained breastfeeding, introduction of solids, sleep behaviours, developmental and immunization reminders and maternal wellbeing (0-6month phase).

**Results:** Commencing in 2021 as a pilot in five CFHNS the program has been delivered to ~2000 families, capturing 96% of parents/carers of newborn infants. Semi-structured interviews (clinicians) and cross-sectional phone surveys (parents/carers) are in progress to evaluate implementation. Preliminary data indicates high acceptability from a clinician and parent perspective

**Conclusions:** Following formal evaluation the service will be scaled-up at a regional level and expanded to address multiple key health and development outcomes to prevent overweight and obesity from birth to 5 years, with significant potential to tailor content and support screening/early intervention via the mHealth service.



# Perceived barriers and enablers to physical activity behaviour in overweight and obese adolescents: a qualitative analysis informed by the Theoretical Domains Framework and COM-B model

**Dr. Puteri Shanaz Jahn Kassim**<sup>1</sup>, Associate Professor Noor Azimah Muhammad<sup>2</sup>, Prof. Sherina Mohd Sidik<sup>1</sup>, Prof. Cecilia Essau<sup>3</sup>, Prof. Shamsul Azhar Shah<sup>2</sup>

<sup>1</sup>Universiti Putra Malaysia, Serdang, Malaysia, <sup>2</sup>Universiti Kebangsaan Malaysia, Cheras, Malaysia, <sup>3</sup>University of Roehampton, London, United Kingdom

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Obesity in adolescence is associated with increased risk of obesity in adulthood and many other adverse health consequences. Physical activity is a modifiable lifestyle behaviour towards prevention of these complications. However, many overweight and obese adolescents are physically inactive due to various personal, social and environmental factors. While there are numerous interventions targeting physical activity in adolescents, few were grounded by underlying behavioural change mechanisms which could determine their effectiveness. Behavioural tools such as the Theoretical Domains Framework (TDF) and COM-B model have been used to understand behaviours for intervention development in order to increase its effectiveness. This study aimed to identify perceived barriers and enablers to physical activity in overweight and obese adolescents using these behaviour change strategies.

**Methods:** Semi-structured interviews were conducted with a purposive sample of thirteen overweight and obese adolescents recruited through social media platforms. Interviews were recorded and transcribed into Atlas.Ti software. Thematic analysis and framework approach were used for data analysis, in which the key themes identified were deductively mapped to the TDF domains and the COM-B constructs.

**Results:** Ten out of fourteen domains of the TDF were found to influence physical activity behaviour in overweight and obese adolescents. Within these domains, important barriers to engage in physical activity behaviour were lack of energy due to excess weight, perceived lack of competence in physical activity, competing interests such as preoccupation with digital devices, lack of family and peer support, lack of motivation to be physically active and environmental influences which limits their participation in physical activity. Important factors reported to enable engagement with physical activity behaviours were having social opportunity to engage in physical activity, enjoyment towards physical activity, having goals and motivation to be physically active and prioritizing time for exercise.

**Conclusion:** Overweight and obese adolescent's capability, motivation and opportunity to engage in physical activity were influenced by a wide range of barriers and enablers, with "social influences" being the most often reported barrier. This study provides a theoretical evidence base towards informing the development of a theory-informed behaviour change intervention to improve physical activity levels among overweight and obese adolescents.

# Applying an Implementation Science Lens to a Women's, Infant, & Children (WIC) Feeding Program Telehealth Intervention: Early Phase Implementation Insights

Mr. Daniel Schultz, MS, RD<sup>1</sup>, Assistant Professor Lauren Au, PhD, RDN<sup>2</sup>, Associate Professor Lisa Gualtieri, PhD, ScM<sup>4</sup>, Prof. Elizabeth Anne Krupinski, PhD, FSIIM, FATA, FSPIE, FAIMBE<sup>3</sup>, Mrs. Danielle Louder, BS<sup>5</sup>, **Assistant Professor Erin Hennessy, PhD, MPH<sup>1</sup>**

<sup>1</sup>Tufts University Friedman School of Nutrition Science and Policy, Boston, USA, <sup>2</sup>University of California, Davis, Davis, USA, <sup>3</sup>Emory University, Atlanta, USA, <sup>4</sup>Tufts University School of Medicine, Boston, USA,

<sup>5</sup>Northeast Telehealth Resource Center, Augusta, USA

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** The implementation science field continues to advance; however, limited research has utilized implementation science frameworks to assess Special Supplemental Nutrition Program for Women, Infants, and Children Feeding Program (WIC) interventions. The USDA/Tufts Telehealth Intervention Strategies for WIC (THIS-WIC) applied implementation science frameworks to a collaborative evaluation of seven WIC State Agencies implementing public health telehealth interventions in the U.S.

**Methods:** THIS-WIC worked collaboratively with participating State Agencies to adapt current implementation science frameworks to the WIC program context. Frameworks leveraged included the Consolidated Framework for Implementation Research (CFIR), Expert Recommendation for Implementation Research (ERIC), and Reach, Effectiveness, Adoption, Implementation, and Maintenance (RE-AIM). During the project startup period, seven WIC State Agencies completed an implementation strategies menu tool that provided 46 different implementation strategies from ERIC. WIC State Agencies indicated which, if any, of these 46 strategies they already implemented, planned to implement, did not intend to implement, or needed further discussion with the project team. Each State Agency also created an implementation tracking tool to assess progress by local agency directors and staff.

**Results:** Common ERIC implementation strategies across the seven State Agencies included assessing readiness and identifying barriers and facilitators, conducting local needs assessments, and identifying and preparing champions. During the early phase of the project, common implementation barriers involved low uptake of innovation use, competing priorities for telehealth implementation, and technology-related challenges. Implementation strategies recommended to address barriers included default use of innovation, capturing and sharing local knowledge, and 'reducing friction' to access the telehealth solution to support utilization.

**Conclusions:** The THIS-WIC project adds to the limited implementation science literature in the context of the WIC program. Findings from the early phase of the project can inform WIC and similar maternal and child nutrition programs about potential telehealth implementation barriers and recommend implementation strategies to address these obstacles.

# Associations between functional nutrition knowledge and dietary intake in youth from six countries: findings from the International Food Policy Study

**Ms. Liza Boyar (corresponding author)<sup>1</sup>**, Ms. Christine White<sup>1</sup>, Dr. Lana Vanderlee<sup>2</sup>, Dr. Jasmin Bhawra<sup>3</sup>, Dr. David Hammond<sup>1</sup>

<sup>1</sup>University of Waterloo, Waterloo, Canada, <sup>2</sup>Université Laval, Quebec, Canada, <sup>3</sup>Toronto Metropolitan University, Toronto, Canada

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Greater nutrition knowledge is associated with healthier dietary intake. Yet, few studies have employed objective measures of nutrition knowledge to understand patterns among youth, including little cross-country comparisons. Using a simple, functional measure of nutrition knowledge based on level of food processing, this study investigated associations between objective and self-reported measures of nutrition knowledge and indicators of dietary intake among youth in six countries.

**Methods:** National surveys were conducted in 2020 with 12,489 youth aged 10-17 in Canada, Australia, United Kingdom, United States (US), Mexico, and Chile. Participants were shown two products in random order, corresponding to “minimally processed” (apple) and “ultra-processed” (apple-flavoured fruit drink) foods under NOVA classification system, and asked to rate the healthiness of each. Respondents who rated the apple higher than the fruit drink were assigned a “correct” score. Binary regression models examined differences in “correct” responses between countries, and associations with perceived nutrition knowledge, perceived diet healthiness, fruit/vegetable and less healthy (e.g., sugary cereal) food intake.

**Results:** Mexican (96.5%) and Chilean (94.3%) youth were most likely to correctly identify minimally processed food items as “healthier”; whereas correct responses were lower among US (79.6%) youth compared to all other countries ( $p < .001$  for all contrasts). Differences in correct responses were also observed by sex, income adequacy, and BMI ( $p < 0.01$ ). Across countries, perceived nutrition knowledge was inversely associated with correct scores ( $F 83.10$ ,  $p < 0.001$ ). Similarly, respondents at the highest (AOR 0.43  $p < 0.001$ ) and lowest (AOR 0.57  $p < 0.05$ ) ends of perceived diet healthiness had lower odds of obtaining correct scores than those in the middle. Higher intake of less healthy foods (AOR 0.70,  $p < 0.001$ ) and fruits/vegetables (AOR 0.87  $p < 0.001$ ) were likewise associated with lower odds of correct scores.

**Conclusions:** In a simple, functional test, substantial proportions of youth were unable to identify a minimally processed apple as healthier than an ultra-processed apple drink, with notable differences across countries and sociodemographic groups. The observed dissonance between perceived and objective measures highlights the poor reliability of self-reported nutrition knowledge, warranting further refinement of simple objective measures to investigate the complex interplay of nutrition knowledge and dietary behavior.

# Sport participation and accelerometer-measured 24-h movement behaviours among children of rural Northeastern Ontario

**Dr. Bruno da Costa<sup>1</sup>**, Dr. Brenda Bruner<sup>1</sup>, Dr. Graydon Raymer<sup>1</sup>, Dr. Barbi Law<sup>1</sup>  
<sup>1</sup>School of Physical and Health Education, Nipissing University, North Bay, Canada

Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** G. Children and families

**Purpose:** When children engage in adequate levels of physical activity (PA) and limit sedentary behaviour (SED), they are likely to experience many health-enhancing benefits. Sports can promote higher levels of PA and can displace SED, promote positive youth development and other social and psychological benefits, while also being fun for children. Children can play sport at different levels, with higher competitive levels being associated with higher training loads and expectations of performance, yet, it is unclear if sport level is associated with higher PA levels and lower SED levels. We explored the associations between the level of sport engagement and accelerometer-measured PA and SED of children from Northeastern Ontario.

**Methods:** 169 students (50.9% male,  $M_{age} = 9.25$  years old) wore GENEActiv accelerometers for 7 days on their non-dominant wrist. They reported the level of sport they engaged in (parent-reported for children in Grade 5 or younger). SED, moderate and vigorous PA (MVPA), and sleep duration were estimated using GGIR. Associations were tested with linear regressions.

**Results:** Participants engaged, on average,  $77.8 \pm 30.6$  min/day in MVPA,  $216.0 \pm 42.0$  min/day in LPA, and  $602.0 \pm 83.8$  min/day in SED. 16.6% reported not participating in sports, 43.8% participated in school intramurals or recreational sports, 11.2% were part of schools sport team, and 16.6% were part of provincial or club competitive teams, with 11.8% reporting engaging in other non-sport PA. Being on a school sports team ( $\beta = 25.4$ , 95%CI 9.0; 41.8) and school intramurals or recreational sports ( $\beta = 15.0$ , 95%CI 2.6; 27.4) was associated with higher MVPA and lower SED ( $\beta = -66.6$ , 95%CI -104.1; -29.2; and  $\beta = -38.5$ , 95%CI -67.0; -10.1, respectively) compared to not engaging in sports. LPA was higher among those who participated in school intramurals or recreational sports, participated on schools sports team, and those in provincial or club competitive levels compared to not engaging in sports.

**Conclusions:** Sports are an important way to promote PA and limit SED among children. Even at a recreational level, the levels of MVPA are as high as more competitive sports levels.

# 'Fear of raising the problem without a solution': why conversations and support for physical activity may not be routinely integrated into cancer care

**Dr. Kajal Gokal<sup>1</sup>**, Dr. Claire Madigan<sup>1</sup>, Prof. Amanda J Daley<sup>1</sup>

<sup>1</sup>Loughborough University, Leicestershire, United Kingdom

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** C. Cancer prevention and management

**Purpose:** The benefits of physical activity across the cancer continuum for many adult cancers are well established. Previous advice for patients to rest during cancer treatment is now redundant and physical activity during and after treatment has been endorsed by the World Health Organisation. However, physical activity is yet to be routinely implemented into cancer care in many health services around the world. This study explored patients' and healthcare professionals' views about integrating conversations and support for physical activity into routine care during treatment for cancer.

**Methods:** Using semi-structured interviews this study explored the perceptions and practicalities of integrating the routine promotion of physical activity by healthcare professionals within cancer care. Healthcare professionals including oncologists, surgeons and cancer nurses, and patients living with or beyond breast cancer, were invited to take part in online interviews. Snowballing sampling methods were used to recruit both healthcare professionals and patients across the UK. The study was advertised via social media, cancer support groups and newsletters. Data were analysed using inductive thematic analysis.

**Findings:** Four themes captured current practice, perspectives and barriers to integrating conversations and support for physical activity among 12 health care professionals and 15 patients. These were: (1) healthcare professionals feared discussing physical inactivity with all patients without having evidence based resources and knowledge for a solution to the problem; (2) physical activity is only discussed if physically active patients are seeking approval to continue; (3) healthcare professionals and patients had concerns regarding the logistics and practicalities of attending in-person physical activity sessions during cancer treatment; (4) physical activity was perceived as a lifestyle change, rather than having an impact on cancer treatment related outcomes and the potential to reduce risk of recurrence.

**Conclusion:** Many healthcare professionals who offer cancer care are reluctant to raise the topic of participation in physical activity with their patients. Providing healthcare professionals with education regarding the ability of physical activity to reduce the risk of recurrence, along with evidence based, low-cost, remote interventions would allow them to more readily integrate conversations about physical activity within routine cancer care for all patients.

# Exploring Social Media Preferences for Healthy Weight Management Interventions among Adolescents of Color: A Mixed-Methods Pilot Study

Ms. Selenne Alatorre<sup>1</sup>, Ms. Aviva Schwarz<sup>1</sup>, Dr. Kelsey Egan<sup>2</sup>, Ms. Amanda Feldman<sup>1</sup>, **Dr. Monica Wang<sup>1,3</sup>**

<sup>1</sup>Boston University School of Public Health, Boston, USA, <sup>2</sup>Boston University School of Medicine, Boston, USA,

<sup>3</sup>Boston University Center for Antiracist Research, Boston, USA

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Social media holds promise as an intervention platform to engage youth in healthy weight management and target racial inequities in obesity. This pilot study aimed to examine social media habits, preferences, and obesity-related behaviors (e.g., diet, physical) among adolescents of color and identify their preferences for a healthy weight management intervention delivered via social media.

**Methods:** This mixed-methods pilot study comprised of a cross-sectional online survey and a series of virtual focus groups. Study participants (English-speaking youth of color ages 14-18 years) were recruited from high schools and youth-based community settings in Massachusetts and California. For surveys, participants were invited to complete an anonymous online survey assessing self-reported sociodemographics, social media habits and preferences, health behaviors (diet, physical activity, sleep, and screen time), and height and weight. For focus groups, participants were invited to participate in 45-60 minute virtual group discussions assessing social media habits, preferred social media platform, and preferences for physical activity and nutrition intervention content and delivery. Survey data were analyzed descriptively; focus group transcripts were analyzed using a directed content analysis approach.

**Results:** A total of 101 adolescents completed the survey and N=20 adolescents participated in a total of 3 focus groups. Participants reported most frequently using TikTok, followed by Instagram, Snapchat, and Twitter; preference for platform varied by purpose of use (e.g., content consumption, connection, or communication). TikTok emerged as the platform of choice as an engaging way to learn about various topics, including desired health information on physical fitness and diet.

**Conclusions:** Findings from this pilot study suggest that social media platforms can be an engaging way to reach adolescents of color. Data will inform future social media-based interventions to engage adolescents of color in healthy weight management content and test intervention efficacy.



# A six-month mHealth behavior change program increases physical activity and fruit intake, and improves sleep in adults over the age of 18 years

**Associate Prof. Jamie Baum<sup>1</sup>**, Associate Professor Erin Howie Hickey<sup>2</sup>

<sup>1</sup>Center for Human Nutrition, University of Arkansas System Division of Agriculture, Fayetteville, USA,

<sup>2</sup>University of Arkansas, Fayetteville, USA

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** The objective of this study was to determine the effectiveness of a 6-month mHealth behavior change program on healthy diet, physical activity, and sleep in adults over 18 years of age.

**Methods:** This was a Quasi-experimental, repeated measures, mHealth study conducted over six months. All adults over the age of 18 years were eligible to participate. Key components of the study included: 1) direct access to experts in nutrition and exercise sciences, 2) a focus on physical activity and behavior change, 3) personalization to the individual/community, 4) social support through virtual interactions and weekly challenges, and 5) multimedia format to increase accessibility and usability of information. The program was based on Self-Determination Theory (SDT), goal setting theory and the socioecological model. All participants completed an online survey at baseline, 3 and 6 months. The questionnaire was administered via Qualtrics and included previously validated questionnaires on diet (adapted FFQ), physical activity (iPAQ), and sleep (PSQI). To assess the change in behaviors mixed models to account for multiple assessments within individuals were used.

**Results:** 60 people signed up to participate and 21 completed the full study (age  $44.3 \pm 15.8$ ; Sex (F) 17 (81%); BMI  $30 \pm 7.2$ ; number of preexisting health conditions  $2.5 \pm 1.9$ ). Of those completing the full study, 20 participants reported they were ready to make changes in eating and physical activity behaviors at the start of the study. Participants completing the study increased self-reported physical activity (total metmin/week) from  $4,479.4 \pm 1,669.4$  at baseline to  $6,394.6 \pm 2,590.6$  at 6 months, although not significant ( $p=0.680$ ). Fruit intake (servings/day) increased from baseline ( $0.24 \pm 0.09$ ) to 6 months ( $0.57 \pm 0.11$ ;  $p<0.05$ ). However, there was no change in vegetable and junk food intake. Self-reported sleep also improved from baseline ( $5.8 \pm 0.7$ ) to 6 months ( $4.4 \pm 0.7$ ;  $p<0.05$ ) with higher scores indicating poorer sleep quality.

**Conclusions:** Multi-media mHealth programs have potential to change behavior to improve dietary patterns, physical activity, and sleep. Additional research is needed to ensure engagement of participants in long-term behavior change programs. Future research will focus on healthy habits throughout the lifespan.

# Barriers and facilitators of physical activity maintenance: As perceived by adolescents

**Mr. Timothy Houtman**<sup>1</sup>, Assistant Professor Amy Van Grieken<sup>2</sup>, Associate Professor Froukje Sleswijk Visser<sup>1</sup>, Associate Professor Valentijn Visch<sup>1</sup>

<sup>1</sup>Delft University of Technology, Delft, Netherlands, <sup>2</sup>Erasmus Medical Centre, Rotterdam, Netherlands

Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Interventions to increase physical activity (PA) in adolescence face major challenges. In addition to the difficulty of influencing PA behavior of adolescents due to increasing autonomy, PA behavior is often not maintained for a long period of time. The aim of this study is to understand the variation and dynamics of lived experiences of adolescents around the barriers and facilitators of maintained PA. This study is a first step in moving beyond one-size-fits-all interventions towards more tailored approaches.

**Methods:** Thirty high school students, aged 14 – 18, were recruited for interviews in Rotterdam, The Netherlands. Based on Q methodology, participants were asked to sort and rank two decks of cards according to personal relevance for a physical activity that they had maintained for longer. Each deck represented barriers or facilitators of adolescent PA behavior, based on previous interviews and systematic reviews. After ranking the items, participants were interviewed about how the items had changed and influenced their PA behavior over time. Next to thematic analysis of the interviews, the ranked items were analyzed using inverted factor analysis to explore the barriers and facilitator clusters.

**Results:** Our preliminary results show that adolescents have common and divergent barriers and facilitators to maintain their PA behaviors. For example, 'having fun', 'being able to be yourself' are recurring facilitators, while life factors such as 'other responsibilities', 'having too many things on my mind' were recurring barriers in the sample. Using inverted factor analysis, we also explore the variety of barriers and facilitators of PA by identifying clusters of barriers and facilitators of adolescents who share similarities. The initial results suggest that the barrier and facilitator clusters are distinct and focus on different domains such as performance, social environment, personal development, and health reasons.

**Conclusions:** The initial findings suggest that some facilitators and barriers for maintaining PA are more universal between adolescents, but others are only relevant to specific groups. The results of this study will be used to design a tailored PA intervention for adolescents. Data analysis is ongoing and the final results will be presented during the event.

# Examining Associations Between Facilitating Health Beliefs, Meeting Vegetable Consumption Guidelines, and Continued Program Participation among Participants in a Produce Prescription Program at a Multi-Site Federally Qualified Health Center in Waco, TX

**Assistant Professor Kathryn Janda**<sup>1</sup>, Ms. Wendy Cox<sup>2</sup>, Dr. Burritt Hess<sup>2</sup>, Dr. Matt Rafalski<sup>2</sup>, Dr. John Gill<sup>2</sup>, Ms. Katie Walter<sup>3</sup>, Ms. Catherine Kaliszewski<sup>1</sup>, Associate Professor Kelly Ylitalo<sup>1</sup>  
<sup>1</sup>Baylor University, Waco, USA, <sup>2</sup>Waco Family Medicine, Waco, USA, <sup>3</sup>World Hunger Farm, Waco, USA

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** There has been strong theory-driven and empirical literature demonstrating the association between facilitating health beliefs and vegetable consumption. However, these associations have been rarely explored simultaneously with program participation in interventions such as produce prescription programs. The purpose of this study was to examine if theory-informed facilitating health beliefs were associated with meeting vegetable consumption recommendations and/or continued program participation in a produce prescription program.

**Methods:** This study was a cross-sectional data analysis of baseline survey and refill data among participants in a produce prescription program at a federally qualified health center in Waco, Texas in 2019 (n=1,679). The baseline survey included seven questions regarding facilitating health beliefs (informed by the Theory of Planned Behavior) of vegetable consumption that were averaged to develop a composite measure. Vegetable consumption was self-reported, and a binary variable was created for meeting United States dietary guideline recommendations. Age, language, and whether the participant obtained refills were also collected. Summary statistics and logistic regression models were used to examine the associations between: 1) facilitating health beliefs and meeting vegetable consumption guidelines; 2) facilitating health beliefs, meeting vegetable consumption guidelines, and obtaining a refill.

**Results:** Participants were, on average, aged 49.66 years (S.D.=19.32), predominantly only English speaking (89.34%), 28.53% met vegetable consumption guidelines, and 11.20% obtained a refill. Individuals with high facilitating health beliefs had greater odds of meeting vegetable consumption guidelines at baseline (aOR:1.43, CI:1.21-1.69,  $p<0.001$ ). Participants who met vegetable consumption guidelines had greater odds of obtaining a refill (aOR:1.85, CI:1.34-2.54,  $p<0.001$ ) than those who did not meet vegetable consumption guidelines. There was no statistically significant association between facilitating health beliefs at baseline and obtaining a refill. Additionally, participants who spoke a language other than English had an indirect association with meeting vegetable consumption guidelines (aOR:0.55, CI:0.37-0.81,  $p=0.003$ ), but a direct association with obtaining a refill (aOR:1.79, CI:1.16-2.77,  $p=0.009$ ) when compared to solely English-speaking participants.

**Conclusions:** This study highlights that dietary interventions, such as produce prescription programs, should be mindful of theory-informed facilitating health beliefs as potential antecedents for nutritional behaviors of interest and sustained program participation.

# Adolescents with ADHD and their encounters with food, meals and physical activity – a qualitative photo-elicitation interview study

**Miss Aleksandra Oravsky Sandström**<sup>1</sup>, Dr. Karin Grahn<sup>1</sup>, Associate Professor Andreas Fröberg<sup>1</sup>, Prof. Christel Larsson<sup>1</sup>

<sup>1</sup>Department of Food and Nutrition, and Sport Science, University of Gothenburg, Gothenburg, Sweden

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Previous studies suggest that adolescents with ADHD may have unhealthy food habits and that they engage in insufficient physical activity. The thoughts and experiences of adolescents with ADHD are of great importance in search of knowledge essential for promotion of healthy lifestyle habits, but their perspectives are absent from the scientific literature. The aim is to explore how adolescents with ADHD experience their daily encounters with food, meals and physical activity, and to identify challenges and positive aspects related to these areas.

**Method:** A purposeful sample of 10 adolescents aged 11-15 with ADHD in Sweden participated in an exploratory, child-centred, photo-elicitation interview study. Participants provided photographs of their encounters with food, meals and physical activity for two days which were used subsequently in 45 minute-interview sessions to facilitate their communication. A background questionnaire completed by the adolescent's caregiver, provided a descriptive layer of information on food, meals and physical activity in the adolescents' daily lives.

The analysis was two-levelled and focused on positive aspects and challenges on intrapersonal, interpersonal, institutional, community and public policy levels. Each interview was regarded as a case of its own on which a within-case analysis was performed separately to allow an in-depth exploration. Thereafter, a joint-case analysis followed where patterns were searched for between the different cases, to identify which experiences cases have in common, as well as what attributes are unique. A qualitative thematic analysis was used to generate themes and patterns within the data, and the socio-ecological model was applied as the guiding framework.

**(Anticipated) Results:** The presentation will focus on the perspectives of the adolescents and their everyday encounters with food, meals and physical activity. Specifically, positive experiences and challenges will be presented. We exemplify how adolescents' experiences of food, meals and physical activity are influenced by many diverse factors and there for suggest that a comprehensive approach is suitable from a health promotion perspective.

**Conclusions:** Drawing on the result of this study, the perspectives of adolescents with ADHD on daily encounters with food, meals and physical activity can help to better inform meaningful health promoting strategies on multiple levels.

# To capture the child's interest- Nurses experiences of Saga Stories in health talks

Ms. Camilla Collan<sup>1</sup>, Ms. Lina Dahl<sup>1</sup>, Dr. Maria Henström<sup>2</sup>, Associate Professor Christine Delisle Nyström<sup>2</sup>, Prof. Marie Löff<sup>2</sup>, **Assistant Professor Susanne Andermo<sup>1,3</sup>**

<sup>1</sup>Department of Neurobiology, Care Sciences and Society, Division of Nursing, Karolinska Institutet, Huddinge, Sweden, <sup>2</sup>Department of Biosciences and Nutrition, Karolinska Institutet, Huddinge, Sweden,

<sup>3</sup>Department of Physical Activity and Health, The Swedish School of Sport and Health Sciences, Stockholm, Sweden

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** As unhealthy lifestyle habits have been found to be established early in life and often track into adulthood, early preventive initiatives are important. Saga Stories is a newly developed material that is intended to be used as a support for nurses at child health care (CHC) centers in their health conversations with children and parents. The aim of this pilot study is to explore how CHC nurses experience the usability of the 'Saga Stories in health talks' material.

**Methods:** This study used a qualitative design. The material Saga Stories in health talks was pilot- tested by 33 nurses working in 11 centers in three regions in Sweden. All nurses were invited to participate in the interviews and 17 agreed. The interviews were transcribed and analysed using content analysis.

**Results:** Three themes and eight sub-themes emerged. The themes were: 1) A focus on healthy living habits directed to children and their families, 2) The health conversations: to capture the child's interest and involve the parents and 3) Challenging structures. Saga Stories was experienced by the nurses as a relevant and sought-after initiative by the nurses, since it had a focus on healthy lifestyle habits. The nurses described the material as well- designed as it helped them to capture the child's interest and increase children's participation in the health talks. In the health talks, the nurses intended to capture the child's interest and involve the parents. Support from colleagues, the researchers, and managers were seen as important facilitators. Challenges included structural factors such as how and when to best use the material, especially concerning that the 4-year visit contained many other mandatory parts.

**Conclusions:** This pilot-study highlights how the material Saga Stories facilitated the health talks with families in CHC with a focus on the children's participation. To use the material at the 5- year routine visit could be as a better option to overcome some identified challenges.

# Physical activity profiles from pre-COVID-19 through the pandemic and their correlates among older adults in Finland

**Dr. Kirsi E. Keskinen**<sup>1,2</sup>, Dr. Katja Pynnönen<sup>1</sup>, Ms. Katja Lindeman<sup>1</sup>, Ms. Essi-Mari Tuomola<sup>1</sup>, Prof. Taina Rantanen<sup>1</sup>, Associate Professor Erja Portegijs<sup>3</sup>

<sup>1</sup>Faculty of Sport and Health Sciences and Gerontology Research Center, University of Jyväskylä, Jyväskylä, Finland, <sup>2</sup>School of Resource Wisdom, University of Jyväskylä, Jyväskylä, Finland, <sup>3</sup>Center for Human Movement Sciences, University Medical Center Groningen, University of Groningen, Groningen, Netherlands

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** The aim is to define developmental physical activity (PA) profiles and their correlates in older adults from pre-COVID-19 through the pandemic. The research questions are: 1) What kind of PA profiles exist, and 2) which individual and environmental characteristics relate to PA profiles? No previous reports on these exist.

**Methods:** Participants were from population-based sample of 75, 80, and 85-year-old community-dwelling people (n=773, mean 78.6 years, 58% women) living in a medium-sized city in Finland. Time in vigorous physical activity (VPA) [min/day] and leisure walking (LW) [min/day] were calculated from self-report Yale Physical Activity Survey pre-COVID-19 (2017-2018), during the Emergency Powers Act (EPA) at-COVID-19 (05-06/2020), and after the EPA (2021-2022). Pre-COVID-19 individual characteristics were collected from registers (age, sex), interviews (number of diseases, depression symptoms (CES-D)) and measurements (lower extremity performance (SPPB)). Environmental characteristics were defined at home location (urban area type (walking/public transport/car-dependent)) or within 1000 meters (residential density) using geospatial datasets. Latent profile analysis generated PA profiles based on combination of VPA and LW in the three successive time-points. Equality of means or probability of categories in the correlates pre-COVID-19 were tested across PA profiles using the modified Bolck-Croon-Hagenaars approach.

**Results:** We found five distinctive PA profiles covering the time-period from pre-COVID-19 through the pandemic: P1 sedentary (46% of participants), P2 walker (9%), P3 moderately active (24%), P4 exerciser (9%), and P5 active (12%) people. PA profiles P3,P4,P5 had a peak value in VPA and P2,P3,P5 in LW during the EPA at-COVID-19. PA profiles with middle/high VPA (P3,P4,P5) had fewer depression symptoms than profiles with low VPA (P1,P2) (overall  $p < .001$ ). SPPB scores were the highest with high VPA (P4,P5) and the lowest in P1 (overall  $p < .001$ ) with more diseases (overall  $p < .001$ ). Of participants with low VPA profiles (P1,P2), P2 (high LW) lived in higher residential density, more walkable, and less car-dependent areas than P1 (low LW) (both  $p < .05$ ).

**Conclusions:** During the EPA at-COVID-19 in Finland, older adults with higher physical capability and fewer depression symptoms reported temporarily higher VPA. Older adults with poorer physical capability accumulated more LW when living in area with more walking supportive infrastructure.



# Food access and dietary quality of low-middle income Chilean children during COVID-19 pandemic. ¿Relevance of personal food environments?

**Ms. Isabel Pemjean<sup>1</sup>**, Dr. Camila Corvalán<sup>1</sup>, Dr. Fernanda Mediano<sup>1</sup>

<sup>1</sup>Universidad de Chile, Santiago, Chile

Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** G. Children and families

**Purpose:** We studied the association between external food access and intake quality of middle and low-income children living in similar external food environments in Santiago during the Covid-19 lockdown and how characteristics of their domestic environment affected this relationship. To better understand relations between diet quality and food access, we must consider how people experience their food environments. Could intra-household dynamics (food management, gender and time) be affecting these relationships?

**Methods:** This was a longitudinal study. 999 households from two longitudinal cohorts participated in online surveys during two periods of the Covid-19 pandemic. External food access profiles were developed by Latent Class Analysis. Their domestic environments were characterized by logistical multinomial regressions with food management and routine modifications (produced by Covid-19) variables. The association of food access profiles with children's intake was estimated using logistic and linear regressions adjusted by children's sex and age. These models were adjusted by significant food management and routine modification variables to assess a possible effect of the domestic environment on these relationships. The effects of the crude and adjusted regressions were compared.

**Results:** We identified three external food access profiles: Classic, Multiple, and Supermarket. Compare with the Classic profile, the Multiple profile gathered female heads household's (RRR=1.51; p:0.058) and the Supermarket profile higher income household's (RRR=12.30; p: 0.001) and concentrated the diet protective variables from the domestic environment. The profile's routines were impacted by the Covid-19 lockdown. Children presented poor diet quality (high daily UPFs consumption (mean=4.4), and low compliance with national DGA recommendations (mean=1.2)). The food access profiles were poorly associated with children's diet quality (only to the Supermarket profile compared to the Classic profile, for fish consumption (OR=1.77; p:0.048), and marginally with the overall compliance of DGA (coef.=0.17; p:0.109)). When adjusting the regressions by the routine modification variables we observed that in the Supermarket profile the likelihood of compliance with the DGA increased (overall: coef.=0.22; p:0.049 and fish: OR=1.96; p:0.024).

**Conclusions:** The external food environment cannot explain the quality of children's diets. To better understand barriers to healthy eating, we must consider intra-household behaviors, particularly addressing time issues from a gender perspective.

# Identifying latent classes of physical activity behaviours over time among adolescents in Canada

**Ms. Claire Buchan**<sup>1</sup>, Dr. Sarah Richmond<sup>2,3</sup>, Dr. Kelly Skinner<sup>1</sup>, Dr. Scott Leatherdale<sup>1</sup>

<sup>1</sup>School of Public Health Sciences, University of Waterloo, Waterloo, Canada, <sup>2</sup>Dalla Lana School of Public Health, University of Toronto, Toronto, Canada, <sup>3</sup>Public Health Ontario, Toronto, Canada

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** High school physical education (PE) in Canada, is optional after grade 9, however little research has examined how PE participation impacts physical activity behaviours over time. This study aimed to identify the patterns of physical activity behaviours among high school aged youth in Canada.

**Methods:** Using data from the COMPASS Study, a school-based prospective cohort study of adolescents in Canada, Ontario youth who participated in grade 9 PE in 2015-16 were analysed through to 2018-19 ( $n = 1,917$ ) using a repeated measures latent class analysis. Physical activity behaviours which defined the latent classes included PE participation, guideline adherence ( $\geq 60$  minutes/day of moderate to vigorous activity over the last 7 days), and sport participation (varsity, community, and/or intramural). Multinomial logistic regression models were used to examine associations between latent class membership and student characteristics.

**Results:** Three distinct latent classes were identified for females, and four were identified for males. These classes were: 1) Guidelines (defined by high probability of guideline adherence; females: 44%; males: 16%), 2) PE & Sports (defined by high probability of PE and sport participation; females: 33%; males: 43%), 3) Guideline & Sports (defined by high probability of guideline adherence and sport participation; females: 23%; males: 23%), and 4) Inactive (defined by low probability of all physical activity behaviours; males: 18%). Strength training, sleep, and English grade were associated with class membership among females. Ethnicity, weekly spending money, strength training, and English and math grades were associated with class membership among males.

**Conclusions:** These findings suggest that latent class patterns of physical activity behaviours differ by sex. Guideline adherence was the most common class among females, indicating high levels of independent physical activity, whereas PE & Sports was the most common class among males, indicating greater tendency towards organized activities. Additionally, a substantial number of male students were not engaging in any physical activity. Participation in both PE and sports did not necessarily lead to meeting physical activity guidelines, highlighting that these activities alone may not be providing sufficient levels of physical activity that aligns with current recommendations for Canadian youth.

# Healthcare professionals' perspectives on barriers and facilitators to referral and recruitment to diabetes prevention programmes: a systematic review protocol

**Ms. clair Haseldine**<sup>1</sup>, Prof. Patricia M Kearney<sup>1,2</sup>, Dr. Grainne O'Donoghue<sup>3</sup>, Dr. Fiona Riordan<sup>1</sup>, Dr. Sheena McHugh<sup>1</sup>

<sup>1</sup>University College Cork, Cork, Ireland, <sup>2</sup>Health Service Executive, Cork, Ireland, <sup>3</sup>University College Dublin, Dublin, Ireland

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** International guidelines recommend identification, screening, and referral to behavioural programmes for those at high risk of developing diabetes. Despite evidence that type 2 diabetes can be prevented or delayed in those at high risk, many eligible participants are not referred to, or do not participate in diabetes prevention programmes (DPPs). Healthcare professionals (HCPs) can influence a person's decision to participate in DPPs and are pivotal to the referral and recruitment processes. The purpose of this study is to identify, appraise and synthesise the evidence on barriers and facilitators to referral and recruitment to DPPs from the perspective of HCPs.

**Methods:** A 'best fit' framework synthesis method will be used to synthesise qualitative, quantitative, and mixed methods evidence on factors that affect HCPs referral and recruitment to DPPs, with the Theoretical Domains Framework (TDF) as the a priori framework. Peer reviewed publications will be searched for in MEDLINE, EMBASE, CINAHL, PsychINFO, Web of Science and Scopus. Reference lists and citation searches will be performed. Eligible are studies published in English that focus on the HCP perspective of their experiences of referral or recruitment to DPPs. Year of publication will be restricted to the last 25 years (1997 – 2022) when the first of the landmark diabetes prevention studies was published. Quality will be assessed using the Mixed Methods Appraisal Tool. One author will screen, extract, appraise and synthesise the literature while a second author will independently verify a 20% sample at each stage. A third author will be consulted if consensus is required. A mix of deductive coding using the TDF and inductive coding of data that does not fit the TDF will be synthesised into themes representing the whole dataset. The relationships between the final set of themes will be explored to create a new model to understand HCP perspectives on referral and recruitment in DPPs. Sensitivity analysis will be carried out on the conceptual model that is developed.

**Conclusion:** Participation in DPPs is key for programme impact. Understanding the HCPs' perspectives of the barriers and facilitators to identifying, screening, referring and recruiting will inform future implementation of DPPs.

# Evaluating the longitudinal impact of participation in school-based physical education classes on physical activity levels among adolescents in Canada

**Ms. Claire Buchan<sup>1</sup>**, Dr. Sarah Richmond<sup>2,3</sup>, Dr. Kelly Skinner<sup>1</sup>, Dr. Scott Leatherdale<sup>1</sup>

<sup>1</sup>School of Public Health Sciences, University of Waterloo, Waterloo, Canada, <sup>2</sup>Dalla Lana School of Public Health, University of Toronto, Toronto, Canada, <sup>3</sup>Public Health Ontario, Toronto, Canada

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** The purpose of this study was to evaluate the longitudinal impact that physical education (PE) participation had on moderate-to-vigorous physical activity (MVPA) levels among high school students in Canada, controlling for differences in observed individual characteristics using propensity scores.

**Methods:** This study utilized linked longitudinal data from grade 10-12 students in Ontario over three waves of the COMPASS study. COMPASS is a school-based prospective cohort study (2012-2021) of youth in Canada. Linear mixed models were used to examine associations between PE participation and minutes of MVPA over time, stratified by sex. Models were adjusted using doubly robust propensity score methodology accounting for observed covariates known, or suspected, to influence PE participation. Propensity scores were applied as weights, through inverse probability of treatment weighting. Standardized mean differences were used to assess covariate balance before and after weighting.

**Results:** Overall, 988 female and 872 male students were included. Female and male students who participated in PE during the semester of data collection reported on average 27 (95% confidence interval (CI): 21 to 34) and 36 (95% CI: 29 to 43) additional minutes of MVPA per day, respectively, compared to those who did not participate in PE that year. Female and male students who participated in PE during the opposite semester of data collection report, on average, 10 (95% CI: 3 to 17) and 15 (95% CI: 7 to 22) additional minutes of MVPA per day, respectively, than students who did not participate in PE that year. Female and male students in grade 12 report on average 6 (95% CI: -11 to -1) and 10 (95% CI: -15 to -4) fewer minutes of MVPA per day, respectively, than grade 10 students.

**Conclusions:** Findings suggest that PE participation in high school has a significant impact on MVPA levels over time. Effects appear to be more pronounced among male youth and are greatest during the semester of PE participation. However, effects are still present even when PE participation is not concurrent with data collection. Canadian schools should consider mandating annual PE courses throughout high school to improve physical activity levels among youth.

# Introducing outdoor office work to reduce stress among office workers in Sweden

**Dr. Feben Javan Abraham<sup>1</sup>**, Dr. Per Andreasson<sup>1</sup>, Prof. Abby King<sup>3,4</sup>, Prof. Katarina Bälter<sup>1,2</sup>, Prof. Susanna Toivanen<sup>1</sup>

<sup>1</sup>Division of Public Health Sciences, Mälardalens University, Västerås, Sweden, <sup>2</sup>Department of Medical Epidemiology and Biostatistics, Karolinska Institutet, Stockholm, Sweden, <sup>3</sup>Department of Epidemiology and Population Health, Stanford University School of Medicine, California, USA, <sup>4</sup>Stanford Prevention Research Center, Department of Medicine, Stanford University School of Medicine, California, USA

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Being outdoors has potential to reduce stress and outdoor office work (OOW) may be an innovative way to decrease workplace stress and offices' sedentary behaviour. This study aims to assess stress among office workers that are working in their normal indoor office and then starts practicing OOW. Additionally, study participants identified facilitators and barriers for doing OOW.

**Methods:** In a feasibility study conducted in October 2022, nine office workers were instructed to do usual indoors work during the first week and then work outdoors for at least 30 minutes per day during the second week. They wore a Heart Rate Variability (HRV) monitor called FirstBeat BG3 (HRV-FB) for two weeks while at work to assess objective stress. Subjective stress was assessed by sending short daily surveys throughout the 2 weeks of the intervention, using a Likert scale of 1 to 10 from "not stressed at all" to "extremely stressed". Also, they were instructed to use the app "Stanford Healthy Neighborhood Discovery Tool" to take photos of facilitators or barriers to practicing OOW.

Self-reported stress data was analysed using paired sample t-test in SPSS 28, whereas analysis of HRV time and frequency parameters are currently being undertaken. The photos were categorised into themes.

**Results:** Preliminary findings show that daily self-reported stress decreased on group level when comparing week 1 to week 2 when OOW was performed.

Categories from picture analysis included themes related to "convenience", "comfort", equipment/facilities", "urban" and "weather" in identified barriers. Out of 76 pictures almost all those themed "nature", both indoor and outdoor, were marked as positive experiences.

**Conclusions:** Reduction in self-reported stress from week 1 to week 2 suggests OOW could potentially be a useful method to reduce work-related stress. Furthermore, by walking outdoor, the office workers increase their physical activity as compared to being sedentary indoors, which adds another health aspect to OOW. Picture analysis suggests, to ensure a healthier milieu for office workers, conditions conducive to OOW such as outdoor work facilities in tandem with green spaces in offices' vicinity may need to be facilitated by employers.

# Concordance of dietary behaviours between parents and children: A cross sectional study

**Ms. Celeste C. Bouchaud<sup>1</sup>**, Ms. Margarita Trujillo Florez<sup>2</sup>, Dr. Ana Carolina Barco Leme<sup>3</sup>, Dr. Hugues Plourde<sup>2</sup>, Dr. Tamara R. Cohen<sup>1,3</sup>

<sup>1</sup>PERFORM Centre, Concordia University, Montreal, Canada, <sup>2</sup>School of Human Nutrition, Faculty of Agricultural and Environmental Sciences, McGill University, Montreal, Canada, <sup>3</sup>Faculty of Land and Food Systems, The University of British Columbia, Vancouver, Canada

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Parent's eating behaviours and feeding styles shape how their child eats but there is a lack of data on the associations between parent and child eating behaviours. We aimed to examine concordance between parental appetitive traits and intuitive eating with children's appetitive traits.

**Methods:** Canadian parents (n=154, 37.9±5.5 years, 97% female) of children aged 5 to 11 (7.1 ±1.9 years) completed a cross-sectional survey with validated questionnaires. The Adult Eating Behavior Questionnaire and Child Eating Behavior Questionnaire were used to describe appetitive traits with the constructs and subscales: "Food Approach" (Food Responsiveness, Enjoyment of Food, Emotional Overeating and Desire to Drink for children and Hunger for adults) and "Food Avoidance" (Satiety Responsiveness, Slowness of Eating, Emotional Undereating and Food Fussiness). Parental intuitive eating was surveyed using the Intuitive Eating Scale 2 with subscales: Unconditional Permission to Eat, Eating for Physical Rather than Emotional Reasons, Reliance on Hunger and Satiety Cues and Body-Food Choice Congruence. Pearson correlations were conducted between adult and child eating behavior subscales and between child eating behavior and parent intuitive eating subscales.

**Results:** Concordance between appetitive traits were significantly correlated for Enjoyment of Food ( $r=0.23$ ;  $p < .01$ ), Emotional Overeating ( $r=0.27$ ;  $p < .001$ ), Emotional Undereating ( $r=0.36$ ;  $p < .001$ ), and Food Responsiveness ( $r=0.16$ ;  $p < .05$ ) as were parents' Emotional Overeating with child Emotional Undereating ( $r=-0.16$ ;  $p < .05$ ). In parents, the intuitive eating construct, Unconditional Permission to Eat, was correlated with children's Emotional Overeating ( $r=-0.26$ ;  $p < .01$ ) and Food Responsiveness ( $r=-0.17$ ;  $p < .05$ ). Parental Eating for Physical rather than Emotional Reasons and child Emotional Overeating ( $r=-0.16$ ;  $p < .05$ ) were also correlated. Reliance on Hunger and Satiety Cues in parents was correlated with child Enjoyment of Food ( $r=0.16$ ;  $p < .05$ ) whereas Body-Food Choice Congruence was correlated with child's Slowness in Eating ( $r=-0.20$ ;  $p < .05$ ) and Food Fussiness ( $r=-0.19$ ;  $p < .05$ ).

**Conclusions:** This study found that self-reported parental eating behavior constructs are correlated to similar constructs in children. Thus, parental eating behaviors should be accounted for when addressing child eating behaviors. Larger studies should explore how these factors are moderated.



# Differences between obese and severely obese children on food intake, physical activity, and parenting practices: A cross-sectional study with a clinical sample

**Mr. Marco Silva-Martins<sup>1</sup>**, Dr. Catarina Canário<sup>1</sup>, Prof. Susana Vale<sup>2</sup>, Dr. Clarice Martins<sup>3</sup>, Assistant Professor Sanne Gerards<sup>4</sup>, Associate Professor Orlanda Cruz<sup>1</sup>

<sup>1</sup>Faculty of Psychology and Education Sciences of the University of Porto, Porto, Portugal, <sup>2</sup>Porto School of Education (ESE), Polytechnic Institute of Porto (IPP), Porto, Portugal, <sup>3</sup>Faculty of Sport of the University of Porto, Porto, Portugal, <sup>4</sup>Faculty of Health, Medicine & Life Sciences of the Maastricht University, Maastricht, Netherlands

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** The purpose of the current cross-sectional study was to investigate differences between obese, and severely obese children, with regard to food intake, physical activity level, lifestyle-related problems, their parents' confidence, and feeding and physical activity parenting practices.

**Methods:** Participants were 76 parents (92% mothers) of obese (BMI z-score > 2, n = 48) and severely obese (BMI z-score > 3, n = 28) children (58% girls) aged 5-11 years, attending an outpatient pediatric care unit in a Portuguese University Hospital. All participants were enrolled in a longitudinal trial on the efficacy of a parenting intervention targeting childhood overweight and obesity. The current study presents baseline data. Pediatricians collected children's anthropometric data during hospital appointments. Parents completed the following measures: Food Intake Diary, Food Frequency Questionnaire, Physical Activity Parenting Practices Questionnaire, Comprehensive Feeding Practices Questionnaire, and the Lifestyle Behavior Checklist. Children used an accelerometer for five days. To compare differences across groups T-Student tests were performed.

**Results:** 24% of the children achieved the recommended daily levels of vegetable and fruit consumption ( $\geq 400\text{gr/day}$ ) and moderate to vigorous physical activity ( $\geq 60\text{min/day}$ ), whereas 18% ate more than four grams of salt. No differences were found regarding physical activity or food intake between the two groups, except that parents of severely obese children reported lower levels of children's daily consumption of salty snacks ( $p = .029$ ), cakes and sweets ( $p = .002$ ), and higher levels of light physical activity ( $p = .048$ ). Parents of severely obese children also reported higher use of food as reward ( $p = .007$ ), and less confidence to address overeating ( $p = .038$ ). All effect sizes were medium, except for the consumption of cakes and sweets, which had a large effect size.

**Conclusions:** These findings inform research and practice on childhood obesity as they contribute to a better understanding of the specific characteristics and needs of obese children and their parents. Although no differences were found regarding children's lifestyle-related problems, severely obese children were found to have different food intake and physical activity characteristics, with their parents reporting different parenting practices than those of obese children.

# Identification of barriers to healthy eating according to a newly developed COM-B questionnaire

**Dr. Sofie van Rongen<sup>1</sup>**, Dr. Jacqueline Langius<sup>1</sup>, Dr. Sanne de Vries<sup>1</sup>

<sup>1</sup>The Hague University of Applied Sciences, The Hague, Netherlands

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** The COM-B model is being used extensively to inform behaviour change intervention design, but it is not yet used in dietetic care practice. The aim of this research is twofold: To develop a new self-evaluation questionnaire of drivers and barriers for healthier eating, and to evaluate what barriers are generally relevant for individuals in the inaction versus action stages of change.

**Methods:** The 33-item questionnaire was based on 1) the original self-evaluation of behaviour questionnaire of Michie, Atkins and West (2014), 2) a COM-B questionnaire for physical activity of Ellis, Pears and Sutton (2019), and 3) a leading review of key psychological factors influencing healthy eating (Ridder, Kroese, Evers, Adriaanse & Gillebaart, 2017). In a pilot study, 82 Dutch students (human resource management) completed paper versions of the questionnaire on a scale from 1 (disagree) to 7 (agree). Overall mean and SDs were calculated to determine importance of the items. T-tests were run to identify barriers that differentiated those that are inactive from those that active in eating healthier, as assessed with an item on the current stage of change with respect to healthier eating.

**Results:** On average, participants evaluated knowing what to do, ease to get healthy food, less expensive healthy food, feeling healthy eating would do well, developing a habit, and having a plan as important barriers to healthier eating ( $M > 4.5$ ). Those who are currently eating healthier identified higher barriers than those who are not yet changing their eating ( $p < .05$ ): a better understanding as to why it is important ( $M = 3.82$ ,  $SD = 2.22$  versus  $M = 2.94$ ,  $SD = 1.59$ ) keeping track of food intake ( $M = 4.58$ ,  $SD = 1.75$  versus  $M = 3.34$ ,  $SD = 1.76$ ), feeling healthy eating would do well ( $M = 5.27$ ,  $SD = 1.55$  versus  $M = 4.55$ ,  $SD = 1.40$ ), and developing a habit ( $M = 5.70$ ,  $SD = 1.43$  versus  $M = 4.68$ ,  $SD = 1.81$ ).

**Conclusions:** Individuals who are in the process of adopting a healthier eating style appear to face specific barriers. These results, though preliminary, stimulate considering different stages of change in further research on intervention design research. Follow-up research is planned to determine how this questionnaire can aid dieticians in barrier identification in individual clients, ultimately to provide more efficient and personalized dietetic treatment.

# The Role of Parental Feeding Practices in Child Health Promotion

**Associate Professor Kristi Sidney Annerstedt<sup>1</sup>**, Ms. Zoë Morris<sup>1</sup>, Associate Professor Emma Patterson<sup>1,2</sup>, Associate Professor Åsa Norman<sup>1</sup>, Prof. Liselotte Schäfer Elinder<sup>1,3</sup>

<sup>1</sup>Karolinska Institutet, Solna, Sweden, <sup>2</sup>Swedish Food Agency, Uppsala, Sweden, <sup>3</sup>Centre for Epidemiology and Social Medicine, Region Stockholm, Stockholm, Sweden

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Childhood obesity caused partially by unhealthy diet is a growing public health concern in Sweden and globally. Since children adopt many of their parents' attitudes and behaviors towards food, parent-child interactions, and parental feeding practices shape children's health-related behaviors. Therefore, parental feeding practices are useful targets for childhood obesity prevention interventions. We investigated parental feeding practices and associations with parent's sex, education and children's weight status.

**Methods:** Data are from the baseline of the Healthy School Start Plus (HSSP) intervention study from 2017 to 2019, a cluster-randomized control trial in 17 schools in the region of Stockholm, Sweden, where the proportion of parents with university education was less than 50 percent. Parents completed the Comprehensive Feeding Practices Questionnaire (CFPQ) regarding parental behaviors at mealtimes and behaviors related to their child's food intake. Validation of the scale in the Swedish context resulted in five factors: monitoring, pressure to eat, restriction for health and weight, emotional regulation, and healthy eating guidance. Wilcoxon rank sum test were used to investigate associations between parental feeding practices and parental sex, education, and child's weight status.

**Results:** The study included 263 parents (154 mothers) with 173 individual children. Monitoring of food intake was higher among mothers compared to fathers ( $p=0.05$ ). No significant differences were found for the other factors or different education levels. Pressure to eat and restriction for health and weight were significantly different between parents of children who were overweight or obese versus normal or underweight ( $p<0.001$ ). Pressure to eat was higher in parents of children with normal or underweight. Restriction for health and weight was higher in parents of children with overweight or obesity. No other parental feeding practices were significantly different between parents of children differing in weight status.

**Conclusion:** The parental feeding practices differed between children with different weight status in the expected direction. It could suggest that parental feeding practices are responsive to the child's weight status. Understanding the direction of the association could help guide future interventions. Further research is needed to examine potential causal relationships and mediating factors.

# Walking difficulties and activity destinations among older adults

**Ms. Essi-Mari Tuomola<sup>1</sup>**, Dr. Kirsi Keskinen<sup>1</sup>, Prof. Taina Rantanen<sup>1</sup>, Associate Professor Erja Portegijs<sup>2</sup>

<sup>1</sup>Faculty of Sport and Health Sciences and Gerontology Research Center, University of Jyväskylä, Jyväskylä, Finland, <sup>2</sup>Center for Human Movement Sciences, University Medical Center Groningen, University of Groningen, Groningen, Netherlands

Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** A. Ageing

**Purpose.** Walking limitations and declining physical capacity may reduce outdoor mobility and opportunities to reach activity destinations. However, walking modifications, such as slower pace, resting in the middle, or using a walking aid, may help individuals reach important destinations despite declined physical capacity. Our purpose was to study whether walking difficulties is associated with the visited activity destinations among older adults.

**Methods.** Community-dwelling 75-, 80-, and 85-year-old people living in Jyväskylä (N=901) reported whether they perceived no difficulties, used walking modifications, or perceived difficulties walking 2 km. Participants located on a digital map activity destinations for physical exercise (outdoor and indoor sports facilities and outdoor recreational areas), destinations facilitating one's outdoor mobility (e.g. nature, lakeside, services and events), and destinations for other activities (e.g. grocery stores, other shops, health services, social visits), which they had visited several times in the past month. The number of activity destinations was calculated. Analyses were adjusted for age, sex, years of education, number of chronic diseases, MMSE score.

**Results.** Poisson loglinear regression showed that participants with intact walking ( $b=0.346$ ,  $s.e.=0.055$ ,  $p<0.001$ ) or modifications ( $b=0.181$ ,  $s.e.=0.066$ ,  $p=0.006$ ) reported higher number of physical exercise destinations than participants with walking difficulty. In addition, those with intact walking ( $b=0.18$ ,  $s.e.=0.069$ ,  $p=0.009$ ) reported higher number of destinations facilitating outdoor mobility than those with walking difficulty. Walking difficulties were not associated with reporting destinations for other destinations.

**Conclusions.** Participants with better physical capacity reported more physical exercise destinations and destinations facilitating outdoor mobility. Destinations for daily chores and social visits, i.e., other destinations, may encourage older people to go outdoors and visit these destinations regardless of walking difficulties.

# Perspectives of intermediaries towards implementing and using gamification to promote physical activity in the neighborhood

**Dr. Ayla Schwarz<sup>1</sup>**, Associate Professor Kirsten Verkooijen<sup>1</sup>, Prof. Emely de Vet<sup>1</sup>, Associate Professor Monique Simons<sup>1</sup>

<sup>1</sup>Wageningen University, Wageningen, Netherlands

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Gamification can be effective in promoting physical activity and can be applied in different forms, ranging from physical adaptations in the environment to virtual mobile health interventions. In the Netherlands, intermediaries -such as neighborhood sport coaches –play an important role in promoting physical activity in the neighborhood. They are responsible for executing local sport agreements by coordinating and executing activities that promote physical activity in the neighborhood. So far, gamified activities are still limited implemented by these intermediaries. This study aimed to assess the beliefs, including perceived barriers and facilitators, of intermediaries working in the Netherlands towards using gamification in their daily work to promote physical activity in the neighborhood.

**Methods:** Twenty-two semi-structured interviews were conducted with intermediaries, defined as neighborhood sport coaches working in the Netherlands. The interviews were audiotaped, transcribed, and analyzed by means of thematic analysis using Atlas.ti 22 software (Scientific Software Development GmbH, Berlin, Germany). The analysis was informed by the Capability, Opportunity, Motivation–Behaviour (COM-B) model and the Theoretical Domains Framework.

**Results:** Applying gamification to existing or new activities of intermediaries to stimulate physical activity in the neighborhood was highly valued by intermediaries. Factors that influence the capability of intermediaries included the cognitive capability of having sufficient knowledge, knowing how to find gamified activities, and one's level of technical proficiency. Financial subsidies, time, availability of material, marketing, and support and leadership of employer's organization influenced opportunity. The professional identity of intermediaries, interest and positive reactions of different target groups, and reinforcement within the intermediaries' network influenced motivation. Differences in beliefs towards applying physical or virtual forms of gamification were identified and could be linked to facilitating and inhibiting factors.

**Conclusions:** In general, intermediaries have a positive attitude toward applying gamification in their daily work. However, gamification practices are currently not strategically implemented in the work of intermediaries. A better understanding of inhibiting and facilitating factors can help to further implement gamification strategically in the work of intermediaries.

# The Association between Perceived Physical Literacy and Physical Activity in Primary School Children in England

**Dr. Mhairi MacDonald<sup>1</sup>**, Miss Caitlin Miller<sup>1</sup>, Prof. Lisa Barnett<sup>2</sup>, Prof. Stuart Fairclough<sup>1</sup>, Dr. Richard Tyler<sup>1</sup>  
<sup>1</sup>Edge Hill University, Ormskirk, United Kingdom, <sup>2</sup>Deakin University, Melbourne, Australia

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Physical literacy (PL) is a multi-dimensional concept that provides a holistic understanding of movement behaviours under four core domains (physical, psychological, social and cognitive) and is viewed as a critical precursor to physical activity (PA). Thus, the promotion of PL in children is fundamental for physical activity and its associated health and wellbeing benefits. However, there is limited literature which addresses the composite nature of Physical Literacy. Therefore, the purpose of this study was to examine the associations between perceived composite PL scores PA and in school children in England.

**Methods:** Primary School Children (n=310; aged 9.95±0.8 years; 46.5% girls; 95% white British) self-reported Physical Literacy using The Physical Literacy in Children Questionnaire (PL-C Quest). Physical Activity was measured using wrist worn accelerometers for 24-hours over 7 consecutive days. Associations between perceived composite PL scores and PA (Total PA, LPA, MPA, MVPA and VPA) were determined using linear mixed model. Analysis accounted for school-level clustering and adjusted for sex, socioeconomic status, maturity offset, and BMI z-score.

**Results:** There was no significant difference in perceived PL scores, Boys spent significantly more time in moderate ( $p < .001$ ) and vigorous PA ( $p = .002$ ) than girls. MVPA and VPA were positively associated with perceived composite PL scores ( $B = 0.07$   $p = .002$ ;  $B = 0.06$   $p = .01$ ) respectively. However, there was no significant association between total PA, MPA and LPA ( $B = 0.01$   $p = .18$ ;  $B = 0.04$   $p = .21$ ;  $B = 0.00$   $p = .83$ )

**Conclusion:** This study contributes to the evidence of the link between composite PL and PA. Results suggest that intensity of activity has stronger associations with perceived composite PL scores.



# How to select interventions for promoting physical activity in primary schools? Combining preferences of stakeholders and scientists using a Delphi study.

Dr. Mirko Brandes<sup>1</sup>, Dr. Berit Brandes<sup>1</sup>, Dr. Jennifer Sacheck<sup>2</sup>, Prof. Mai Chin A Paw<sup>3</sup>, Prof. David Lubans<sup>4</sup>, Prof. Alexander Woll<sup>5</sup>, Prof. Jasper Schipperijn<sup>6</sup>, Prof. Russ Jago<sup>7, 8</sup>, Prof. Hajo Zeeb<sup>1</sup>, **Dr. Heide Busse<sup>1</sup>**

<sup>1</sup>Leibniz Institute for Prevention Research and Epidemiology - BIPS, Bremen, Germany, <sup>2</sup>Milken Institute School of Public Health, The George Washington University, Washington D.C., USA, <sup>3</sup>Amsterdam UMC, location Vrije Universiteit Amsterdam, Public and Occupational Health, Amsterdam Public Health Research Institute, Amsterdam, Netherlands, <sup>4</sup>University of Newcastle, Newcastle, Australia, <sup>5</sup>Karlsruhe Institute of Technology, Karlsruhe, Germany, <sup>6</sup>University of Southern Denmark, Odense, Denmark, <sup>7</sup>School for Policy Studies, University of Bristol, Bristol, United Kingdom, <sup>8</sup>Bristol Medical School, University of Bristol, Bristol, United Kingdom

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** The failure of physical activity (PA) interventions in the implementation and scale-up in the real world, previously found effective under controlled conditions, may be attributed to the different priorities of stakeholders and scientists. Therefore, the aim of our study was to understand the priorities and criteria for selecting suitable PA interventions among scientists and local stakeholders.

**Methods:** We conducted a three-round repeated Delphi study with local stakeholders (n=7) and international scientific PA experts (n=6). Independently for both panels, two rounds were utilized to develop a list of criteria and the definitions of criteria, followed by a prioritization of the criteria in the third round. For each panel, a narrative analysis was used to rank-order unique criteria, list the number of scores for the unique criteria and synthesize criteria into overarching categories.

**Results:** The stakeholders developed a list of 53 unique criteria, synthesized into 11 categories with top-ranked criteria for selecting PA interventions being 'free of costs', 'longevity' and 'integration into everyday school life'. The scientists listed 35 unique criteria, synthesized into 7 categories with the top-ranked criteria being 'efficacy', 'potential for reach' and 'feasibility'. The top-ranked unique criteria in the stakeholder panel were distributed over many categories, whereas four out of the top six criteria in the scientist panel were related to 'evidence'. Synthesizing the priorities and rankings of both groups, we propose the following set of seven key criteria for the selection process of PA interventions in primary school children: cost, sustainability, feasibility, potential for reach, efficacy, acceptability and social development.

**Conclusions:** Stakeholders and scientists demonstrated a fair overlap of criteria when selecting PA interventions, however, they substantially differed in their characterization and ranking which limited the agreement between both groups. PA interventions that incorporate a focus on the social development of children, that are low cost, feasible and acceptable, that are evidence-based with potential to reach many children and to be sustainable are most likely to be chosen by scientists and stakeholders. Keeping in mind these seven key criteria established will ensure that PA interventions are fit-for-purpose and potentially being implemented long-term in the real world.

# Examining the Associations Between Parental Weight Bias and Adolescent Girls' Body Image Experiences and Dysfunctional Eating Behaviors

**Miss Rosalie Lacerte<sup>1</sup>**, Dr. Geneviève Lavigne<sup>1</sup>, Prof. Noémie Carbonneau<sup>1</sup>

<sup>1</sup>Université du Québec à Trois-Rivières, Trois-Rivières, Canada

Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** G. Children and families

**Purpose:** The Tripartite Influence Model of body dissatisfaction and eating disturbance (Shroff & Thompson, 2006) proposes that peers, parents, and the media all influence body image and eating disturbance. However, the literature remains unclear regarding the unique impact of the two parents' attitudes and beliefs on their adolescents' body image and eating behaviors. In addition, no study to date has tested whether both parents' weight bias (i.e., negative attitudes or judgments toward people of higher weight) relates to their adolescents' eating dysfunction. The present study aims at examining whether perceptions of parental weight bias relate to three different dimensions of adolescent girls' dysfunctional eating habits, namely cognitive restraint, emotional eating and uncontrolled eating. The study also examines whether adolescents' perceptions of body-related pressures from their family and internalization of the thin ideal mediate the associations between perceived parental weight bias and dysfunctional eating behaviors.

**Methods:** Participants were 348 French-Canadian girls aged between 14 and 17 years. They completed validated self-report questionnaires including the Antifat Attitudes Questionnaire (Crandall, 1994), the Sociocultural Attitudes Towards Appearance Scale-4 (Schaefer et al., 2015), and the Three-Factor Eating Questionnaire (Karlsson et al., 2000).

**Results:** Structural equation modeling analyses were conducted. Globally, participants' perceptions of their mother's and father's weight bias were independently associated with higher levels of body-related pressures from the family (respectively  $B = .225$ ,  $p < .05$ , and  $B = .175$ ,  $p < .05$ ), and higher internalization of the thin ideal (respectively  $B = .177$ ,  $p < .05$ , and  $B = .125$ ,  $p < .05$ ). In turn, perceived body-related pressures were significantly and positively related to all three indicators of dysfunctional eating behaviors: cognitive restraint ( $B = .227$ ,  $p < .05$ ), emotional eating ( $B = .242$ ,  $p < .05$ ), and uncontrolled eating ( $B = .210$ ,  $p < .05$ ). Internalization of the thin ideal was also positively related to cognitive restraint ( $B = .452$ ,  $p < .05$ ).

**Conclusions:** Overall, the results affirm the importance of considering parents' negative attitudes toward people of higher weight in order to better understand their daughters' body image experiences and dysfunctional eating behaviors.

# The relationships between sociocultural body-related pressures and eating behaviors in adolescent girls: A person-centered approach

**Miss Carolanne Tanguay (Corresponding author)<sup>1</sup>**, Dr. Geneviève Lavigne (Corresponding author)<sup>1</sup>, Prof. Noémie Carbonneau (Corresponding author)<sup>1</sup>

<sup>1</sup>Université du Québec à Trois-Rivières, Trois-Rivières, Canada

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Disordered eating behaviors in adolescents have skyrocketed since the COVID pandemic, making it important to better understand their determinants. Sociocultural pressures about body image represent one of these determinants. The purpose of the present study is to examine the relationships between perceived body-related pressures from four sociocultural agents (i.e., mother, father, peers, and media) and adolescent girls' eating behaviors, using a person-centered approach. This type of approach enables the identification of subgroups of individuals with distinct sociocultural pressure profiles. To our knowledge, this study is the first to examine how combined sources of sociocultural pressures are associated with adolescent girls' eating behaviors.

**Methods:** Participants are 388 French-Canadian girls aged between 14 and 17 years. Participants completed self-reported validated measures assessing their perceptions of the pressure about body image exerted by their parents, media and peers, as well as their bulimia symptoms and intuitive eating. The study design is correlational. Latent profile analyses (LPA) and MANOVAS/LSD post hocs were conducted.

**Results:** First, three profiles emerged from the LPA: (1) *High Pressure Profile* (high levels of the four types of pressure); (2) *Low Pressure Profile* (low levels of the four types of pressure); and (3) *High Media Pressure Profile* (high level of media pressure, and low levels of the other types). Second, MANOVA/LSD post hoc results showed that participants in the *High Pressure Profile* reported more problematic eating behaviors (i.e., more bulimia symptoms,  $M = 2.87$  [ $SD = 1.15$ ],  $p < 0.001$ , and less intuitive eating,  $M = 2.93$  [ $SD = .53$ ],  $p < 0.001$ ) than did participants in the *High Media Pressure Profile*, who, in turn, reported more problematic eating behaviors (i.e., more bulimia symptoms,  $M = 2.17$  [ $SD = .96$ ],  $p < 0.001$ , and less intuitive eating,  $M = 3.33$  [ $SD = .64$ ],  $p < 0.001$ ) than did participants in the *Low Pressure Profile* ( $M = 1.70$  [ $SD = .70$ ];  $M = 3.74$  [ $SD = .60$ ]).

**Conclusions:** These results are important for the field of behavioral nutrition and provide insight into how different sources of sociocultural pressure combine across adolescents.

# Experiences and Perceptions of School Nurses' Motivational Interviewing Competence: A Convergent Mixed-Methods Study

**Dr. Marianna Moberg<sup>1</sup>**, Dr. Helena Lindqvist<sup>1</sup>, Dr. Susanne Andermo<sup>1</sup>, Associate Professor Åsa Norman<sup>1</sup>  
<sup>1</sup>Karolinska Institutet, Stockholm, Sweden

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** In this convergent mixed-methods study, the aim was to explore how objective and subjective quality ratings of school nurses' motivational interviewing (MI) correlate whilst also considering the perceptions of delivering and participating in the same MI sessions.

**Methods:** Quantitative and qualitative data were derived from seven intervention schools participating in the Healthy School Start Plus parenting support intervention. School nurses were trained in MI and conducted an MI session with parents of 6–7-year-old children to discuss children's physical health and development. Quantitative data comprised objective ratings of school nurses' MI competence using the Motivational Interviewing Treatment Integrity 4.2 [MITI-4] protocol, as well as parents' and school nurses' subjective ratings of the MI sessions. Qualitative data comprised semi-structured interviews with parents and school nurses about their perceptions of the MI sessions. First, quantitative data were analysed using Spearman's rank correlation, and qualitative data were analysed using content analysis. Next, quantitative and qualitative findings were merged.

**Results:** Our findings suggest that school nurses' MI performances were rated and perceived as valuable and family-centred by both school nurses and parents who had left the meeting feeling motivated and empowered to promote their children's healthy behaviours. Nonetheless, school nurses were critical to their own MI technical performance, and they found that reflections were easier to deliver and to self-rate.

**Conclusion:** Overall, MITI ratings were the lowest and parents' ratings were the highest. Future studies should focus on relating clients' subjective ratings of MI with clients' behavioural outcomes.

# Implementing the first school-based movement behaviours surveillance system in Mexico: the Mexican Movement Observatory pilot study protocol

**Dr. Gabriela Argumedo<sup>1</sup>**, Dr. Silvia González<sup>1,2</sup>, Mr. Jesús Garcés<sup>1</sup>, Mr. Daniel Velázquez<sup>1</sup>, Dr. Catalina Medina<sup>1</sup>, Prof. Simón Barquera<sup>3</sup>, Dr. Alejandra Jáuregui<sup>1</sup>

<sup>1</sup>Department of Physical Activity and Healthy Lifestyle, Center for Research in Nutrition and Health, National Institute of Public Health, Morelos, Mexico, <sup>2</sup>Universidad de los Andes, Bogotá, Colombia, <sup>3</sup>Center for Research in Nutrition and Health, National Institute of Public Health, Morelos, Mexico

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** There is limited surveillance of the 24 hours movement behaviours in Mexico among children under 10 years of age. Monitoring these behaviours is necessary for evidence-based decision-making for the promotion of healthy lifestyles. This study aims to implement the Mexican Movement Observatory (OMM), a system for monitoring children's physical activity, sleep, and sedentary time through primary schools in Mexico. This work reports the pilot study protocol and preliminary results.

**Methods:** The study comprises two phases: 1) A pilot study to assess the feasibility of the OMM within a diverse sample of schools, and 2) Improvement and upscaling at the national level. For phase 1, a cross-sectional study will be conducted on 12 public primary schools in central regions of Mexico. Children from grades 1 to 6 along with their caretakers will be asked to answer a self-completed short online survey on the child's movement behaviours. Head teachers will be asked to report the school's social and built environments conducive to physical activity. Data from these questionnaires will be mapped and openly available through the OMM website. An international board of experts on movement behaviours and population surveillance systems will guide the decisions about the Observatory.

**Results:** Preliminary results on the percentage of children meeting movement behaviour guidelines will be presented. Information regarding the barriers and facilitators for implementing the OMM will also be presented, along with the required adaptations of the instruments and procedures for the following feasibility study and national scaling up.

**Conclusions:** Through the Observatory, it is expected to generate evidence at the regional and/or national level on the movement behaviours of school-age children. Lessons learned from this pilot study will provide evidence to improve the OMM and facilitate its upscaling process and may provide relevant information for school-based observatories on other places sharing socio-contextual conditions.

# Using a toolbox of tailored evidence-based physical activity interventions to improve children's physical activity and cardiorespiratory fitness at primary schools: Results of the ACTIPROS feasibility study

Dr. Berit Brandes<sup>1</sup>, Dr. Christoph Buck<sup>1</sup>, Miss Louisa Sell<sup>1</sup>, **Dr. Heide Busse<sup>1</sup>**, Prof. Hajo Zeeb<sup>1</sup>, Dr. Mirko Brandes<sup>1</sup>

<sup>1</sup>Leibniz Institute for Prevention Research and Epidemiology – BIPS, Bremen, Germany

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** Usually, school-based PA promotion is conducted by providing one specific intervention to schools. In contrast, the ACTivity PROMotion via Schools (ACTIPROS) approach provides a set of 12 evidence-based PA interventions (the ACTIPROS toolbox) where schools can select interventions according to their prerequisites and have the option to replace unsuitable interventions within the school year. In this study, we tested the feasibility and acceptability of the toolbox approach at primary schools.

**Methods:** A two-arm cluster-controlled feasibility trial at primary schools (n=5 intervention schools, n=5 control schools) located in a city of Northern Germany was conducted. Children's habitual PA (GENEActiv, Activinsights Ltd.) and motor skills (Deutscher Motorik Test; DMT) were measured at the beginning (t0: Sept and Oct 2021) and at the end of the school year (t1: June and July 2022). Between Nov 2021 and July 2022, the ACTIPROS toolbox was implemented at intervention schools. Action teams within intervention schools, consisting of children and teachers, were free to choose interventions from the toolbox. Teachers documented intervention choices and implementation within a short questionnaire (SIQ) at t1.

**Results:** In total, 20 classes (N=429 students) were recruited to take part in the study. The mean consent rate was 75.1% (n=322). At t0 and t1, n=304 (94.4%) and n=256 (79.3%) of consented children took part in the DMT, respectively. Half of the participating classes received accelerometers (t0: n= 166 students; t1: n=151 students). At t0, n=133 (80.1%) and n=106 (70.2%) valid records could be retrieved, respectively. Intervention schools successfully implemented at least one intervention, whereby two schools replaced the intervention during the school year. 7/10 intervention classes completed the SIQ. Intervention classes tended to choose similar interventions but implementation frequency was highly different. In intervention schools, accelerometry indicated a mean increase of 15.5min (95%CI: 4.5,26.6) in MVPA compared to controls.

**Conclusions:** All intervention classes were able to implement at least one intervention from the toolbox, and unsuitable interventions were successfully replaced in a timely manner. We achieved good response rates for accelerometer and motor skills data. The remarkable trend towards an increase in MVPA will be tested in a subsequent randomized controlled trial.



# SnackTrack – an app-based tool to assess the influence of digital and physical environments on snack choice

Miss Eva Valenčič<sup>1,3,4,5</sup>, Dr. Emma Becket<sup>2,5</sup>, Prof. Barbara Koroušić Seljak<sup>3,4</sup>, Prof. Clare Collins<sup>1,5</sup>, **Associate Prof. Tamara Bucher<sup>2,5</sup>**

<sup>1</sup>University of Newcastle, School of Health Sciences, College of Health, Medicine and Wellbeing, Newcastle, NSW, Australia, <sup>2</sup>University of Newcastle, School of Environmental and Life Sciences, College of Engineering, Science and Environment, Newcastle, NSW, Australia, <sup>3</sup>Jožef Stefan Institute, Computer Systems Department, Ljubljana, Slovenia, <sup>4</sup>Jožef Stefan International Postgraduate School, Ljubljana, Slovenia, <sup>5</sup>Hunter Medical Research Institute, Food and Nutrition Program, Newcastle, NSW, Australia

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Environmental factors have great influence on consumer behaviour, including food choices. Therefore, focusing not only on individual's behaviours, but also on the food choice and eating environment should be considered when trying to improve dietary behaviours. In the recent years, consumers' everyday food choice environments shifted, with food choices frequently conducted in digital settings, such as in online grocery stores, pre-ordering systems or food delivery services. Food choices are often influenced by environmental cues which are processed unconsciously. Thus, strategically changing cues in the physical and the digital environment, might help promoting healthier food choices. The aim of this study was to develop a novel tool to investigate the influence of physical and digital environments on consumer's food choices.

**Methods:** This feasibility study developed and tested a mobile app, called SnackTrack. The app was used to collect data on the snack choices of 188 app users in real-life settings between February and April 2022. It asked users to take a photo of the food they were planning to consume, and to provide additional information regarding the physical environment and context in which the food was consumed. The app also exposed users to different user interface designs, which were implemented as mobile app backgrounds. Participants were randomised in 4 intervention conditions (background of either fruits, vegetables, salty snacks or sweets), or a control condition (grey-coloured background).

**Results:** During the intervention participants from Australia and Slovenia submitted a total of 1,763 photos. The majority of snacks (76.1%) was obtained at the moment of consumption, purchased by participant themselves (66.3%), and consumed when participants were alone (74.9%). Most snacks consumed by Australian participants were eaten at the working desk (35%), while Slovenian participants consumed most snacks at the dining table (31.8%). Results suggest that time of snack obtainment did not have a significant effect on the healthfulness of snacks chosen. However, findings suggest that 'unhealthy' background images encouraged healthier snack choices.

**Conclusions:** Despite consumers having the knowledge about the impact of diet on health, environmental stimuli can influence their food choices. SnackTrack is a novel tool to investigate environmental and digital nudging impacts on food choices.

# A social network analysis of self-efficacy and social connection among CrossFitters.

**Ms. christina amo**<sup>1</sup>, Dr. Meg Patterson<sup>1</sup>, Dr. Tyler Prochnow<sup>1</sup>, Dr. Katie Heinrich<sup>2</sup>, Ms. Allison Francis N.<sup>1</sup>

<sup>1</sup>Texas A&M University, COLLEGE STATION, USA, <sup>2</sup>Kansas State University, Manhattan, USA

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Physical activity (PA) adherence and retention rates continue to decrease. Self-efficacy (SE) is a key factor of PA participation; increasing exercise SE increases one's likelihood of PA adherence and retention. Likewise, social support and connectedness also improve PA behavior. Studies suggest social networks and social connections are associated with individual-level SE, however less is understood about whether SE drives people to connect with one another in group-exercise settings. CrossFit is one type of group-exercise with a particularly strong sense of community. Therefore, the purpose of this study was to examine the relationship between SE and social connection among a network of CrossFitters.

**Methods:** All members of a CrossFit gym were invited to complete surveys assessing exercise SE, sense of community, PA frequency, CrossFit competition participation, and the class time that they primarily attended. Respondents then used a roster of all network members to nominate those that they regularly workout with or see at the gym. Nearly two thirds of the gym (60.8%, n=66, 71% female, 98% white, 34.4+/- 9.67 years) completed surveys. Exponential random graph modeling (ERGM) was used to determine if SE was associated with social connections between CrossFitters in this network.

**Results:** ERGMs indicated that those with higher SE ( $PE = 0.16$ ,  $p < 0.01$ ) were significantly more likely to create social connections than would be expected by chance. Additionally, connections existed more between people with similar PA frequency scores ( $PE = 0.10$ ,  $p < 0.001$ ), those who attended class at the same time ( $PE = 0.94$ ,  $p < 0.001$ ), those that participated in CrossFit competitions ( $PE = 0.25$ ,  $p < 0.001$ ), and those that reported a higher sense of community ( $PE = 0.01$ ,  $p < 0.001$ ).

**Conclusion:** Coaches and fitness instructors may use these results to encourage social connection among participants. Strategically placing members into classes based on SE, PA frequency, CrossFit competition participation, and sense of community may increase social connection and, therefore, enhance their PA experience. Future studies could determine if improved social connectedness ultimately leads to increased PA adherence and retention rates.

# Internet-connected exercise equipment supports physical activity among persons with a history of insufficient activity

**Dr. Margaret Schneider<sup>1</sup>**, Ms. Amanda Woodworth<sup>1</sup>

<sup>1</sup>University of California, Irvine, Irvine, USA

Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** The majority of U.S. adults do not meet physical activity (PA) public health guidelines. Recent advances in technology have introduced a new generation of home exercise equipment that is enhanced via internet with live and on-demand classes. There is a dearth of information, however, about whether internet-connected fitness equipment holds the potential to benefit only persons who have a history of engaging in regular PA.

**Methods:** In winter 2022, we recruited 880 Peloton bike owners (92% female, 6% Hispanic, 88% non-Hispanic White; age range 22-70+) from 38 Facebook sites with a Peloton theme. Study participants completed a survey assessing their past and present PA participation and reasons for purchasing a Peloton.

**Results:** Following the criteria of the Godin Leisure-Time Exercise Questionnaire, 30% of survey respondents were insufficiently active in their teens, 30% were insufficiently active in their twenties, and 5% were insufficiently active currently. Those insufficiently active both in their teens and in their twenties comprised 20% of the total sample (N = 93). Regardless of past PA history, respondents were equally motivated to purchase their Peloton by the convenience of exercising at home (~90%), the variety in classes and instructors (~54%), and the beliefs that it would help with meeting exercise goals (~75%), improve well-being (~54%), and help with stress coping (~50%). Those with a history of insufficient activity were less likely to report being motivated by expecting to enjoy it (48% vs. 58%) but more likely to be motivated by the belief that the Peloton would help them feel more connected with others (30% vs 20%).

**Conclusions:** Internet-connected home exercise equipment may support regular PA even among adults with a history of insufficient PA, although motivations may differ between persons with and without a history of regular PA. Home-based exercise equipment that is enhanced with an internet connection to provide on-demand and live classes may be an effective tool for promoting physical activity, even among individuals who were insufficiently active in their teens and young-adulthood.

# Training experiences and intervention preferences of recreational youth soccer coaches

**Dr. Jorge Banda<sup>1</sup>**, Mr. Ivan Mendoza<sup>1</sup>, Dr. Yumary Ruiz<sup>1</sup>

<sup>1</sup>Department of Public Health, College of Health and Human Sciences, Purdue University, West Lafayette, USA

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Team sports coaches can have a tremendous impact on child health and development. Despite their potential, coaches have been mostly overlooked in public health intervention research. The purpose of this study was to determine youth sports coach training experiences and coaches' interest and preferences for a coach training program.

**Methods:** This study was conducted in a recreational youth soccer organization in a mid-sized city in the Midwestern part of the U.S. The organization offered co-ed (U5-U6), girls (U7-U14 and U18), and boys (U7-U14 and U18) soccer. Coaches aged  $\geq 18$  years were eligible to participate in this study. Participants were asked to complete an online survey to assess coach demographic characteristics, coaching experience, soccer playing experience, coach training experience, soccer knowledge (rules, skills, and tactics), and interest and preferences for a coach training program (including content, mode of delivery, and program timing, frequency, and duration).

**Results:** 58 coaches (mean age =  $39.5 \pm 6.6$  years, 76% male) participated in this study. Although 88% of participants had previous team sports coaching experience (mean team sports coaching experience =  $5.3 \pm 5.9$  years), 86% had not earned a coaching certification, 74% had not participated in a coach training program, and 35% had never played on an organized soccer team. Participants rated their knowledge of soccer rules, skills, and tactics as  $6.8 \pm 2.3$  on a scale of 1 (poor) to 10 (excellent). When asked what they would like to learn in a coach training program, a majority selected soccer skills and tactics (92%), effective motivational techniques (60%), and physical fitness and conditioning (54%). Between coaches of younger and older age group teams, differences were found in coaching experience, coach training experience, and preferences in a coach training program. For example, more U10-U18 coaches than U5-U9 coaches selected healthy eating and nutrition as an area they would like to learn in a coach training program (16% vs 4%).

**Conclusions:** Although most participants have prior coaching experience, few have participated in a coach training program. Results from this study have important implications for the development of youth sports coach training programs.

# Mama Latina: Exploring Sociocultural Determinants of Hispanic Immigrants' Diets in the U.S.

**Ms. Grace Moore<sup>1</sup>**, Ms. Victoria Perez<sup>1</sup>, Dr. Maria Romo-Palafox, Ph.D., RD<sup>1</sup>

<sup>1</sup>Saint Louis University, St. Louis, USA

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Hispanic immigrants seemingly experience better health outcomes than their white, non-immigrant counterparts in the U.S., an observation known as the Hispanic Paradox. Yet despite greater socioeconomic and educational assimilation, subsequent generations of Hispanics seemingly experience worse health outcomes than their parents and grandparents. The purpose of Mama Latina, an ongoing formative, qualitative study, is to identify the sociocultural determinants of maternal eating and feeding behaviors in Hispanic immigrants in the U.S.

**Methods:** Bilingual researchers performed a preliminary thematic analysis on five 60-minute focus groups (2021-2022) with Hispanic immigrant mothers of children ≤18 years who shared their experiences with making food choices after immigrating to the U.S.

**Results:** Twelve Hispanic mothers who immigrated to the U.S. between the ages of 17 and 46 participated in five focus groups. Countries of origin included Mexico, Colombia, Honduras, Peru, and Costa Rica. Every group expressed frustration regarding perceived inferior taste and texture of fruits and vegetables and the lack of accessibility and availability of fresh produce. Every group also emphasized that they believe that their health and the health of their family have been negatively impacted by the types of food they consume in the U.S., although they all mentioned ongoing efforts to adhere to the healthy aspects of their original culture (e.g., cooking and eating at home without distractions).

**Conclusions:** Failing to acknowledge the process wherein immigrants adopt the dietary practices of a host culture (i.e., dietary acculturation) may lead to misleading conclusions about Hispanic's diets. Preference for fresh produce was evident; therefore, the lack of palatability compared to that of the produce in Latin America and the accessibility and availability barriers they experience in the U.S. explain why U.S. data on Hispanics suggests that they consume fewer fruits and vegetables than their non-Hispanic White counterparts. Preliminary themes from the ongoing study draw attention to sociocultural determinants of eating and feeding in Hispanic immigrant mothers that are expected to be associated with the adoption of maladaptive U.S. diet patterns. Understanding these determinants will provide the basis for specific interventions that delay the acquisition of maladaptive dietary behaviors and preserve healthy cultural habits.

# Maintenance Isn't Easy (But It Sure Is Hard Enough): Perceived Need for Maintenance Programming in Graduates of a Pediatric Obesity Lifestyle Management Program

**Dr. Madelaine Gierc**<sup>1</sup>, Ms. Sundip Khosa<sup>2</sup>, Ms. Serena Bring<sup>2</sup>, Ms. Kiran Kalkat<sup>1</sup>, Ms. Arlene Cristall<sup>1</sup>

<sup>1</sup>Shapedown BC, BC Children's Hospital, Vancouver, Canada, <sup>2</sup>YMCA of Greater Vancouver, Vancouver, Canada

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Overweight/obesity affects approximately one third of children in Canada. Shapedown BC is a family-based lifestyle intervention that aims to provide patients and families with the knowledge and skills to support health behaviours. However, even with increased capacity, it can be hard for families to sustain health behaviours over the long-term. The purpose of the current study was to investigate the perceived need for maintenance support in Shapedown BC graduates.

**Methods:** The current study followed a cross-sectional mixed-methods design. To address barriers to participation, a flexible data collection procedure was utilized with families invited to complete either a focus group, telephone interview, online questionnaire, or pen-and-paper questionnaire. Items examined experiences with Shapedown BC, programming preferences, and social cognitions surrounding maintenance programming. Quantitative items were rated on a 5-point scale, with higher values indicating more favourable perceptions.

**Results:** Forty-five families provided feedback from across British Columbia. Families spoke positively of their program experience, with particular focus on health education and skills development. Families were moderately confident ( $M = 3.50$ ,  $SD = 0.87$ ) in their ability to engage in health behaviour post-intervention. There was widespread interest in maintenance, with families ( $N = 21$ ) reporting that they want maintenance programming ( $M = 4.05$ ,  $SD = 0.97$ ); that maintenance programming would help them reach their health goals ( $M = 4.28$ ,  $SD = 0.85$ ); and that they would be likely to attend programming ( $M = 4.48$ ,  $SD = 0.87$ ). Confidence was weakly associated with perceptions of maintenance programming ( $r_s = -0.15$  to  $0.17$ ,  $p_s > 0.05$ ). Families identified that they would like programming offered at least once per month, for approximately 1 year after completing the 10-week program. There was interest in a range of activities, particularly applied activities like cooking classes and physical activity.

**Conclusion:** Though families reported positive experiences with Shapedown BC, they also identified the need for long-term health behaviour support. There was consistent interest in maintenance programming, with a preference for regular (i.e., monthly) activities. Findings suggest there is a need for pediatric lifestyle programs to support families beyond the end of the intervention.



# Improving the usability of online resources to support implementation research and practice: The RE-AIM website use case

**Mrs. Emiliane L. Pereira<sup>1</sup>**, Mr. Thomas E Strayer<sup>5</sup>, Mrs. Samantha Harden<sup>4</sup>, Mrs. Christina Studts<sup>2</sup>, Mrs. Tzeyu Michaud<sup>1</sup>, Mr. Paul Estabrooks<sup>3</sup>, Mr. Russell Glasgow<sup>2</sup>, Mrs. Amy Huebschmann<sup>2</sup>

<sup>1</sup>University of Nebraska Medical Center, Omaha, USA, <sup>2</sup>University of Colorado Anschutz Medical Campus, Aurora, USA, <sup>3</sup>University of Utah, Salt Lake City, USA, <sup>4</sup>Virginia Tech Carilion School of Medicine, Blacksburg, USA, <sup>5</sup>Vanderbilt University Medical Center, Nashville, USA

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** The objectives of this project were: 1) systematically conduct need and priority assessments of the RE-AIM website (re-aim.org) usability; 2) iteratively improve the RE-AIM website structure based on testing input, and guidance from end-users and RE-AIM experts; and 3) compare RE-AIM website usability before and after modifications.

**Methods:** We applied a mixed-methods approach to obtain user feedback on the RE-AIM website among dissemination and implementation (D&I) science researchers and practitioners. Through survey questionnaires, we assessed usability (i.e., System Usability Scales [SUS]) and interactivity (i.e., Interactivity Scale) in a convenience sample of 24 participants at baseline and after two iterative rounds of website modifications (i.e., Round 1, Round 2). Qualitative assessments of usability through participant interviews were also at baseline, Round 1 and Round 2. We examined the changes in the SUS (0-100 scale, higher is better) and Interactivity scales from baseline (pre assessment) to Round 1 and Round 2 (post assessment) using a t-test.

**Results:** We found significant improvements on system usability score (pre mean= 64.1, post mean =81.5,  $p<0.05$ ) and interactivity (pre mean=3.5, post mean =4.0,  $p<0.05$ ) from pre to post assessment.

**Conclusion:** A mixed methods, iterative approach led to significantly increased usability and interactivity. Primary qualitative findings from baseline and Round 1 included: the need to simplify the accessibility of information; to provide concrete guidance on RE-AIM framework for planning, implementation, and evaluation; and to clarify how contextual factors related to RE-AIM constructs. These findings resulted in online modifications including a new webpage with a tour guide, welcome video, new interactive planning tool, and a video introduction of contextual factors that influence RE-AIM outcomes. Round 2 qualitative results suggested that the user experience was improved, the website contained useful information, and it was easy to use and navigate. While the update of the REAIM website is continuous, the key domains (i.e., homepage, grant writing resources, and resources and tool sections) realized from the present project may be salient to others seeking to build implementation science capacity through online resources.

# Improving the reach evidence-based, lifestyle interventions: Patient and provider co-production of tools to promote access and utilization.

**Prof. Paul Estabrooks<sup>1</sup>**, Dr. Amy Locke<sup>1</sup>, Ms. Megan Miller<sup>1</sup>, Ms. Linnea Horvath<sup>1</sup>, Ms. Ellen Mussler Maxfield<sup>1</sup>

<sup>1</sup>University of Utah, Salt Lake City, USA

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** The proliferation of clinically available, evidence-based interventions (EBIs) that effectively help people eat better, move more, lose weight, and prevent chronic disease has increased the challenges, from patient and provider perspectives, in determining the best fit of an intervention for a given patient. We conducted a co-production strategy to facilitate the mapping of patient and provider needs to characteristics of research tested recruitment strategies with a goal of developing a prototype tool to promote access to, and utilization of, available lifestyle EBIs.

**Methods:** A Comprehensive Participatory Planning and Evaluation (CPPE) strategy was implemented across a sequence of 3 collaborative meetings each with primary care providers (n=8) and patients (n=15). The meetings included (1) the development of user-centered causal maps of facilitators and barriers to enrollment in lifestyle EBIs, (2) a review, prioritization, and adaptation of research-tested strategies to increase patient enrollment based on the causal maps, and (3) prototype development for recruitment strategy implementation in primary care settings. Qualitative data was interpreted collaboratively by the providers, patients, and researchers.

**Results:** Causal maps included shared and unique barriers and facilitators for patients and providers. Key factors to address were a lack of awareness of available EBIs, provider time to refer, and that patients expressed a strong interest in personalized referrals from providers, while providers felt overwhelmed with the number of potential referrals. Population health management (PHM), community wide, and mass media marketing strategies were assessed for degree of fit with patient and provider causal maps. PHM that leveraged automation within the electronic health record, gave providers autonomy, and allowed flexibility in how patients received personalized referrals was acceptable to patients and providers. Community-wide strategies were also positively reviewed, but that it may cast too wide a net and increase clinical workload fielding self-referrals. Prototype materials for both the population health management and community wide recruitment strategies were developed, revised, finalized, and approved by patient and provider groups.

**Conclusions:** The CPPE process resulted in the development a prototype recruitment system that addressed patient and provider concerns and preferences and has strong potential to improve access to, and utilization of, lifestyle EBIs.

# Feasibility of a Family-Based Program to Strengthening Latinx Youth Mental Wellbeing by Promoting Nutrition and Physical Activity: The Familias Activas Experience

**Assistant Prof. Ghaffar Hurtado Choque<sup>1</sup>**, Dr. Hilda Garcia Cosavalente<sup>1</sup>, Dr. Alexander Chan<sup>1</sup>, Dr. Matthew Rodriguez<sup>2</sup>

<sup>1</sup>University of Maryland, College Park, USA, <sup>2</sup>University of California, Roseville, USA

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** This study examines the feasibility of Familias Activas(FA) developed following participative research principles. Obesity and overweight is a major public-health concern among US. Latino youth. Healthy eating and physical activity can prevent obesity, and its benefits extend to youth mental health, a growing concern that has disproportionately impacted youth in recent years. Latino families face an increased risk for depressive symptoms compared to white youth. Sports are also linked to psychosocial and behavioral concerns, that can improve mental wellbeing. FA is a community-university collaboration, the program includes three interrelated components: 1) Parent - Healthy parenting practices; 2) Youth - Positive Youth Development (PYD) to promote mental health; and 3) Youth Physical Activity (PA) soccer practices. The resulting intervention includes eight (1.5 hrs.) sessions. Youth focused on PYD and soccer practices.

**Methods** One-group pretest-posttest. Participating families included Latinx parents (n=16) of adolescents aged 10 to 14 years (youth n=30). Parent sessions were led by trained parent educators in Spanish, and youth session focused on PYD and soccer practices (PA), mostly in English led by certified soccer coaches, trained in Youth Mental Health (MHFA). Feasibility measures included, retention rates, program appropriateness (interest, relevance, comfort level, and satisfaction), and program quality. Parenting outcomes included: acceptance and involvement (and others), youth resilience, life skills, among others.

**Results:** Feasibility was assessed with descriptive statistics. Paired t-tests measured changes in parenting outcomes. Adjusted multiple regression models were conducted for change in each outcome. Program appropriateness and group interaction scores were positive Parents attended an average of seven sessions; 76% attended seven to eight sessions. Mean scores averaged across all sessions were similar for interest, relevance, comfort level, and satisfaction (M = 2.90, 2.94, 2.90, 2.90 on 3-point scale). Improvements was noted for the parenting outcomes. Youth increased motivation in engaging soccer practices, PA, and self-efficacy.

**Conclusions:** This FA intervention is feasible by high levels of program acceptability and retention through the majority sessions and may influence healthy parenting contributors to youth wellbeing. Participating youth were motivated to attend the fun soccer practices, reminding their parents to attend the FA program.

# CANcer BEhavioural Nutrition and Exercise Feasibility Trial: lessons learned and early results

**Dr. Cindy Forbes<sup>1</sup>**, Mr. Jordan Smith<sup>1</sup>, Dr. Alex Bullock<sup>1</sup>, Dr. Angela Darby<sup>3</sup>, Prof. Michael Lind<sup>2</sup>, Dr. Flavia Swan<sup>1</sup>, Prof. Miriam Johnson<sup>1</sup>

<sup>1</sup>University of Hull, Hull, United Kingdom, <sup>2</sup>Queen's Centre for Oncology and Haematology, Cottingham, United Kingdom, <sup>3</sup>York Teaching Hospital, York, United Kingdom

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** C. Cancer prevention and management

**Purpose:** Older adults with lung cancers are often frail and unfit, negatively affecting treatment tolerance and quality of life (QoL); more than younger counterparts. Lifestyle behaviours, like physical activity (PA) and healthy nutrition, significantly improve QoL among people with cancer. They may also positively impact treatment completion rates, potentially improving survival. However, older, frailer lung cancer populations are typically excluded from research as, assumed to be too high risk. Following our previous development research, our aim was to investigate the feasibility and acceptability of conducting a large RCT of a tailored wellbeing programme for older adults with lung cancers.

**Methods:** Clinical teams identify older adults ( $\geq 60$  years) with stage III/IV lung cancer or mesothelioma who are offered new (first/subsequent) systemic anti-cancer treatment (chemotherapy, radiotherapy, and/or immunotherapy). The primary outcome is feasibility assessed by recruitment/retention rates, data collection/quality, and programme adherence/acceptability. Secondary measures include PA, frailty, performance status, physical function, body composition, grip strength, nutritional status, symptom burden, treatment tolerance, QoL, and health service usage. Participants receive a tailored home-based PA and nutrition programme (resistance bands, Fitbit, handheld fan, tailored educational materials) with initial consultation sessions with a qualified physiotherapist and a dietitian. Participants are followed over 12 weeks with check-in calls. Measures are collected at mid-point (6 weeks – survey only), post-study (12 weeks) and, at 24 weeks. At 12 weeks, in-depth interviews are conducted with participants to explore acceptability further.

**Results:** Recruitment closes 28 February 2023. Recruitment rate is currently ~27% (6 consented). Therefore, we changed from a 2-group RCT to a 1-group trial. Participants have completed all intended measures and 90% of check-in appointments. Changes in measures will be reported, but so far, interviews show increased confidence for other activities (e.g., going out, walking more, visiting family more), feeling stronger overall, and positive views about the tailored, adaptable programme.

**Conclusions:** Though a challenging time for clinic-based recruitment, those recruited to date, have felt it helpful and worthwhile. We will use the interviews and feasibility data to understand how best to further evaluate this potentially beneficial programme for this overlooked group of people with cancer.

# The Association of parents' obesity and lifestyle factors with the excessive body weight of children: PICCAH study

**Dr. Grazyna Badowski<sup>1</sup>, Mr. Nico Valencia<sup>1</sup>**, Dr. Tanisha Aflague<sup>1</sup>, Dr. Margaret Hattori-Uchima<sup>1</sup>, Dr. Kathryn Wood<sup>1</sup>, Dr. Rachael Leon Guerrero<sup>1</sup>

<sup>1</sup>University of Guam, Mangilao, Guam

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** To examine the associations of parents' weight, physical activity (PA), sedentary behavior (SB), screen time (ST), and parental support for children's physical activity and nutrition with body weight in their children participating in the Pacific Island's Cohort for Cardiometabolic Health (PICCAH) study, conducted in Guam 2017-2022.

**Methods:** The preliminary data from the cross-sectional study in Guam included 481 parent-child dyads (458/32 mother/father, parent aged 21-50y, child aged 3-9y) with complete data on body weight categories and who completed lifestyle surveys. Binary logistic regression, adjusted for age and gender of children, was used to identify which of parents' lifestyle indicators were associated with the weight status of their children.

**Results:** The majority of parents (81.5%) and 26.6% of children were overweight or obese (OWOB). Adults in this study did not meet physical activity (55.5%), sleep (56.5%), or sedentary behavior (61.1%) recommendations. Children did not meet screen time (73.1%), and sleep (54.5%) recommendation. Adults with obesity significantly increased their child's odds of OWOB (OR=3.05, 95% CI: 1.88-4.94). For family eating activity practices, eating "often" or "very often" at fast food restaurants, as reported by adults, was associated with higher rates of the OWOB in children (OR=1.56, 95% CI: 1.01-2.44); and limiting screentime by parents was associated with lower levels OWOB in their children (OR=.18, 95% CI: 0.05-0.62).

**Conclusions:** Family-based lifestyle interventions could prevent the development of OWOB in the children in Guam.

Funding Source: NIH/NIMHD (1U24MD011201-01)

# Physical activity has a stronger correlation with arterial stiffness than grip strength, balance, or BMI in the elderly

Ms. Hannah Hill<sup>1</sup>, **Dr. Catherine Elliot<sup>1</sup>**, Dr. Catherine Lizamore<sup>2</sup>

<sup>1</sup>Lincoln University, Christchurch, New Zealand, <sup>2</sup>Ara Institute of Canterbury, Christchurch, New Zealand

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** Arterial stiffness (AS) is associated with an array of debilitating health conditions, worsening with age. This cross-sectional study aimed to investigate the relationship between balance, grip strength, cardiovascular fitness and physical activity with AS (using pulse wave velocity (PWV)) in older adults.

**Methods:** Eighty-one retirement-village residents (24 males, 57 females, age:  $78.2 \pm 6.4$  years, weight:  $69.4 \pm 12.5$  kg, height:  $162.9 \pm 8.5$  cm, BMI:  $26.1 \pm 4$ ) completed the Yale Physical Activity Survey, PWV (applanation tonometry), 30-second sit-to-stand leg strength test, hand grip strength assessment, 4-stage balance test, and a 6-minute walk fitness test. Pearson's correlations were used to assess the relationship between PWV with health and fitness parameters. A linear regression then assessed the variables with the highest correlations with PWV.

**Results:** The number of cardiovascular risk factors ( $r = 0.57$ ,  $p < 0.01$ ), age ( $r = 0.51$ ,  $p < 0.01$ ) and systolic blood pressure ( $r = 0.50$ ,  $p < 0.01$ ) had strong, harmful associations with PWV. Total physical activity minutes/week ( $r = -0.1$ ,  $p = 0.01$ ), total Kcal/week ( $r = -0.30$ ,  $p = 0.01$ ), and the 6-minute walk test ( $r = -0.29$ ,  $p = 0.01$ ) had a moderate, beneficial association with PWV, whereby sit-to-stand ( $r = -0.27$ ,  $p = 0.02$ ) and balance ( $r = -0.27$ ,  $p = 0.01$ ) had a weak, beneficial association with PWV. Grip strength had a non-significant relationship with PWV ( $r = -0.02$ ,  $p = 0.94$ ). Body mass index had no significant association with PWV ( $r = -0.04$ ,  $p = 0.75$ ).

**Conclusions:** Having an increased number of risk factors, increased age, and a higher systolic blood pressure had negative correlations on arterial stiffness in an elderly population. Physical activity had the highest positive association with AS. Older adults living in retirement homes should be encouraged to engage in higher physical activity levels to reduce arterial stiffness.



# Distilling causality between physical (in)activity and obesity

Dr. Zhe Wang<sup>1</sup>, Prof. George Davey Smith<sup>2,3</sup>, Prof. Ruth Loos<sup>1,4</sup>, Dr. Marcel Den Hoed<sup>5</sup>, **Dr. Hannah Brooke**<sup>1</sup>.  
<sup>1</sup>The Charles Bronfman Institute for Personalized Medicine, Icahn School of Medicine at Mount Sinai, New York, New York, USA, <sup>2</sup>MRC Integrative Epidemiology Unit, University of Bristol and NIHR Bristol Biomedical Research Center, Bristol, United Kingdom, <sup>3</sup>Population Health Science, Bristol Medical School, University of Bristol and NIHR Bristol Biomedical Research Center, Bristol, United Kingdom, <sup>4</sup>Novo Nordisk Foundation Center for Basic Metabolic Research, Faculty of Health and Medical Sciences, University of Copenhagen, Copenhagen, Denmark, <sup>5</sup>The Beijer Laboratory and Department of Immunology, Genetics and Pathology, Uppsala University and SciLifeLab, Uppsala, Sweden

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** To what extent obesity is a cause and/or a consequence of low physical activity levels and more time spent being sedentary has still not yet been fully elucidated. Observational studies and genetic correlations suggest that higher education is associated with more physical activity and lower risk of obesity.

**Methods:** Leveraging results from our recent genome-wide association study for moderate-to-vigorous intensity (MV) physical activity and leisure screen time (screen time), we here disentangle the causal relationships between these two traits, education – defined by years of schooling – and obesity, measured by body mass index (BMI) using multiple univariate and multivariate Mendelian Randomization (MR) approaches.

**Results:** Univariate MR analyses show bidirectional causal effects between physical (in)activity traits and BMI. However, when taking years of schooling into account, multivariate MR analyses show that more MV physical activity causes a lower BMI, and a higher BMI causes more screen time, but not the other way around. In addition, more years of schooling causes higher levels of MV physical activity, less screen time, and lower BMI.

**Conclusion:** In conclusion, results from multivariate MR analyses highlight beneficial effects of education and suggest that more physical activity leads to lower adiposity, while time spent sedentary per se is a consequence but not a cause of obesity.

# Examining the Use of Digital Technology for Nutrition Training in the ECE Setting Amid the COVID-19 Pandemic

**Dr. Lucine Francis<sup>1</sup>**, Dr. Chelsea Kracht<sup>2</sup>, Ms. Wenyi Chen<sup>1</sup>, Dr. Alison Tovar<sup>3</sup>, Dr. Kim Gans<sup>4</sup>, Dr. Nancy Perrin<sup>1</sup>

<sup>1</sup>Johns Hopkins University School of Nursing, Baltimore, USA, <sup>2</sup>Pennington Biomedical Research Center, Baton Rouge, USA, <sup>3</sup>Brown University School of Public Health, Providence, USA, <sup>4</sup>Department of Human Development and Family Sciences, University of Connecticut, Storrs, USA

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** During the COVID-19 pandemic, many states implemented stay-at-home orders, disrupting the availability of in-person nutrition training for early care and education (ECE) providers. Nutrition training is critical to ensure providers have the latest nutrition information to support children's health. COVID-19-related nutrition policies for the ECE setting emerged, making nutrition training crucial during the pandemic. The Child and Adult Care Food Program (CACFP), a federal subsidy program to help provide healthy foods, offers training to ECE providers. Digital technology can connect providers to online training and reduce participation barriers. Little is known about how ECE providers leverage digital technology to support training. This study examines the use and barriers to using digital technology for nutrition training in the ECE setting amid the pandemic.

**Methods:** Data were collected using a self-administered online survey informed by the Technology Acceptance Model. We recruited a convenience sample of ECE providers via state agency listservs and social media posts, including CACFP. Descriptive statistics describe participants' demographic characteristics. A chi-square test examined the relationship between digital use and selected demographic factors.

**Results:** 143 participants from center-based (n=91) and Family Child Care Homes (FCCHs, n=52) were represented across all regions of the US. Participants were 50.4% ECE administrators, 61.5% non-Hispanic White, 52.5% ages 40-59, 62.9% with a college degree, and 81.1% enrolled in the CACFP. Regarding general digital technology use, over 97.9% of providers had access to high-speed internet, and 95.1% used electronic devices, primarily tablets (70%). Nearly 85% report being confident about using digital technology. Most ECE providers (83.2%) received nutrition training since the start of the pandemic in March 2020, with CACFP being the largest training source (49%). Digital Use is significantly associated with CACFP as the source of training ( $p=0.007$ ). Over half the sample (53.2%) received nutrition training via virtual platforms. However, only 18-30% of the trainings contained information regarding COVID-19-related changes in feeding practices in the ECE setting.

**Conclusion:** Digital technology can support the continuity of training in the face of significant disruptions due to the pandemic and has the potential to reach more providers than in-person trainings.

# Examining the Routine Use of Digital Technology to Create Opportunities for Active Play in the ECE Setting

**Dr. Lucine Francis<sup>1</sup>**, Dr. Chelsea Kracht<sup>2</sup>, Dr. Alison Tovar<sup>3</sup>, Ms. Grace Chen<sup>1</sup>, Dr. Nancy Perrin<sup>1</sup>, Dr. Kim Gans<sup>4</sup>

<sup>1</sup>Johns Hopkins University School of Nursing, Baltimore, USA, <sup>2</sup>Pennington Biomedical Research Center, Baton Rouge, USA, <sup>3</sup>Brown University School of Public Health, Providence, USA, <sup>4</sup>Department of Human Development and Family Sciences, University of Connecticut, Storrs, USA

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Since many working families rely on the early care and education (ECE) setting for their childcare needs, this setting is a prime space to promote active play. Digital technology can assist providers in supporting active play in the ECE setting. We know little about how ECE providers leverage digital technology to create opportunities for active play. The study aims to examine ECE providers' routine use of digital technology to create opportunities for active play for the children in their care.

**Methods:** Data were collected using a self-administered, online survey developed with the guidance of the Technology Acceptance Model. We recruited a convenience sample of ECE providers via state agency listservs and social media posts. Pearson's chi-square tests assessed the association between digital use and selected variables.

**Results:** A total of 143 participants from center-based (n=91) and Family Child Care Homes (FCCHs) (n=52) were represented across all regions of the US. Participants were 50.4% ECE administrators, 61.5% non-Hispanic White, 52.5% ages 40-59, 62.9% with a college degree, and 81.1% enrolled in the CACFP. Regarding technology use, over 97% of providers had access to high-speed internet, and 95% used electronic devices, primarily iPads (70%). Over half of the providers (65.7%) use digital technology to create opportunities for active play. Digital use is significantly associated with the participants' race/ethnicity (p-value <0.05) and age group of children (p-value <0.01). Participants perceived challenges to be the lack of technology equipment (28%), lack of knowledge of digital enrichment (25.2%), and the perceived high cost of digital active play/physical activity programs (26.6%). Finally, about 14% of participants who do not use digital technology for active play report that they intend to use it in the future.

**Conclusion:** Most ECE providers use digital technology to create opportunities for active play. Educating ECE providers on inexpensive and developmentally appropriate digital active play programs could help overcome providers' perceived challenges.

# Depression and positive affect in women newly diagnosed with breast cancer: Cross-sectional associations with device-measured physical activity and sedentary time

**Prof. Jeff Vallance**<sup>1</sup>, Dr. Christine Friedenreich<sup>2</sup>, Dr. Qinggang Wang<sup>2</sup>, Dr. Charles Matthews<sup>3</sup>, Dr. Lin Yang<sup>2</sup>, Prof. Margaret McNeely<sup>4</sup>, Prof. Nicole Culos-Reed<sup>5</sup>, Prof. Gordon Bell<sup>4</sup>, Dr. Jessica McNeil<sup>6</sup>, Ms. Leanne Dickau<sup>2</sup>, Prof. Kerry Courneya<sup>4</sup>

<sup>1</sup>Athabasca University, Athabasca, Canada, <sup>2</sup>Alberta Health Services, Calgary, Canada, <sup>3</sup>National Cancer Institute, Bethesda, USA, <sup>4</sup>University of Alberta, Edmonton, Canada, <sup>5</sup>University of Calgary, Calgary, Canada, <sup>6</sup>University of North Carolina Greensboro, Greensboro, USA

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** C. Cancer prevention and management

**Purpose:** Few studies have examined depression after a cancer diagnosis and before initiating adjuvant or neoadjuvant systemic treatments. In this study, we present baseline data on device-measured physical activity, sedentary behaviour, depression, and positive affect in newly diagnosed breast cancer survivors. To examine associations of accelerometer-assessed physical activity and sedentary time with depression symptom severity and depression prevalence.

**Methods:** Shortly after diagnosis, 1,425 participants completed depression, happiness, and satisfaction with life measures and wore an ActiGraph® device and the activPAL™ inclinometer on their thigh for seven days to measure sedentary time (sitting/lying) and steps (1,384 completed both device measures). ActiGraph® data were analyzed using a hybrid machine learning method (R Sojourn package, Soj3x), and activPAL™ data using activPAL™ algorithms (PAL Software version 8). We used linear and logistic regression to examine associations of physical activity and sedentary time with depression symptom severity and depression prevalence, happiness, and satisfaction with life. For logistic regression analysis, we compared participants with none-minimal depression (n=895) to participants with some depression [i.e., mild, moderate, moderately-severe, or severe depression (n=530)].

**Results:** Mean depression symptom severity score was 4.3 (SD=4.1), mean satisfaction with life score was 25.7 (SD=7.2), and mean happiness score was 70 (SD=21.8). Depression symptom severity was negatively associated with moderate-to-vigorous physical activity (MVPA) ( $\beta=-0.51$ , 95% CI: -0.88 to -0.14,  $p=0.007$ ). MVPA was associated with a significantly reduced odds of at least mild or worse depression [Odds Ratio (OR) =0.78, 95% CI: 0.63 to 0.97,  $p=0.026$ ]. Depression symptom severity was also negatively associated with average daily steps ( $\beta=-0.17$ , 95% CI: -0.24 to -0.10,  $p<0.001$ ). Perceptions of happiness was significantly associated with MVPA ( $\beta=2.17$ , 95% CI: 0.18 to 4.17,  $p=0.033$ ) and steps per day ( $\beta=0.50$ , 95% CI: 0.13 to 0.87,  $p=0.008$ ). Sedentary time was not associated with depression but was inversely associated with perceptions of happiness ( $\beta=-0.79$ , 95% CI: -1.48 to -0.11,  $p=0.024$ ).

**Conclusions:** Physical activity was inversely associated with depression symptom severity and odds of having mild or worse depression. Sedentary time was not associated with depression symptom severity or odds of having depression, but was inversely associated with perceptions of happiness.

# Exploring factors predicting Canadian early childhood educators' physical activity, sedentary behaviour, and outdoor play-related self-efficacy, behavioural intention, and perceived behavioural control

**Dr. Brianne Bruijns**, Dr. Matthew Bourke, Ms. Tanya Nguyen, Dr. Patricia Tucker

<sup>1</sup>Western University, London, Canada

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** F. Early care and education

**Purpose:** Early childhood educators (ECEs) can have substantial influence on young children's movement behaviors in childcare and psychosocial factors have been found to influence their teaching practices in this setting. The purpose of this study was to determine which personal characteristics predicted ECEs' self-efficacy, behavioral intention, and perceived behavioral control (PBC) to promote active childcare settings.

**Methods:** Canadian ECEs (n = 390) completed an online survey to collect demographic information (10 items) and ratings of their physical activity, sedentary behaviour, and outdoor play-related self-efficacy (30 items), behavioral intention (28 items), and PBC (28 items); composite scores were calculated. Latent profile analysis was conducted to identify subgroups of participants based on self-efficacy, behavioral intention, and PBC. Univariate differences in independent variables among profiles were explored and multinomial logistic regression was used to determine multivariate predictors of profile membership.

**Results:** In general, ECEs rated their self-efficacy, behavioural intention, and PBC similarly, except for one item related to engaging children in their care in 120 minutes of physical activity each day, where ECEs reported lower behavioural intention and PBC ratings compared to self-efficacy ratings. Most ECEs fit into profiles with high to very high ratings across all psychosocial variables. Being female, employed in centre-based childcare, not having a bachelor's degree, having completed an outdoor play professional development course, and achieving the adult physical activity guideline were associated with being in profiles with the highest ratings across all psychosocial variables.

**Conclusion:** Knowing which factors predict ECEs' confidence, intentions, and PBC to promote healthy active childcare environments will help researchers and practitioners develop resources and provide support for ECEs in such endeavours. Future research is needed to determine if ECEs' self-efficacy, behavioural intention, and PBC directly influence their teaching practices or their children's movement behaviours in childcare settings.

# A new tool to measure early childhood educators' physical activity, sedentary behaviour, and outdoor play-related behavioural intention and perceived behavioural control

**Dr. Brianne Bruijns<sup>1</sup>**, Dr. Andrew Johnson<sup>1</sup>, Dr. Shauna Burke<sup>1</sup>, Dr. Patricia Tucker<sup>1</sup>

<sup>1</sup>Western University, London, Canada

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** F. Early care and education

**Purpose:** Early childhood educators (ECEs) play a valuable role in childcare settings with respect to promoting physical activity and outdoor play and minimizing sedentary behaviour among young children. Assessing psychosocial variables among ECEs, such as their behavioural intention and perceived behavioral control (PBC), is one way to explore their motivation and ability to support these health behaviours. The ECE Movement Behavioural Intention and Perceived Control (ECE-MBIPC) questionnaire (n = 56 items) was developed via expert consensus to fill the noted gap in tools available to measure these constructs among ECEs in the context of physical activity, sedentary behaviour, and outdoor play.

**Methods:** A test-retest approach, via an online survey administered twice (one-week apart) was adopted to evaluate the reliability and factorial validity of the questionnaire with ECEs in Canada (n = 165). Seven behaviours (3 relating to physical activity, 2 relating to sedentary behaviour, and 2 relating to outdoor play) were included in the questionnaire, with 4 items used to assess intention and PBC for each of the 7 behaviours, respectively. Cronbach's alpha and test-retest statistics were used to assess reliability, while exploratory factor analysis (EFA) was used to examine factorial validity.

**Results:** The ECE-MBIPC questionnaire demonstrated high internal consistency (Cronbach's alpha > 0.85 across behaviour category subscales) and acceptable temporal stability (r > 0.70). A 7-factor solution was proposed by the EFA, with each of the 7 behaviours loading onto their own factor; this solution explained 71% of the variability in the data.

**Conclusion:** As the first reliable and valid tool to measure ECEs' behavioural intention and PBC to promote physical activity and outdoor play and to minimize sedentary behaviour in childcare, the ECE-MBIPC questionnaire will help to standardize how these psychosocial variables are measured in early years research. Standardizing the measurement of these important variables will enable comparisons across studies to provide a more fulsome understanding of how behavioural intention and PBC may influence ECEs' teaching practices and children's movement behaviours in childcare.



# Alignment of Early Learning Service Menus to Healthy Food, Drink and Choking Guidance in New Zealand

Ms. Olivia Hall<sup>1</sup>, Prof. Ajmol Ali<sup>1</sup>, **Prof. Carol Wham<sup>1</sup>**

<sup>1</sup>School of Sport, Exercise and Nutrition, Massey University, Auckland, New Zealand

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** F. Early care and education

**Purpose:** Healthy Active Learning (HAL) is a government programme that delivers education and health outcomes for children and youth across Aotearoa New Zealand and includes food and nutrition guidance for education settings such as early learning services (ELS). The programme seeks to assist ELS to develop policies and practices to promote healthy foods and drinks and support the development of healthy eating habits in childhood. As part of the baseline evaluation of HAL this study aimed to assess alignment of food and drinks served to NZ children in ELS with the Ministry of Health (MoH) *Healthy Food and Drink* and *Choking* Guidance.

**Methods:** Menus (n=271) collected remotely from 148 ELS between November 2020-March 2021 were analysed for their nutritional quality (percentage of 'green', 'amber', and 'red' menu items) using a scoring system based on the MoH guidance. Points were awarded based on the availability of healthy (green) menu items and the exclusion of unhealthy (red) menu items.

**Results:** Overall, of all menus 2.6% met the MoH *Healthy Food and Drink* Guidance and a fifth (18.5%) met the MoH *Choking* guidance. Menus for over two-year-olds (over-2s) scored, on average, 12% higher than menus for under two-year-olds (under-2s;  $p<0.01$ ). Services with a Heart Foundation *Healthy Heart Award* provided more green items to over-2s ( $p=0.04$ ) and under-2s ( $p=0.01$ ), and less red items to over-2s ( $p=0.04$ ). Providing more green menu items was inversely correlated with providing less high choking risk foods ( $p<0.01$ ). Menu scores did not vary by service location, neighbourhood socioeconomic deprivation or type (services operating independently versus those part of an education group chain).

**Conclusions:** Alignment of menus with MoH nutritional guidance was low, particularly in ELS caring for very young children (under-2s). The low compliance of ELS menus with the MoH guidance in this sample suggests that children's healthy eating exposures are lacking, whilst exposure to energy-dense, nutrient-poor foods and drinks is excessive. ELS who provided more healthy foods and beverages also provided less high-choking-risk foods may be more aware of the MOH Guidance. Greater uptake of the *Healthy Heart Awards* scheme could assist ELS to provide healthier food and drinks.

# Food Intake and Psychosomatic Symptoms in Adolescents<sup>6/15</sup>

**Mrs. Maria Tell<sup>1</sup>**, Prof. Katarina Hedin<sup>1,2</sup>, Dr. Mats Nilsson<sup>1</sup>, Associate Professor Marie Golsäter<sup>1,3</sup>, Dr. Hans Lingfors<sup>1</sup>

<sup>1</sup>Futurum, Region Jönköping County, and Department of Health, Medicine and Caring Sciences, Linköping University, Jönköping, Sweden, <sup>2</sup>Department of Clinical Sciences in Malmö, Family Medicine, Lund University, Lund, Sweden, <sup>3</sup>Child Research Group, Department of Nursing, School of Health and Welfare, Jönköping University, Jönköping, Sweden

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** N. Other

**Purpose:** Increasing rates of psychosomatic symptoms among adolescents have been reported. Few studies have examined the relation between food intake and psychosomatic symptoms. The aim was to study the association between food intake and psychosomatic symptoms.

**Methods:** In this cross-sectional study, we used data from 6 248 girls and 7 153 boys, who turned 16 during the academic years 2009/2010 up to 2015/2016 and answered a questionnaire at School Health Services in south-east Sweden. Descriptive statistics and Chi2-test were used. A  $p$ -value  $< 0.05$  was considered as statistically significant. Odds Ratio (95% Confidence Limits) for the association between an overall healthy food intake and a low score for psychosomatic symptoms was calculated when stratifying for lifestyle habits and gender.

**Results:** An overall healthy food intake was associated with a low psychosomatic symptom score ( $p = < 0.0001$ ), regardless of other lifestyle habits and gender. An overall healthy food intake was also related to a low frequency of the specific psychosomatic symptoms concentration difficulties, sleep difficulties, a poor appetite or dizziness ( $p < 0.0001$ ). Some healthy intakes of specific foods were associated with a low frequency of specific psychosomatic symptoms ( $p = 0.001$ ).

**Conclusions:** A healthy diet seems to be associated with less psychosomatic symptoms among adolescents. Deeper knowledge is needed whether a change from an unhealthy to a healthier diet may reduce the psychosomatic symptoms and improve mental health.

# Translating exercise interventions online: Considerations for real-world impact

Dr. Samantha Harden<sup>1</sup>, **Ms. MC Frazier<sup>1</sup>**, Mr. Md Shafiqul Islam<sup>1</sup>, Ms. Rachel Kaplan<sup>1</sup>, Dr. Sol Lim<sup>1</sup>  
<sup>1</sup>Virginia Tech, Blacksburg, USA

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** To explore delivery personnel barriers and facilitators when translating an evidence-based physical activity intervention that was previously tested through in-person, synchronous delivery.

**Methods:** A learning collaborative consisting of human factors engineering and ergonomists, behavioral psychologist, exercise scientists, and LIFT instructors engaged in three iterative trials to answer distinct research aims: 1) LIFT delivered online was pilot tested ( $n = 88$ ) for participant adherence and self-report physical activity; 2) qualitative data were collected via one-on-one interviews with instructors ( $n = 10$ ) to determine barriers and facilitators; and 3) sensor data was collected on a subsample of older adults ( $n = 3$ ) to determine compliance and acceptability of wearables.

**Results:** In 2021, 88 older adults (95% female; 44% non-White;  $71 \pm 9$  years of age; average BMI  $30.36(+6.4)$  kg/m<sup>2</sup>) participated in LIFT online across Arkansas, North Carolina, and Virginia who had significant improvements in lower body and upper body strength, upper body flexibility and aerobic endurance ( $p < 0.05$ ). Agility, lower body flexibility, and balance improved, but not significantly ( $p > 0.05$ ). One participant shared, "The best part of LIFT was being able to exercise safely during the pandemic and winter weather." Instructors shared challenges in facilitating social connection in the virtual space and concerns about ease of technology use, "Zoom is better than nothing....You know, in-person is, to me, the- the best form." Finally, to inform gesture-based interfaces that can simplify instructor-participant communication without the need to share the camera feed, wearable inertial measurement unit (IMU) data were collected in one cohort of LIFT. Some participants shared difficulties in understanding the sensor interface and how to use the sensors correctly for data recording with written instructions. However, after providing a live video demonstration of the sensor data recording process, errors in data recording had a downward trend.

**Conclusions:** Virtual exercise programs can be safe and feasible. Instructors need ongoing training and support for prompting virtual programming. This includes, but is not limited to: orientation calls to help guide participants with audio/visual best practices and adapting the objective functional fitness protocol to the virtual space.

# Leisure time physical activities and active ageing status among older adults in Bangladesh

**Mr. Palash Karmakar<sup>1</sup>**, Associate Professor Wendy Yajun Huang<sup>1</sup>

<sup>1</sup>Hong Kong Baptist University, Kowloon Tong, Hong Kong

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** Leisure time physical activity (LTPA) has numerous health and social benefits for older adults. The aim of this study was to assess the relationship between different LTPAs and active ageing status (AAS) among older adults in Bangladesh, as well as the moderating role of socioeconomic factors in that relationship.

**Methods:** A cross-sectional survey was conducted among 348 older adults (73.9% males) aged 65 years and above from February to October 2021. LTPA and AAS were assessed using the Physical Activity Scale for the Elderly (PASE) and the University of Jyväskylä Active Ageing Scale (UJACAS), respectively. Hierarchical multiple regressions were performed to determine the relationships between different types of LTPA and AAS, while adjusting for household and work-related activities. A moderation test was also performed using SPSS PROCESS (Version 4).

**Results:** Over half of the older adults aged 65-69 years (52.6%), lived in rural areas (51.7%), had a normal body weight (56.9%), were unemployed or homemaker (62.6%), had a lower level of education (55.5%) and had other sources of income or financial support (54.9%). AAS significantly differed according to sex, age, weight status, education level, employment status, and other sources of income or financial support among older adults. LTPAs, including walking outside of the home ( $\beta=0.24$ ; 95% CI: 0.13, 0.35), light ( $\beta=0.20$ ; 95% CI: 0.10, 0.30), moderate ( $\beta=0.10$ ; 95% CI: 0.00, 0.20), and strenuous ( $\beta=0.14$ ; 95% CI: 0.04, 0.24) sport or recreational activities, were positively associated with a higher score of AAS. Activities other than LTPAs, i.e., home repairs ( $\beta=0.14$ ; 95% CI: 0.01, 0.27) and caring for another person ( $\beta=0.14$ ; 95% CI: 0.03, 0.25), were positively, while paid or voluntary work ( $\beta=-0.10$ ; 95% CI: -0.20, 0.00) was negatively, associated with AAS. Employment status moderated the relationship between LTPAs and AAS.

**Conclusions:** Higher levels of LTPAs were related to better AAS. Regular participation in the optimum level of LTPAs is highly advisable for older adults in Bangladesh in order to stay active, healthy, and have a better quality of life at a later stage.

# Evaluation of the Active Together multi-modal cancer rehabilitation service embedded within clinical care.

**Dr. Michael Thelwell<sup>1</sup>**, Dr. Anna Myers<sup>1</sup>, Dr. Liam Humphreys<sup>1</sup>, Ms. Gabbi Frith<sup>1</sup>, Dr. Katie Pickering<sup>1</sup>, Ms. Gail Phillips<sup>1</sup>, Mrs. Carol Keen<sup>2</sup>, Prof. Rob Copeland<sup>1</sup>

<sup>1</sup>Sheffield Hallam University, Sheffield, United Kingdom, <sup>2</sup>Sheffield Teaching Hospitals NHS Foundation Trust, Sheffield, United Kingdom

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** C. Cancer prevention and management

**Purpose:** Active Together is an evidence-based multi-modal rehabilitation service for patients with a cancer diagnosis in Sheffield, embedded within the clinical care pathway, providing support to help patients prepare both physically and psychologically before treatment and to recover well after treatment. The purpose of the evaluation is to determine the impact of this multi-modal rehabilitation service on patients' physical and psychological state, as well as their clinical treatment outcomes and economic benefits to the wider healthcare system.

**Methods:** The outcome evaluation comprises a single group, longitudinal design to determine the impact of the Active Together service on patient outcomes measured throughout the service pathway, including physical capacity, psychological state and dietetic need. A one-way repeated measures (within-group) analysis of variance will be used to determine both the statistical and clinical significance of changes in patient outcome measures throughout the service pathway. Health resource usage and clinical treatment outcomes for patients that have received support from the Active Together service, will be compared to patients who previously underwent treatment for cancer without receiving rehabilitation support, to assess the impact of the service from an economic perspective.

**Results:** To date, 145 male patients and 104 female patients have received support from the Active Together service during their cancer treatment. Preliminary data shows that patients exhibit clinically significant improvements in measures of physical capacity (6-minute walk test and 30 second sit-to-stand), psychological state (quality of life, depression, anxiety) and levels of dietetic need, both during prehabilitation before starting treatment and during rehabilitation following treatment. Patients have improved outcomes from their treatment, leading to a reduction in mean hospital length of stay and reduced overall cost to the healthcare system compared to patients that did not receive rehabilitation.

**Conclusions:** Evidence to support the role of multi-modal rehabilitation for patients at all stages of their cancer treatment journey is growing. The translation of that evidence into practice is less advanced. The results of this evaluation will contribute to the growing evidence base of the real-world effectiveness of cancer rehabilitation on both patient outcomes and the health economic landscape.

# Associations of neighbourhood environmental attributes and socio-economic status with health-related quality of life in urban mid-aged and older adults: mediation by physical activity and sedentary behaviour

**Associate Professor Anthony Barnett**<sup>1</sup>, Prof. Jonathan E. Shaw<sup>2</sup>, Ms. Erika Martino<sup>3</sup>, Associate Professor Luke D. Knibbs<sup>4</sup>, Dr. Govinda Poudel<sup>1</sup>, Prof. Neville Owen<sup>2</sup>, Prof. Ester Cerin<sup>1,2</sup>

<sup>1</sup>Australian Catholic University, Melbourne, Australia, <sup>2</sup>Baker Heart and Diabetes Institute, Melbourne, Australia, <sup>3</sup>The University of Melbourne, Melbourne, Australia, <sup>4</sup>The University of Sydney, Sydney, Australia

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** This study of middle-aged and older adults examined the associations between objectively-assessed features of the neighbourhood environment and physical and mental aspects of health-related quality of life (HRQoL), and the mediating effects of physical activity and sedentary behaviours in the associations.

**Methods:** We used data from the third wave of the Australian Diabetes, Obesity and Lifestyle survey (conducted in 2011-12) with relevant environmental exposures. Attributes of the built and natural environment were assessed using Geographic Information Systems data for 1-km residential buffers, while annual average concentrations of air pollutants were estimated using satellite-based land use regression models. Neighbourhood socio-economic status (SES) was obtained from census data. Physical activity (walking for different purposes, gardening and resistance training) and sedentary behaviours (leisure-time and transport sitting) were self-reported. HRQoL was measured using the SF-36. Generalised linear mixed models informed by directed acyclic graphs were used to estimate associations between environmental, behavioural and outcome variables.

**Results:** Neighbourhood SES (positively) and annual average concentrations of PM<sub>2.5</sub> (negatively) were the only attributes associated significantly with HRQoL in the total- and direct-effect models. All neighbourhood environmental attributes were indirectly related to the physical and mental components of HRQoL via physical activity behaviours and leisure-time sitting. Indirect effects of most environmental features on HRQoL were inconsistent, i.e., positive through some behavioural pathways and negative through others.

**Conclusions:** Neighbourhood SES appears to have beneficial effects on HRQoL. Walkability-related built environment attributes appear to have beneficial associations with HRQoL via walking and resistance training which may displace some leisure-time sitting. However, some of these attributes may also contribute to more sitting by limiting mid-aged and older adults' opportunities for household and gardening activities. Access to natural features may also provide support some activities (e.g., resistance training, less sitting) but limit opportunities for others (gardening). These findings highlight the importance of further examining the potential role of the neighbourhood environment in HRQoL through mediation analyses encompassing key inter-related neighbourhood environmental attributes and a variety of lifestyle behaviours theoretically linked to specific environmental features and HRQoL.



# Health determinants of physical literacy for older adults: A mixed-method systematic review

**Ms. Kai-ling Ou<sup>1</sup>**, Dr. Wendy Yajun Huang<sup>1,2</sup>, Dr. Ming Yu Claudia Wong<sup>3</sup>

<sup>1</sup>Department of Sport, Physical Education and Health, Hong Kong Baptist University, Hong Kong, China, <sup>2</sup>Dr. Stephen Hui Research Centre for Physical Recreation and Wellness, Hong Kong Baptist University, Hong Kong, China, <sup>3</sup>Department of Health and Physical Education, The Education University of Hong Kong, Hong Kong, China

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** This mixed-method systematic review aimed to identify the conceptualization and assessment of physical literacy, and summarize the potential health determinants across the multiple domains of physical literacy (physical, affective, cognitive and behavioural) for older adults aged 60 years and above.

**Method:** Six scientific databases, MEDLINE (Ovid), PsycINFO (ProQuest), Scopus, PubMed, Web of Science, and EMBASE(Ovid) were searched on 17 November 2022. Critical appraisal was conducted using Joanna Briggs Institute's Critical Appraisal tools and the Mixed Method Appraisal Tool. Inductive thematic analysis was used to synthesize health determinants related to physical literacy.

**Results:** 12 articles, including 2,106 participants from 6 countries and districts, were included. Physical literacy was assessed either qualitatively by using interviews, open-end questions, and observation, or quantitatively using psychometric scales for different physical literacy domains. Most of the studies measured the affective domain (67%; motivation, and confidence), followed by the physical domain (50%; physical competence, motor skill competence, fundamental movement skills, purposeful physical pursuit), cognitive domain (33%; knowledge and understanding of activities, knowledge and understanding of healthy and active lifestyles, and value and take responsibility for physical activity), behaviour domain (17%; physical activity engagement), and general physical literacy (25%). Five health determinants have been investigated in their relationships with physical literacy domains: (1) individual characteristics and behaviours: physical well-being, previous exercises experience, staying active and diet, (2) health services: physical activity program, (3) education: instructor, education attainment, knowledge and awareness of the physical activity and pedagogical strategies, (4) social support network: social engagement, and (5) gender.

**Conclusion:** A comprehensive assessment of physical literacy for older adults is lacking. There was some evidence showing that intrapersonal factors and participating in physical activity programs were positively associated with physical literacy in older adults. Future studies should examine a wide range of health determinants of multiple domains of physical literacy in older adults.

# Benefits and barriers to spending a longer time in the kitchen among older women with frailty

**Ms. Sayaka Nagao-Sato<sup>1</sup>**, Dr. Rie Akamatsu<sup>1</sup>, Dr. Sakiko Yamamoto<sup>1</sup>, Dr. Etsuko Saito<sup>1</sup>

<sup>1</sup>Ochanomizu University, Tokyo, Japan

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose** Cooking is a physical activity that declined at the beginning of frailty. Poorer cooking status may contribute to unhealthy eating, leading to the progress of frailty status. This study aimed to examine the associations between spending time in the kitchen, healthy diet intake, and frailty status, and barriers to kitchen use were also explored among older women.

**Methods** An online cross-sectional survey was conducted with 600 community-dwelling older Japanese women aged  $\geq 65$  years in January 2023. Frailty status was assessed using the Kihon Check List. Healthy diet intake was assessed using the balanced-meal intake frequency, asking the days of having  $\geq 2$  meals including a staple, a main, and a side dishes in a week. Kitchen use was evaluated using the weekly frequency of using the kitchen and time spent in the kitchen a day. Barriers to kitchen use were identified by asking about inconvenient things in the kitchen with 16 options. Kruskal-Wallis and Fisher's exact tests were used to examine associations of frailty status with demographic characteristics, balanced-meal intake, kitchen use, and barriers to kitchen use. Moderation analysis was used to test the conditional effect of time spent in the kitchen on frailty status and balanced-meal intake.

**Results:** The prevalence of pre-frailty and frailty were 34.0% and 21.1%, respectively, and 95% used their kitchen every day. Participants with frailty were older ( $p < 0.001$ ), had larger BMI ( $p = 0.010$ ), and were more likely to have lower household income ( $p = 0.002$ ) and receive caregiving ( $p < 0.001$ ), compared to robust participants. While participants who spent a longer time in the kitchen consumed more balanced-meals in each frailty status, the conditional effect of time spent in the kitchen on balanced-meal intake was stronger among those with pre-frailty or frailty, compared to robust participants ( $p = 0.012$ ). Participants with frailty were more likely to report three inconveniences: a strain in their low back ( $p < 0.001$ ), a strain on their neck ( $p = 0.017$ ), and a distant storage yard for garbage and dish soap ( $p < 0.001$ ).

**Conclusions:** These findings support that kitchens should be redesigned for older women with frailty, which may contribute to spending longer time in the kitchen and improving their diet.

# Effect of staff professional development on preschooler`s fundamental motor skills and physical fitness: The ACTNOW cluster-randomized controlled trial

**Miss Elisabeth Straume Haugland<sup>1</sup>**, Prof. Eivind Aadland<sup>1</sup>, Dr. Ada Kristine Ofrim Nilsen<sup>1</sup>

<sup>1</sup>Western Norway University of Applied Sciences, SOGNDAL, Norway

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** F. Early care and education

**Purpose:** Being physically active at moderate-to-vigorous intensity is favorably associated with several health indicators in early childhood, including improved motor development (FMS) and physical fitness (FIT). However, children's lack of physical activity (PA), and thus suboptimal levels of FMS and FIT, is a global public health concern. The Active Learning Norwegian Preschool(er)s (ACTNOW) study investigated the effects of an 18-month cluster randomized controlled preschool-based trial with staff professional development on FMS, FIT, and PA in 3-5-year-old preschoolers.

**Methods:** A total of 1265 preschoolers (4.3 yr, 52% boys) from preschools in Sogn og Fjordane County were cluster-randomized by preschool to either an intervention (n=23) or a control group (n=23). Intervention preschools participated in a PA intervention in 2019-2022 delivered by preschool staff, consisting of four core components: moderate-to-vigorous PA, motor-challenging PA, cognitively engaging PA, and physically active learning. PA was measured with accelerometry (ActiGraph GT3X+). FMS was evaluated by a process-oriented test battery (9 items) across three domains: locomotor, object control, and balance skills. FIT was assessed through motor fitness, handgrip strength, and standing long jump. Data from baseline, 7-months, and 18-month follow-up were analyzed using a linear mixed model with child and preschool as random effects. Effect estimates were derived from testing the main effect of group on change in FMS, FIT, and PA.

**Results:** During preschool hours, findings showed significant improvements in vigorous PA at 7- (ES=0.15; p=0.041) and 18 months (ES=0.16; p=0.015) and a significant reduction in sedentary time at 7 months (ES=-0.12; p=0.031) and light PA at 18 months (ES=-0.14; p=0.026) in favor of the intervention group. Significant increases were found for the intervention group in locomotor skills at 18 months (ES; 0.22; p<0.001) and object control skills at 7 months (ES; 0.17; p=0.006). Significant reductions were found for balance skills (ES=-0.15; p=0.003) and handgrip strength (ES=-0.3; p=0.01).

**Conclusion:** The ACTNOW intervention increased vigorous PA, locomotor-, and object control skills and reduced sedentary time in preschool children. However, further research is needed to investigate how to stimulate balance skills and fitness in early childhood. These findings show that PA promotion in early childhood can benefit child development.

# Self-rated health and physical activity during retirement transition – a multi-trajectory analysis of concurrent changes

**Mrs. Roosa Lintuaho**<sup>1,2</sup>, Prof. Mikhail Saltychev<sup>2</sup>, Mrs. Jaana Pentti<sup>3,4,5</sup>, Prof. Jussi Vahtera<sup>3,4</sup>, Prof. Sari Stenholm<sup>3,4</sup>

<sup>1</sup>Department of Emergency Medicine, Turku University Hospital, Turku, Finland, <sup>2</sup>Department of Physical and Rehabilitation Medicine, Turku University hospital and the University of Turku, Turku, Finland, <sup>3</sup>Department of Public Health, University of Turku and Turku University Hospital, Turku, Finland, <sup>4</sup>Centre for Population Health Research, University of Turku and Turku University Hospital, Turku, Finland, <sup>5</sup>Clinicum, Faculty of Medicine, University of Helsinki, Helsinki, Finland

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** Previous studies have reported changes in physical activity and self-rated health during retirement transition, but the results have been inconclusive, and these two variables have not been studied simultaneously. The aim of the study was to evaluate concurrent changes in physical activity and self-rated health during retirement transition by multivariate trajectory analysis and to examine, whether sociodemographic and lifestyle factors predict the probability of being classified to a certain subgroup of observed changes.

**Methods:** 3,550 participants of the ongoing Finnish Retirement and Aging (FIREA) study answered annual surveys prior to and after retirement, in five possible study waves. Participants were asked to estimate weekly hours spent on different types of activities, then converted to MET-h/week. Self-rated health was assessed on a 5-point Likert-like scale from poor to excellent and dichotomized as suboptimal and optimal. Multivariate trajectory analysis was used to distinguish different subgroups of trajectories of concurrent changes in physical activity and self-rated health. Multinomial regression analysis was used to describe the associations between covariates and the probability of being classified to a certain trajectory group.

**Results:** Three trajectory groups were identified, all displaying increasing activity during retirement transition with a simultaneous decrease in perceived suboptimal health. The improvement was temporary for most participants, except for 9% of participants who had high physical activity which only increased during follow-up, with low percentage of suboptimal health. Male gender, professional occupation, being married or co-habiting, normal or overweight, not smoking and using alcohol below risk levels were associated with higher activity and better self-rated health.

**Conclusion:** Changes in physical activity and perceived health during retirement transition were found to be interconnected. Both were improved during retirement transition, but the change was temporary. Longer follow-up studies are required to further assess the changes over longer period of time after retirement.

# Lifestyle factors influencing body weight and body composition trajectories as women go through menopause: A systematic review.

**Miss Mozghan Esmailpour**<sup>1</sup>, Associate Professor Jennifer Miles-Chan<sup>1</sup>, Associate Professor Beatrix Jones<sup>2</sup>, Dr. Kathryn Bradbury<sup>3</sup>, Prof. Berit Lilienthal Heitmann<sup>4,5</sup>

<sup>1</sup>Human Nutrition Unit, School of Biological Sciences, The University of Auckland, Auckland, New Zealand,

<sup>2</sup>Department of Statistics, Faculty of Science, The University of Auckland, Auckland, New Zealand, <sup>3</sup>National Institute for Health Innovation, School of Population Health, Faculty of Medical and Health Sciences, The University of Auckland, Auckland, New Zealand, <sup>4</sup>Frederiksberg Hospital, Department of Public Health Sciences and The Parker Institute, The University of Copenhagen, Copenhagen, Denmark, <sup>5</sup>The Boden Institute, Faculty of Medicine and Health Sciences, The University of Sydney, Sydney, Australia

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** This study aimed to systematically review all available evidence on lifestyle factors influencing body weight and body composition trajectories as women go through menopause, including both experimental and observational studies that measured outcomes at least twice.

**Method:** A search strategy was developed and adapted based on Jull et al.'s (2014) systematic review of lifestyle interventions for menopausal weight change. Database searches were conducted, including Scopus, Cochrane, Embase, PubMed (Ovid), and CINAHL Plus, as well as hand-searching. Eligible studies were longitudinal interventions, including randomized, non-randomized, and cross-over trials, as well as observational studies (cohorts and cross-sectional) that investigated lifestyle factors' effect on body weight and/or body composition changes. Studies had to target women across their menopausal age, specifically those who transitioned from pre- or peri-menopausal to peri- or post-menopausal, or remained perimenopausal throughout the study period. Additionally, studies needed to measure variables related to body weight and/or body composition at two or more time points. Data collection and quality assessment were conducted using a standardized form, the revised Cochrane Risk-of-Bias (RoB2) tool, and the Newcastle-Ottawa scale for experimental and observational studies, respectively.

**Results:** Of 12,260 articles after deduplication, twenty-four studies were included in this review, comprising 10 controlled trials, 13 cohorts, and one cross-sectional study (including retrospective body weight data). Because of the heterogeneity in intervention/exposures and outcome details, conducting a meta-analysis was not feasible, and a descriptive analysis was conducted. The findings of four out of ten interventional studies demonstrated that study groups following an aerobic and resistant exercise intervention, a low-fat, high-carbohydrate dietary intervention, a healthy lifestyle educational intervention, or a combined dietary and exercise intervention had significant, favourable differences in changes in weight, BMI, gynoid, and/or android fat mass. Nine of 14 observational studies identified statistically significant relationships between longitudinal adiposity measurements and factors such as diet quality, smoking cessation, sitting time, physical activity level, and consumption of full-fat milk products (milk, sour milk, or cheese).

**Conclusion:** While further research is needed, the present findings suggest that lifestyle and behavioural modifications could be a useful strategy for preventing weight gain and adiposity in women transitioning through Menopause.

# Sleep problems at younger ages mediate the relationship between chronotype and socioemotional problems in school-aged children

**Mr. Derric ZH Eng<sup>1</sup>**, Dr. Elaine KH Tham<sup>1</sup>, Prof. Yung Seng Lee<sup>1,2</sup>, Associate Professor Daniel YT Goh<sup>2</sup>, Prof. Lynette PC Shek<sup>1,2</sup>, Associate Professor Oon-Hoe Teoh<sup>3</sup>, Dr. Fabian Yap<sup>3</sup>, Prof. Kok Hian Tan<sup>4,5</sup>, Associate Professor Joshua J Gooley<sup>6</sup>, Prof. Yap Seng Chong<sup>1,7</sup>, Prof. Michael J Meaney<sup>1,2,8</sup>, Dr. Shirong Cai<sup>1,9</sup>, Associate Professor Birit FP Broekman<sup>1,10</sup>

<sup>1</sup>Singapore Institute for Clinical Sciences, Agency for Science, Technology and Research (A\*STAR) Singapore, Singapore, Singapore, <sup>2</sup>Department of Pediatrics, Yong Loo Lin School of Medicine, National University of Singapore, National University Health System, Singapore, Singapore, <sup>3</sup>Department of Paediatrics, KK Women's and Children's Hospital, Singapore, Singapore, <sup>4</sup>Department of Maternal Fetal Medicine, KK Women's and Children's Hospital, Singapore, Singapore, <sup>5</sup>Duke-NUS Graduate Medical School, Singapore, Singapore, <sup>6</sup>Center for Cognitive Neuroscience, Program in Neuroscience and Behavioral Disorders, Duke-NUS Medical School, Singapore, Singapore, <sup>7</sup>Department of Obstetrics & Gynaecology, Yong Loo Lin School of Medicine, National University of Singapore, National University Health System, Singapore, Singapore, <sup>8</sup>Douglas Mental Health University Institute, Department of Psychiatry, McGill University, Montreal, Canada, <sup>9</sup>Human Potential Translational Research Programme, Yong Loo Lin School of Medicine, National University of Singapore, Singapore, Singapore, Singapore, <sup>10</sup>Department of Psychiatry, Amsterdam UMC and OLVG, VU University, Amsterdam, Netherlands

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** F. Early care and education

**Purpose:** Evening-chronotype, which refers to an innate preference for later periods of the day, has been found to pose as a risk factor for socioemotional problems in children. Research has also shown that children with evening-chronotype are more prone to sleep problems compared to peers with morning-chronotype. Evidence from studies in school-aged children suggest that sleep problems lie on the pathway between chronotype and socioemotional problems. However, it remains unknown whether sleep problems during earlier stages of childhood may mediate the relationship between chronotype and socioemotional problems at school-age. It is important to identify the mechanisms underlying the development of socioemotional problems at early ages as they may escalate into more severe behavioral and emotional problems later in life. Hence, we conducted mediation analyses with longitudinal models to investigate how sleep problems earlier at preschool-age may mediate the relationship between chronotype and socioemotional problems at school-age.

**Methods:** We included 587 typically-developing children from the Growing Up in Singapore Towards healthy Outcomes (GUSTO) birth cohort study. Children's diurnal preferences were identified with the Children's Chronotype Questionnaire and corroborated by objective actigraphy at 4.5 years of age, while sleep problems were assessed using the Children's Sleep Habits Questionnaire when they were 4.5 and 6 years old. Children's socioemotional problems were evaluated with the Child Behavioral Checklist when they were 7 years old. All questionnaires administered were caregiver-reported.

**Results:** After controlling for potential confounders, greater eveningness in children was significantly associated with increased sleep problems at 4.5 and 6 years of age, as well as greater internalizing, externalizing and total behavioral problems at 7 years old. Further mediation analyses revealed that sleep problems at both 4.5 and 6 years of age significantly mediated the association between chronotype and later internalizing, externalizing and total behavioral problems at 7 years old.

**Conclusions:** Our study is amongst the first to demonstrate the mediating effects of sleep problems at earlier ages on the relationship between chronotype and socioemotional problems at school-age. An important implication of our results is that sleep problems in preschool serve as targets for early interventions for socioemotional problems, especially among evening-chronotype children.



# Joint associations of physical activity and sleep duration with cognitive ageing: longitudinal analysis of an English cohort study

**Dr. Mikaela Bloomberg<sup>1</sup>**, Dr. Laura Brocklebank<sup>1</sup>, Prof. Mark Hamer<sup>2</sup>, Prof. Andrew Steptoe<sup>1</sup>

<sup>1</sup>Department of Behavioural Science and Health, University College London, London, United Kingdom,

<sup>2</sup>Division of Surgery and Interventional Science, University College London, London, United Kingdom

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** As there is currently no effective treatment for dementia, it is important to identify contributors to cognitive decline from midlife to delay onset of clinical symptoms. Low physical activity (PA) and nightly sleep duration outside 6-8 hours are two interrelated factors thought to contribute to cognitive decline and dementia risk. Nonetheless, how PA and sleep combine to influence trajectories of cognitive ageing is still not well-explored. To investigate this, we examined longitudinal associations of different combinations of PA and sleep duration with 10-year cognitive trajectories.

**Methods:** Linear mixed models were used to examine independent and joint associations of PA (low, high) and sleep duration (short [ $<6$  hours], optimal [6-8 hours], long [ $>8$  hours]) with cognitive performance at baseline, 10 years, and cognitive decline in cognitively healthy adults aged  $\geq 50$  years from the English Longitudinal Study of Ageing (N=8991). Models were adjusted for sociodemographic and socioeconomic covariates, health behaviour indicators, chronic conditions, and depressive symptoms.

**Results:** Low PA was independently associated with worse cognitive performance at baseline ( $p<0.001$ ), while short sleep was independently associated with faster cognitive decline ( $p=0.04$ ). At baseline, high PA/optimal sleepers had higher cognitive scores than all sleep categories in the low PA category (e.g. difference high PA/optimal-low PA/optimal at age 50=0.10 [0.06, 0.15] standard deviations), while there was no difference in cognitive performance between sleep categories within the high PA category. Differences remained consistent over 10 years of follow-up, except high PA/short sleepers who declined faster than high PA/optimal sleepers, such that their cognitive scores at 10 years were commensurate with those in the low PA category (difference high PA/optimal-high PA/short=0.20 [0.05, 0.34]; high PA/optimal-low PA/short=0.28 [0.15, 0.41]).

**Conclusions:** PA and sleep duration combine in complex ways to influence cognitive trajectories from middle age; for example, the cognitive benefit at baseline provided by high PA was insufficient to blunt the rapid cognitive decline associated with short sleep. While WHO already identify PA as a target for maintaining cognitive function, effective PA interventions should also consider sleep habits to maximise potential benefits of PA for cognitive health and delay onset of dementia.

# Process evaluation of a preschool-based intervention to promote an ECEC teacher-parent partnership regarding healthy eating, physical (in)activity and sleeping behaviours in young children.

**Mrs. Nicole Toussaint<sup>1</sup>**, Dr. Martinette T. Streppel<sup>1</sup>, Mrs. Sandra Mul<sup>1</sup>, Miss Meryem Gündüz<sup>1</sup>, Dr. Marloes D.A. van Verseveld<sup>2</sup>, Dr. Mirka Janssen<sup>1</sup>, Prof. Peter J.M. Weijs<sup>1,3</sup>, Prof. Ruben G. Fekkink<sup>1,4</sup>

<sup>1</sup>Amsterdam University of Applied Sciences, Amsterdam, Netherlands, <sup>2</sup>University of Science and Technology, Trondheim, Norway, <sup>3</sup>VU University, Amsterdam, Netherlands, <sup>4</sup>University of Amsterdam, Amsterdam, Netherlands

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** F. Early care and education

**Purpose** Early Childhood Education and Care (ECEC) teachers at urban preschools are potential key figures to promote healthy behaviours in disadvantaged young children and to engage parents in lifestyle-related topics. An ECEC teacher-parent partnership regarding healthy behaviours may support parents and stimulate their children's development. A preschool-based intervention (CO-HEALTHY) was developed to promote an ECEC teacher-parent partnership regarding healthy eating, physical (in)activity and sleeping behaviours in young children. The intervention consists of a toolkit with parent-child activities and an associated training for ECEC teachers. The activities were composed using the Intervention Mapping protocol. Intervention materials were accessible for families with different sociocultural and socioeconomic backgrounds (e.g. simple vocabulary and cultural sensitive images). This study describes the process evaluation of the intervention.

**Methods** Semi-structured interviews with ECEC teachers (n=16) and parents (n=16), and a questionnaire for ECEC teachers (n=33) served as input for the process evaluation of the intervention. The process evaluation addressed topics like the reach of the intervention and experience of participants with the intervention. Interviews were transcribed non-verbatim and thematically analysed in MAXQDA. Questionnaires were distributed via the survey software Qualtrics and descriptive statistics were calculated using IBM SPSS Statistics.

**Results** The intervention was carried out at n=20 preschools in Amsterdam, the Netherlands. ECEC teachers said that the toolkit was fun and accessible as it were activities that children and parents could do during the standard walk-in play time at preschool. The activities were a good opportunity to start a conversation about the lifestyle-related topics. Parents indicated that it was fun and informative to do the activities together with their child. Most of the ECEC teachers thought that the intervention materials were convenient for their group of parents/children, also for less linguistic parents. The intervention materials were also received positively by parents (e.g. the use colourful A5 information cards). The ECEC teachers evaluated the intervention with an average score of 7.8 (scale 1-10) in establishing a teacher-parent partnership.

**Conclusions** The intervention was positively received. A majority of the participants thinks the toolkit benefits the ECEC teacher-parent partnership regarding healthy eating, physical (in)activity and sleeping behaviours in young children.

# Stand When You Can: Feasibility of a sedentary behaviour intervention in assisted living

**Ms. Milena Zdjelar<sup>1</sup>**, Ms. Irmina Klicnik<sup>2</sup>, Ms. Brianna Leadbetter<sup>3</sup>, Dr. Danielle R. Bouchard<sup>3</sup>, Dr. Shilpa Dogra<sup>2</sup>, Ms. Haley A. Dennis<sup>1</sup>, Dr. Jennifer L. Copeland<sup>1</sup>

<sup>1</sup>University of Lethbridge, Lethbridge, Canada, <sup>2</sup>Ontario Tech University, Oshawa, Canada, <sup>3</sup>University of New Brunswick, Fredericton, Canada

Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** A. Ageing

**Purpose:** Prolonged sedentary time poses health risks for older adults. Older adults in assisted living spend more time sedentary than community dwelling peers and reducing passive sedentary time could be beneficial. The purpose of this study was to examine the feasibility of Stand When You Can (SWYC), a sedentary behaviour intervention based on the social ecological model, for assisted living.

**Methods:** SWYC aims to reduce sedentary time through individual behaviour change and modifications to the social and physical environment. A toolkit is provided to staff and residents so the intervention can be implemented without researcher involvement. SWYC was tested in four assisted living residences in three Canadian provinces. Each site had a staff person identified as a “SWYC Ambassador”; residents ( $n = 68$ ,  $84.9 \pm 6.5$  years; 81% women) volunteered for pre- and post-intervention testing. Before and 12 weeks after SWYC was introduced, participants wore activPAL<sup>TM</sup> inclinometers for seven days to measure sedentary time. Lower body function and quality of life were assessed with repeated chair stands and the EQ-5D, respectively. Changes were analyzed using paired sample t-tests. Onsite observations and checklists at 6 weeks were used to examine intervention fidelity.

**Results:** Observations revealed substantial variability in implementation, with only one site demonstrating good intervention fidelity. There was significant participant attrition ( $>50\%$ ) at 12 weeks. Sedentary time increased from pre- to post-intervention ( $681 \pm 129$  vs  $721 \pm 142$  min/day;  $p=0.016$ ). There was no significant difference ( $p > 0.05$ ) in time spent in sedentary bouts ( $173 \pm 85$  vs  $183 \pm 73$  min/day), sit-to-stand transitions ( $50 \pm 14$  vs  $51 \pm 14$ ), or standing time ( $196 \pm 78$  vs  $190 \pm 77$  min/day). There were no significant changes in quality of life or lower body function.

**Conclusions:** Developing strategies to reduce sedentary time and maintain function among residents of assisted living is a priority. SWYC is a novel, evidence-informed intervention, however it may not be feasible for most assisted living residences. It is unknown what role COVID-19 measures played in poor intervention fidelity and participant attrition, but it was clear that staff engagement is crucial to intervention success.

# Walking football for Health- physiological response to playing and characteristics of the players

Dr. Helena Andersson<sup>2</sup>, **Dr. Andreas Caspers**<sup>1</sup>, Mr. Manne Godhe<sup>3</sup>, Mr. Torbjörn Helge<sup>3</sup>, Ms. Julia Eriksen, Dr. Dan Fransson<sup>1</sup>, Prof. Mats Börjesson<sup>4</sup>, Dr. Elin Ekblom-Bak<sup>3</sup>

<sup>1</sup>University of Gothenburg, Gothenburg, Sweden, <sup>2</sup>Umeå University, Umeå, Sweden, <sup>3</sup>The Swedish School of Sport and Health Sciences, Stockholm, Sweden, <sup>4</sup>Sahlgrenska Academy, Gothenburg, Sweden

Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** A. Ageing

**Purpose:** Walking Football (WF) is one type of recreational football increasing in popularity, targeting older adults. Further knowledge on the intensity and physical workload of WF, characteristics of the players, the social context, and reasons for playing WF is needed. Thus, the aim of the study was to characterize the individuals that regularly play WF and their experience of WF, and the physiological characteristics of the sport.

**Methods:** Sixty-three players from three clubs taking part in organised WF in Sweden were included. The players underwent performance tests consisting of a balance test, estimation of cardiorespiratory fitness, strength, and a vertical jump test as well as answering a written questionnaire regarding sociodemographic, health experiences, physical activity habits and experiences of WF. The included players participated in up to four WF-games wearing a GPS-unit and heart rate monitor.

**Results:** The participants mean age was 70.9 years, ranging from 63 to 85 years with 71% (n=27) of the men and 68% (n=13) of the women having a BMI >25. Fifty-one percent (n=27) of the players had hypertension, and 73 % (n=39) regularly used prescription drugs due to illness. During WF, the players covered on average 2409 meters (2509 m for men and 2205 m for women). Expressed in percentage of their age-estimated maximal heart rate, mean heart rate represented  $80 \pm 9$  and  $80 \pm 8\%$  of max for men, and  $78 \pm 9$  and  $79 \pm 9\%$  of max for women in the first and second half, respectively, hence WF can be considered a moderate intensity activity for older adults.

**Conclusions:** Individuals regularly playing WF show similar cardiovascular risk profile as the general population but show somewhat better physical fitness profile. The main reason for WF participation were linked to socializing with others and having fun. WF includes a considerable number of accelerations and decelerations, which makes the sport more energetically and mechanically demanding than e.g., walking or running. As our results show that WF mainly is a moderate intensity aerobic activity, it may be a relevant alternative in physical activity prescription for health in clinical practice

# On-Cancer: how to improve cancer survivors motivation and engagement to physical activity practice - a qualitative pilot study

**Dr. Jordi Vilaró<sup>1,2</sup>, Dr. Paula Jakszyn<sup>1,4</sup>, Dr. Olga Canet<sup>1,3</sup>, Miss Andrea Fuente<sup>4,5</sup>, Mr. Jordi Mascarell<sup>6</sup>, Mrs. Sandra Ruiz<sup>6</sup>**

<sup>1</sup>Blanquerna Faculty of Health Sciences, Ramon Llull University, Barcelona, Spain, <sup>2</sup>Global Research on Wellbeing (GRoW), Ramon Llull University, Barcelona, Spain, <sup>3</sup>Global Health, Gender and Society (GHenderS), Ramon Llull University, Barcelona, Spain, <sup>4</sup>Unit of Nutrition and Cancer, Cancer Epidemiology Research Program, Catalan Institute of Oncology (ICO) – Bellvitge Biomedical Research Institute (IDIBELL), Barcelona, Spain, <sup>5</sup>Research Group on Methodology, Methods, Models and Outcomes of Health and Social Sciences (M3O), Faculty of Health Sciences and Welfare, Centre for Health and Social Care Research (CESS), University of Vic-Central University of Catalonia (UVic-UCC), Vic, Spain, <sup>6</sup>Servei d'Esports i Àrea de Innovación Social Ajuntament de L'Hospitalet, L'Hospitalet de Llobregat, Spain

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** C. Cancer prevention and management

**Purpose:** cancer survivors (CS) present low levels of physical activity (PA), and high levels of sedentary behavior and cancer related-fatigue. Commonly there are no programmed interventions to empower them towards a more active lifestyle. The aim of this study was to test different methods that engage CS to PA in a community setting. Also, we aimed to know needs, barriers and facilitators for the practice of PA.

**Methods:** 20 CS were recruited from the Institut Català d'Oncologia (ICO, L'Hospitalet, Spain). A 4 weekly program with active meetings were conducted combining talks on educational concepts related to PA and active sessions using different community resources such as parks, public sports facilities or walking city tracks. Every meeting a weekly PA challenge was established and agreed with the participants. CS used a private whatsapp group to share their achievements. A photo elicitation was also carried on by the participants to detect the barriers and facilitators perceived when doing community PA.

**Results:** finally 17 (80% women, aged 45-64 years), mostly breast, ovarian, prostate and lung CS finished. A video recorded their impressions about the conducted actions (<https://www.youtube.com/watch?v=0VthnV3y7wq>). The general response was very positive to the interventions and the challenges. They feel more energy, good mood. They have the possibility to achieve the challenges, to share the same feelings and limitations with pairs, the feeling of belonging to a group with similar problems. They look for similar solutions, the freedom to practice PA elsewhere and without an established time and program, etc.

Regarding 1) barriers to exercise: fear, pain, cancer related-fatigue, lack of social support; lack of facilities or knowledge about the type of recommended activities. 2) facilitators to exercise: availability of green spaces, professional support, group activities with other CS. The main demand was to get the opportunity of more community PA programs that consider their particularities and needs as CS.

**Conclusions:** This pilot study provides relevant information regarding CS perspectives in relation to PA practice. Including a patient centered approach in the design of PA interventions will be necessary to increase adherence and engagement.

# Sleep Characteristics and Associations with Dietary Behaviors in Racially/Ethnically Diverse Children

**Dr. Amy Noser<sup>1</sup>**, Dr. Allan Tate<sup>2</sup>, Ms. Yasemin Inceoglu<sup>2</sup>, Dr. Snigdha Pusalavidyasagar<sup>1</sup>, Dr. Chinar Singhal<sup>1</sup>, Dr. Jerica Berge<sup>1</sup>

<sup>1</sup>University of Minnesota, Minneapolis, USA, <sup>2</sup>University of Georgia, Georgia, USA

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** To examine the relationship between sleep characteristics (i.e., duration, onset, and variability) and dietary behaviors in a sample of racially and ethnically diverse school-aged children. This study extends the pediatric sleep literature by: (1) examining novel sleep patterns (i.e., variation in sleep onset and duration); (2) describing differences in sleep patterns among six racial/ethnic groups; and (3) examining the association between these sleep patterns and dietary behaviors.

**Methods:** Parent-youth dyads ( $N = 555$ ) from 6 racial and/or ethnic groups (*non-Hispanic Black, Hispanic, Native American, Hmong, Somali, and non-Hispanic White*) were recruited through primary care clinics in the Minneapolis/St. Paul, MN metropolitan area. Parents/caregivers completed eight days of ecological momentary assessment (EMA) surveys about child sleep characteristics and dietary intake. Previous night sleep characteristics (duration, onset, and variability) were operationalized as predictors of next evening dietary intake. Descriptive statistics were computed to examine racial/ethnic differences in sleep patterns. Generalized estimating equations were used to model the longitudinal relationships between sleep and dietary intake after controlling for sociodemographic and time-varying covariates (e.g., weekends).

**Results:** Significant racial/ethnic differences emerged for sleep duration and onset, with White children having the longest duration and earliest onset ( $p$ 's  $< 0.001$ ). Later sleep onset was associated with higher consumption of salty snacks, sugar sweetened beverages, and refined grains and lower consumption of vegetables ( $p$ 's  $< 0.01$ ). Within-child variation in sleep onset was associated with higher consumption of salty snacks, sugar sweetened beverages, and fruit, and lower consumption of vegetables ( $p$ 's  $< 0.001$ ). Variation in sleep duration was associated with lower consumption of salty snacks, sugar sweetened beverages, refined grains, and vegetables ( $p$ 's  $< 0.05$ ).

**Conclusions:** Study findings highlight sleep disparities in racial/ethnic minority children and suggest that variation in children's bedtimes and duration of nightly sleep influence their dietary intake. Future research is needed to identify modifiable causes of sleep disparities in racial/ethnic subpopulations and indicate a need for interventions that minimize sleep disparities and their impact on dietary behaviors.



# The Occurrence of Frailty with Continued Group Exercise among Japanese Older Adults: A Follow-up Study during COVID-19

✉ **Kento Tabira**<sup>1</sup>, Mr. Yoshinobu Saito<sup>2</sup>, Mr. Takayuki Tajima<sup>3</sup>, Mr. Haruhiko Imamura<sup>4</sup>, Ms. Yuko Oguma<sup>1</sup>

<sup>1</sup>Keio University, Kanagawa, Japan, <sup>2</sup>Nippon Sport Science University, Kanagawa, Japan, <sup>3</sup>Tokyo Metropolitan University, Tokyo, Japan, <sup>4</sup>The University of Nagano, Nagano, Japan

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** The Occurrence of Frailty in Continued Group Exercise among Japanese Elderly People: A Follow-up Study during COVID-19 The purpose of this study was to clarify the association between continued group exercise and the development of frailty among elderly Japanese before and during the COVID-19 epidemic.

**Methods:** From August to November 2018 (Baseline [BL]), 4102 community-dwelling older adults participating in a senior club in Fujisawa, Kanagawa, Japan participated in a mailed survey. Of these, 2,283 participated in a mailed survey from September to November 2020 (follow-up [FL]) during the COVID-19 pandemic. 1,241 of the elderly who were not frail in the BL and had no missing data for analysis were included in the analysis. Frailty scores were assessed with the Kihon checklist (KCL). Group exercise continuation was questioned in BL and FL, and the subjects were divided into 4 groups according to continuation status: continuation group (n = 474), discontinuation group (n = 164), initiation group (n = 118), and non-initiation group (n = 485). In univariate and multivariate analyses, descriptive statistics were used to characterize each group, and logistic regression models were used to estimate odds ratios (ORs) and 95% confidence intervals (CIs) between the four groups and new onset of frailty.

**Results:** Of the elderly who were not frail in 2018, 249 (20.1%) had developed frailty in 2020. 64 (13.5%) in the continuation group, 49 (29.9%) in the discontinuation group, 19 (16.1%) in the initiation group, and 117 (24.1%) in the non-initiation group developed new frailty, with the discontinuation group having the highest rate of frailty development compared to other groups.

Analysis showed that the discontinuation group had a significantly higher rate of new onset of frailty compared to the continuation group (OR: 1.73 [95%CI 1.16-2.6]). The initiation and non-implementation groups showed no significant difference in the rate of new onset of frailty compared to the continuation group (OR: 0.88 [95%CI 0.57-1.36], OR: 1.25 [95%CI 0.93-1.69]).

**Conclusion:** Continuation of group exercise was associated with the onset of frailty, suggesting that continuation of group exercise without discontinuation may prevent frailty.

# Changes in older adults' food choices – a 10-year follow-up study

**Mrs. Ida Synnøve Grini<sup>1</sup>**, Associate Professor Laura Terragni<sup>2</sup>, Dr. Øydis Ueland<sup>1</sup>

<sup>1</sup>Nofima, Ås, Norway, <sup>2</sup>Oslo Metropolitan University, Oslo, Norway

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** The aim of this qualitative longitudinal study was to investigate changes in food intake when one ages and identify opportunities for healthy aging. Food is essential to older adults' quality of life, and adequate nutrition is necessary for healthy aging. Staying healthy longer and being able to live at home is an overarching aim for both society and older adults. In our experience, there are no longitudinal studies showing the development and changes in older adults' diets focusing on the foods and food products they consume.

**Methods:** The study used a phenomenological research design to gain deeper insights into the experience with food among older adults. The data collection was carried out in 2011 and 2020/21 using semi-structured interviews. The interview guide developed in 2011 was updated in 2020 to capture a longitudinal perspective. The age to participate in the first study was 67 – 84 years. Efforts were made to recontact all previous participants for the second study. Out of 15 participants from 2011, nine of the older adults were willing to participate in a follow-up interview. The data were analyzed using a thematic approach. By combining and analyzing the data from 2011 and 2021, we will present the data and results from the study.

**Results:** The findings show both continuity and changes. Meals and eating habits were linked to both eating healthfully and enjoying the food. Overall, the changes observed were related to a more health-focused approach to the respondents' food intake. A main finding was how the older adults coped with their changing life situation. Food habits and food context will be presented.

**Conclusions:** The importance of food as a health factor is a discourse that has existed for a long time, and the food eaten should also be healthy. A focus on food behavior with recommendations particularly aimed at older adults' lives in their own homes could contribute to healthy, active, and social aging. It will also contribute to more knowledge for governments and stakeholders from a public health perspective, about what older adults need when it comes to food behavior and healthy eating.

# Post-prandial CGM responses are inversely associated with positive mood states in healthy college students.

**Ms. Samantha Fessler<sup>1</sup>**, Mr. Asifur Arefeen<sup>1</sup>, Prof. Carol S. Johnston<sup>1</sup>, Prof. Hassan Ghasemzadeh<sup>1</sup>

<sup>1</sup>Arizona State University, Phoenix, USA

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Evidence suggests that fluctuations in blood glucose may influence mood, though research in healthy volunteers has yielded inconsistent results. The dynamics between glucose excursions and variations in mood may be obscured by the examination of average glucose and mood measures. Therefore, this report aimed to examine the relationships between first-meal post-prandial glucose (PPG) responses from continuous glucose monitoring (CGM) and ecological momentary assessment of mood in healthy adults under controlled and free-living conditions.

**Methods:** This report utilized data from an ongoing trial examining nutrient intake and CGM responses in healthy adults. This study consists of laboratory monitoring days and home monitoring days. During three non-consecutive days of laboratory monitoring, participants received customized meal plans with consistent macronutrient profiles that were either hypercaloric, eucaloric, or hypocaloric based on calculated energy requirements. Glucose was monitored using CGM devices and participants recorded mood states using a mobile app every 30 minutes over the 10-hour visit. During the four free-living days, CGM and mood state reporting were similar to control days, but participants tracked 24-hour unrestricted dietary intake using food diaries. Pearson's correlations were used to examine associations between PPG (e.g., area under the curve [AUC]) and corresponding mood scores for the first meal of the day under both controlled and free-living conditions.

**Results:** First-meal CGM and corresponding mood data are from 4 participants (26.3±3.4 y) covering both laboratory (3) and free-living (4) days with viable CGM and mood data. Analysis of laboratory monitoring days suggested a higher AUC for the first-meal CGM peak was associated with more negative composite mood scores ( $r=-.49$ ,  $P=.062$ ). Similarly, an association between the first-meal AUC from the CGM peak and more negative mood states was observed on free-living days ( $r=-.42$ ,  $P=.069$ ). Although these outcomes did not reach statistical significance, likely due to the small sample size, the large effect sizes suggest a strong relationship between the degree of glycemia and negative mood state.

**Conclusion:** The observed associations between blood glucose excursions and a negative mood state in healthy young adults suggest that steep blood glucose excursions could have important health implications even for individuals with normal glucose control.

# Facilitators and barriers related to the implementation of a digital “healthy eating” resource to support Early childhood education and care (ECEC) staff: A qualitative interview-study with teachers

**Dr. Sissel Helland<sup>1</sup>**, Dr. Tormod Bjørkkjær<sup>1</sup>, Dr. Kristine Vejrup<sup>2</sup>, Prof. Nina Øverby<sup>1</sup>

<sup>1</sup>University Of Agder, Kristiansand, Norway, <sup>2</sup>Norwegian Armed Forces Joint Medical Services, Institute of Military Epidemiology , Oslo, Norway

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** F. Early care and education

**Purpose:** Efficacious interventions that improve children's eating habits are desirable to implement in real-world settings and in a larger scale. Core components required for effective implementation is end-user involvement and adapting the interventions to the users' needs. Previously we have evaluated a digital “healthy eating” resource for ECEC staff. The purpose of the current qualitative study was to explore perception of needs of such a resource, and to identify facilitators and barriers related to implementation of the resource in staff.

**Methods:** Twelve individual semi-structured interviews and two focus group interviews were conducted with ECEC teachers in a selected municipality in Norway. Focus group interviews were conducted to stimulate teachers to reflect on preliminary results from the individual interviews. Data were transcribed verbatim and subjected to thematic analysis, to summarise the subjective experiences and sense-making of the teachers.

**Results:** Perceptions of needs from a digital “healthy eating” resource in ECEC included: 1) *Recipe bank and menus*; 2) *Ideas for educational food activities with children*; 3) *Link to the national curriculum for ECEC and highlighting research*, 4) *Access for, and training of parents and facilitator for implementing* was 5) *Newsletter with seasonal tips*. Barriers included: 1) *Lack of tradition for using information from the internet at work*; 2) *Lack of intentions to use since a new web resource is primarily associated with cooking* 3) *Likely short time use*; 4) *Knowledge-based feeding style and practices, a blind spot* and 5) *Different organizational cultures for training and meetings*.

**Conclusions:** This study provided information on how to adapt a digital expert-led “healthy eating” intervention to be more relevant for the ECEC staff, by e.g., providing links to national curriculum for ECEC and research. We also identified barriers (e.g., lack of tradition in use of digital resources) and facilitators for implementation (e.g., newsletter prompts), that will be used in an upcoming scaling of the digital intervention.

# The association between device-measured physical activity and performance-based physical function outcomes in adults: a systematic review and meta-analysis

**Mr. Joshua Culverhouse<sup>1</sup>**, Associate Professor Melvyn Hillsdon<sup>1</sup>, Dr. Brad Metcalf<sup>1</sup>, Dr. Michael Nunns<sup>1</sup>, Miss Rebecca Lear<sup>1</sup>, Dr. Gemma Brailey<sup>1</sup>, Dr. Richard Pulsford<sup>1</sup>

<sup>1</sup>University of Exeter, Exeter, United Kingdom

Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** A. Ageing

**Purpose:** Changes in physical function (PF) are an important aspect of ageing. A range of laboratory /clinic-based performance measures of PF are predictive of adverse future health outcomes in older adults. Remote health monitoring, through wearable devices, may allow the detection of declines in PF, earlier in the life course, before people perceive changes, and before presentation in clinic. If so, there is evidence that structured physical activity (PA) interventions can improve or delay losses in PF. Nevertheless, the strength of the association between wearable device-measured features of PA and performance-based measures of PF is unclear. This review examines the association between device-measured PA and performance-based measures of (PF) in adults.

**Methods:** A systematic review of observational studies reporting cross-sectional or prospective associations between wearable device-measured PA and PF outcomes in non-clinical adults. Meta-analyses were performed on included studies where a standardised regression coefficient was available or could be calculated.

**Results:** Forty-two studies with a pooled sample of 27276 participants were eligible, with 34 studies reporting a standardised regression coefficient ( $\beta$ ) between at least one of four PA measures and one of six PF outcomes. All measures of PA were positively associated with all measures of PF, except for step count with grip strength. Strongest associations were seen with lower-body PF tests; gait speed ( $\beta$ s = 0.11 to 0.27), walk tests ( $\beta$ s = 0.18 to 0.43), chair-rise test ( $\beta$ s = 0.10 to 0.26), balance ( $\beta$ s = 0.07 to 0.25) and timed up-and-go ( $\beta$ s = 0.10 to 0.24) all  $p < 0.01$ . Weak or no association was seen with PA grip strength ( $\beta$ s = 0.02 to 0.07).

**Conclusion:** In observational studies of general adult populations, there were associations between multiple dimensions of PA and a broad range of PF measures. The findings provide provisional support for the use of device-measures of movement to remotely monitor declines in PF in community-dwelling adults in mid-life/early old age. Prospective designs are needed to determine the direction of the relationship and future studies should also explore a broader range of PA metrics, including postural transitions and the temporal distribution of activity.

# The challenge of participatory projects for physical activity promotion: What to scale and how to scale?

**Miss Raluca Sommer**<sup>1</sup>, Dr. Maike Till<sup>1</sup>, Dr. Alexandra Sauter<sup>2</sup>, Dr. Karim Abu-Omar<sup>1</sup>, Dr. Peter Gelius<sup>1</sup>

<sup>1</sup>Friedrich-Alexander-Universität Erlangen-Nürnberg, Erlangen, Germany, <sup>2</sup>University of Regensburg, Regensburg, Germany

Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** Effective pilot interventions for physical activity (PA) promotion should be scaled up, i.e. transferred to broader contexts while permanently integrating them into policies or systems (WHO, 2010). This study explores the scale-up strategies of four German projects that developed actions for PA promotion based on a participatory approach (Gelius et al., 2021), highlighting the challenges encountered while transferring the participatory approach to other contexts and reaching other population groups.

**Methods:** We conducted a qualitative study based on document analysis and 15 semi-structured focus group interviews with each of the four projects' research teams. The ExpandNet framework (WHO, 2010) was used to retrospectively analyze the various scale-up strategies as well as key elements (i.e., innovation, user organization, environment etc.) utilized in the projects.

**Results:** The four projects succeeded in transferring effective pilot interventions to a total of 16 new sites ("horizontal" scale-up). At some sites, the process ran smoothly, while at others, the employed scale-up strategies differed from the initial plan. As a result, some projects scaled the participatory component, while others focused on specific actions previously developed in the initial project. Also, in some projects, political support and other favorable circumstances allowed for institutionalizing PA promotion actions on a higher organizational level ("vertical" scale-up).

**Conclusions:** When participatory approaches are used as mechanisms to co-create an agenda for PA promotion jointly with researchers, population groups, and relevant stakeholders, it seems that multiple strategies may be employed for scale-up. Participatory projects can be scaled-up horizontally or vertically, i.e. by focusing either on the participatory approach as a whole or on specific actions developed using the participatory approach in a previous pilot project. There is a need to develop novel theoretical concepts of scalability that capture the diversity of approaches observed in our study.



# Pain, quality of life and physical function among breast cancer survivors undergoing hormonal therapy with aromatase inhibitors

Ms. Inês Nobre<sup>1</sup>, Ms. Sofia Franco<sup>2,3</sup>, Mr. Bruno Rodrigues<sup>3,4</sup>, Mr. Flávio Jerónimo<sup>2</sup>, Mr. Vítor Ilharco<sup>2</sup>, Ms. Andreia Dias<sup>2</sup>, **Prof. António Palmeira<sup>2</sup>**, Dr. Marlene N. Silva<sup>2,3</sup>, Dr. Eliana Carraça<sup>2</sup>

<sup>1</sup>Faculdade de Motricidade Humana, Universidade de Lisboa, Lisbon, Portugal, <sup>2</sup>CIDEFES, Faculdade de Educação Física e Desporto, Universidade Lusófona, Lisbon, Portugal, <sup>3</sup>Programa Nacional para a Promoção da Atividade Física, Direção-Geral da Saúde, Portugal, <sup>4</sup>Faculdade de Desporto, Universidade do Porto (Centro de Investigação em Atividade Física, Saúde e Lazer), Porto, Portugal

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** C. Cancer prevention and management

**Purpose:** About 75% of breast cancer diagnoses are hormone-receptor-positive (HRP). After active treatment, breast cancer survivors (BCS) with HRP undergo 5–10 years of hormonal therapy (HT). One of the most used HT regimens is blocking estrogen biosynthesis with aromatase inhibitors (AIs).

Although HT improves disease-free survival rates, treatments are often related to several adverse side effects, which can adversely affect BCS's quality of life (QoL). One side effect that has been consistently reported in the literature is chronic pain, especially arthralgia. Ultimately this can lead to premature therapy discontinuation, and eventually, lower treatment efficacy and increased mortality.

The improvement of physical function (PF), through physical activity (PA), has been shown to significantly ameliorate pain in most chronic pain diseases. However, there is limited evidence regarding this approach as a part of pain treatment among BCS.

Therefore, the aim is to characterize pain and PA and analyze the associations between pain, QoL and PF in this population.

**Methods:** A group of BCS doing HT with AIs ( $n = 75$ , mean age  $56.2 \text{ years} \pm 7.7$ ) completed pain measures using the Brief Pain Inventory and the Pain Disability Index, QoL measures with EORTC, PA assessed with the International Physical Activity Questionnaire short form and PF assessed with time up and go (TUG), strength (handgrip and 10 RM) and flexibility (ROM) tests.

**Results:** 92% reported usual pain and 50% did not meet PA adult recommendations for aerobic exercise. Bivariate correlation analysis adjusted for BMI and time on AIs revealed negative and significant correlations with pain and PF (TUG, strength and flexibility; all  $p_s < 0,05$ ) and several QoL dimensions (Global Health, Physical Functioning, Role Functioning, Social Functioning, Fatigue, Insomnia, Financial Difficulties, Body Image, Systemic Therapy Side Effects, Arm Symptoms and Musculoskeletal Symptoms; all  $p_s < 0,01$ ).

**Conclusions:** These findings confirm the detrimental association between pain and QoL and are aligned with previous research regarding the potential benefit of PF in pain. Nevertheless, further pain management investigation involving different methods for improving PF, namely PA interventions, is needed in this population.

# A community-engaged model for the NUEVA app/website: Nutrition for Underserved Elders Via Application

**Dr. Lesli Biediger-Friedman**, Dr. Cassandra M Johnson

<sup>1</sup>Texas State University, San Marcos, USA

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** Describe a new community-engaged model for innovating senior nutrition programs through technology with the NUEVA project (Nutrition for Underserved Elders Via Application). Older adults (60 years+) have unique needs related to food and nutrition to ensure food security and support socialization, but the existing U.S. Senior Nutrition Program has had limited reach and effectiveness with congregate sites and home delivered meal programs.

**Methods:** A socioecological framework and principles from community-engaged research and user-centered design (UCD), informed development of multifunctional app/website. The prototype includes four modules: sign-up, referral, meal selection (for home delivered meals), and assessment. The team solicited feedback from stakeholders (Advisory Board and community partners) during concept generation, iterative development, and prototype testing. Stakeholders provided in-depth consultation of processes to sign-up, program qualification, meal selection, and initial program participant assessment. Validated measures were selected for the assessment module (e.g., food security and loneliness scales). All findings were applied to build the prototype.

**Results:** A new model was created to facilitate the PSE (policy, system, or environmental) changes including pathways linking community meal providers, food security partners, and health/ social service providers, Area Agencies on Aging, older adults, and their families. Twenty-four community stakeholders, representing 11 organizations have engaged in the development phases NUEVA. Stakeholders have shared strengths of the NUEVA app including providing connection between the program, older adults and their family, and meal delivery personnel. Stakeholders have been excited to discuss opportunities to automate and optimize the program and empower the volunteer workforce to provide observational data to improve outcomes. Concerns have included technology acceptance, intention to use long-term, and reading level/ functional limitations. Threats have included cyber security concerns, access to technology (devices, data-plans, broad band), and competing priorities for meal and service providers.

**Conclusions:** Preliminary results have highlighted benefits of a community engaged and UCD approach, such as designing features to reflect sociocultural values and existing community assets. Findings will inform prototype modification, including the addition of new modules (e.g., nutrition education, grocery delivery), and subsequent testing in collaboration with stakeholder groups. Ongoing research will identify opportunities to maximize impact of senior nutrition programs.

# Outcome domains measured in randomized controlled trials of physical activity for older adults: A rapid review

Associate Professor Dawn Mackey<sup>1</sup>, **Dr. Christina Ekegren<sup>2</sup>**, Dr. Claire Baldwin<sup>3</sup>, Mr. Peter Young<sup>1</sup>, Dr. Samantha Gray<sup>1</sup>, Mr. Alex Ciok<sup>1</sup>, Ms. Angela Wong<sup>1</sup>

<sup>1</sup>Simon Fraser University, Burnaby, Canada, <sup>2</sup>Monash University, Melbourne, Australia, <sup>3</sup>Flinders University, Bedford Park, Australia

Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** A. Ageing

**Purpose:** Toward development of a core outcome set for randomized controlled trials (RCTs) of physical activity (PA) interventions for older adults, the purpose of this study was to identify outcome domains and subdomains ('what' was measured) in previously published RCTs of PA for older adults.

**Methods:** We conducted a rapid review and searched Ovid MEDLINE for recently published (2015-2021), English-language, RCTs of PA interventions for older adults (mean age 60+ yrs). We limited to articles published in Web of Science top-10 journals in general and internal medicine, geriatrics and gerontology, rehabilitation, and sports science. Two reviewers independently completed eligibility screening; two other reviewers abstracted trial descriptors and study outcomes. We classified study outcomes according to the standard outcome classification taxonomy endorsed by the Core Outcome Measures in Effectiveness Trials Initiative.

**Results:** Our search yielded 548 articles; 67 articles were eligible to be included. Of these, 82% were efficacy/effectiveness trials, 85% included both male and female participants, and 84% recruited community-dwelling older adults. Forty percent of articles reported on interventions that involved a combination of group and individual PAs, and 60% involved a combination of PA modes (e.g., aerobic, resistance). Trial sample size ranged from 14 to 2157 participants, with median (IQR) of 94 (57-517); 28,649 participants were included across all trials. We identified 21 unique outcome domains, spanning 4/5 possible core areas (physiological/clinical; life impact; resource use; adverse events). The five most commonly reported outcome domains were physical functioning (included in n=51 articles), musculoskeletal and connective tissue (n=30), general (n=26), cognitive functioning (n=16), and emotional functioning/wellbeing (n=14). Under these five outcome domains, we further identified 10 unique outcome subdomains (e.g., fall-related; body composition; quality of life). No outcome domains or subdomains were reported consistently in all RCTs.

**Conclusions:** We found extensive variability in outcome domains and subdomains used in RCTs of PA for older adults, reflecting the broad range of potential health benefits derived from PA and also investigator interest to monitor a range of safety parameters related to adverse events. This study will inform development of a core outcome set to improve outcome reporting consistency and evidence quality.

# The Exercise Right for Active Ageing study: Participation in community-based exercise classes by older Australians during the COVID-19 pandemic

**Dr. Christina Ekegren<sup>1</sup>**, Dr. Darshini Ayton<sup>1</sup>, Prof. Helen Skouteris<sup>1</sup>, Dr. Sze-Ee Soh<sup>1</sup>

<sup>1</sup>Monash University, Melbourne, Australia

Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** A. Ageing

**Purpose:** To determine factors associated with participation of older Australians in community-based exercise classes during the COVID-19 pandemic. A secondary aim was to investigate the association between participation in exercise classes and changes in physical activity levels.

**Methods:** This pre-post study included community-dwelling older adults ( $\geq 65$  years) from across Australia. The intervention consisted of 12 low to moderate-intensity exercise classes, delivered weekly by university-trained accredited exercise scientists or physiologists (AESs/AEPs). Negative binomial regression was used to determine factors associated with the primary outcome (number of classes attended/12). Physical activity levels were self-reported using a modified version of the International Physical Activity Questionnaire Short Form. To assess the change in physical activity levels (pre-test to post-test), three outcomes (total weekly MET minutes, active days/week, hours sitting/day) were modelled using mixed-effects linear regression.

**Results:** Of 6,949 participants recruited, 6,626 attended  $\geq 1$  class and were included in the primary analysis (95%). 49% of participants attended all 12 classes. Higher class attendance was associated with yoga/flexibility/mobility classes, attendance at a free trial class (adjusted incidence rate ratio [95% CI]: 1.05 [1.03, 1.08]) and online classes (1.19 [1.11, 1.26]). Lower class attendance was associated with state of residence, living in inner regional areas (0.95 [0.93, 0.98]) and having  $\geq 2$  comorbidities (0.97 [0.95, 0.99]). 3,505 participants were included in secondary analyses (53%). Participants who attended  $\geq 1$  exercise class increased physical activity by 447.0 (95% CI: 417.6, 476.3) METmins/week, were active on 0.9 (0.8, 1.0) additional days/week and reduced their sitting time by 0.5 (-0.6, -0.5) hours/day (pre-test to post-test). For each additional class attended, there was an increase in physical activity of 25.2 (2.4, 48.0) METmins/week.

**Conclusions:** High class attendance suggests the Exercise Right for Active Ageing program was well-received by older Australians, particularly in states less impacted by COVID-19 lockdowns. Classes attendance was associated with a significant increase in self-reported physical activity levels and active days, and a significant decrease in self-reported sitting time, suggesting that group exercise classes played an important role in promoting physical activity in older Australians during the pandemic.

# A participatory action research study with focus on learning in and about education for sustainable development in physical education

**Associate Professor Andreas Fröberg<sup>1</sup>**, Prof. Suzanne Lundvall<sup>1</sup>

<sup>1</sup>Department of Food and Nutrition, and Sport Science, University Of Gothenburg, Gothenburg, Sweden

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** F. Early care and education

**Purpose:** There is a growing internationally research interest in how physical education (PE) and PE teacher education (PETE) may contribute to the education for sustainable development (SD) agenda. Although it has been suggested that some of the contents of PE are related to education for SD, one critical question is that of prioritizing teaching and learning of content and challenge the way it is taught. The overall aim of this participatory action research (PAR) study is to explore what PE teacher (PET) educators perceive to be critical aspects on education for SD in PETE. More specifically, we explore how PET educators perceive and conceptualize SD, and what aspects on education for SD they perceive to be critical to implement in PETE courses, as well as what arguments and support that are put forward in relation to this.

**Methods:** The PAR study draws on the principles of collaborative learning and involves 10 PET educators from one higher education institution in Sweden. They have different employment and academic positions, including adjunct lectures and professors, who together prepare PETs in compulsory and upper secondary schools. The PET educators took part in a series of audio recorded workshops and seminars (6 sessions × 180 minutes) encountering and problematizing the conceptualizing of education for SD. Data was also collected through logbooks. The analytical process is structured in three layers: individual responses and reflection, collegial responses and reflections, and thematical analyses of recordings from workshops and logbooks.

**Conclusion:** The analytical attention is directed towards subjectivities, positionalities, and motivations. Data collection from the first part of the PAR study have been analysed, and preliminary results will be presented from the recorded workshops and seminars, and logbooks. The finalization process of findings and conclusions will focus on what education for SD can mean individually and as part of a collective understanding, and in relation to the individual PET educators' understandings and courses of various character in PETE.

# EX-MED Cancer Sweden: study protocol for a randomised controlled trial of distance-based delivery of exercise for people treated for breast, prostate or colorectal cancer

**Ms. Melissa Kotte**<sup>1</sup>, Dr. Kate Bolam<sup>1,2</sup>, Dr. Sara Mijwel<sup>1,3</sup>, Associate Professor Renske Altena<sup>1,4</sup>, Associate Professor Prue Cormie<sup>5,6</sup>, Prof. Yvonne Wengström<sup>1,4</sup>

<sup>1</sup>Karolinska Institutet, Stockholm, Sweden, <sup>2</sup>The Swedish School of Sport and Health Sciences, Stockholm, Sweden, <sup>3</sup>Norwegian School of Sport Sciences, Oslo, Norway, <sup>4</sup>Karolinska University Hospital, Stockholm, Sweden, <sup>5</sup>Peter MacCallum Cancer Centre, Melbourne, Australia, <sup>6</sup>The University of Melbourne, Melbourne, Australia

**Poster Session #1, June 15, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** C. Cancer prevention and management

**Purpose:** Robust evidence shows that regular exercise plays an important role in improving the quality of life, physical function, and psychological health, and in managing common cancer-related side effects for cancer survivors. However, the challenge is being able to provide cancer survivors with easily accessible, high-quality exercise support and programs. Consequently, we need to develop easily accessible exercise programs that draw upon the current evidence base that can be delivered to as many as possible and determine if these programs are effective. EX-MED Cancer Sweden is a supervised, distance-based group exercise program providing cancer survivors with access to evidence-based exercise medicine, delivered through community gyms, by upskilled exercise specialists. This study aims to examine the effectiveness of EX-MED Cancer Sweden for survivors of breast, prostate, and colorectal cancer.

**Methods:** Adults that have completed curative treatment for breast, prostate, or colorectal cancer (n = 200) are recruited to participate in a single centre, single-blind, two-armed randomised controlled trial. Participants are randomly allocated to an exercise group or a routine care control group. The exercise group will participate in a supervised, distance-based exercise program delivered by a personal trainer who has undertaken specialised exercise oncology education modules, twice per week for three months. The primary outcome is health-related quality of life assessed at baseline, 3- (end of intervention and primary endpoint) and 6-months post-baseline. Secondary outcomes are physiological (cardiorespiratory fitness, muscle strength, physical function, body composition) and patient-reported outcomes (cancer-related symptoms, fatigue, self-reported physical activity), and self-efficacy of exercise. Furthermore, the study will explore and describe the experiences of participation in the exercise intervention.

**Conclusion:** The EX-MED Cancer Sweden trial will provide evidence regarding the effectiveness of a supervised, distance-based exercise program for survivors of breast, prostate, and colorectal cancer. If successful, it will contribute to the implementation of flexible and effective exercise programs as part of standard of care for people following cancer treatment, which is likely to contribute to a reduction in the burden of cancer on the individual, health care system and society.



# Physical Activity and Visceral Adiposity in Young Adults

**Dr. Claudia Magaly Espinosa Méndez**<sup>1</sup>, Dr. Ciria Salazar Carrillo<sup>2</sup>, Dr. Ixchel Reyes Espejel<sup>1</sup>, Prof. Benjamín Flores Chico<sup>1</sup>, Dr. Sebastian Leonardo San Martín Rodríguez<sup>3</sup>

<sup>1</sup>Meritorious Autonomous University of Puebla, Puebla, Mexico, <sup>2</sup>University of Colima, Colima, Mexico,

<sup>3</sup>Institute of Higher Studies of Educational Engineering, Puebla, Mexico

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** J. Young Adults

**Purpose:** Regular physical activity (PA) is a determining factor for maintaining health, its beneficial effects are well known, among which are the maintenance of an adequate weight and the reduction of risks of diseases such as diabetes and cardiovascular diseases, directly related to visceral adiposity. Many people claim to be physically active, but do not know the parameters necessary to maintain health through PA, so the objective of this study is to determine the level of self-reported physical activity by young adults and its relationship with visceral adiposity presented by the evaluated subjects.

**Methods:** Cross-sectional, observational analytical study. The sample consisted of 159 young adults (122 women and 37 men,  $21.35 \pm 1.6$  years). To evaluate the level of physical activity the short version IPAQ questionnaire was applied, and an anthropometric evaluation was carried out, obtaining measurements of height, weight, waist circumference (WC), and abdominal perimeter (AP), the degree of visceral adiposity was determined using the Waist-Height index as a reference. Descriptive and qualitative statistical analysis was performed using chi-square to establish an association between the variables.

**Results:** 74.8% of the participants present elevated visceral adiposity, contradicting the self-reports generated through the survey, which indicate that 66% of the participants perform high-intensity PA, only 15.7% reported doing low-intensity PA, while no one stated that they did not perform PA, without significant associations.

**Conclusions:** The participants report high levels of physical activity, but more than half of the participants presented higher than healthy levels of visceral adiposity, which leads us to think that the sample subjects overestimate the levels of physical activity they perform, so we consider it necessary to create programs to improve the quality of PA and raise awareness among young adults about their health care.

# Characteristics of prenatal yoga in the West: A scoping review

**Miss Kirina Angrish<sup>1</sup>**, Miss Cassie Cassie Copelli<sup>2</sup>, Dr. Kimberley L. Gammage<sup>2</sup>

<sup>1</sup>Brock University, Faculty of Applied Health Science, St. Catharines, Canada, <sup>2</sup>Brock University, Department of Kinesiology, St. Catharines, Canada

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** N. Other

**Purpose:** Prenatal yoga is a safe form of physical activity recommended for the pregnant population, given its association with improved maternal and fetal health outcomes (e.g., depressive symptoms, fetal heart rate). However, there is significant diversity in how prenatal yoga programs are designed and implemented in Western countries. This scoping review aimed to identify the characteristics of prenatal yoga programs conducted in Western countries (e.g., USA), including the frequency, duration, and type of yoga, as well as key outcomes.

**Methods:** This scoping review followed the established guidelines developed by Arksey and O'Malley (2005) as well as the PRISMA checklist for conducting scoping reviews.

**Results:**  $N = 30$  studies were included in this review. Most included studies investigated women in their second or third trimester; very few had pregnancy-specific inclusion criteria (e.g., singleton pregnancy). Maternal mental health outcomes (e.g., depressive symptoms, pregnancy-related anxiety, perceived stress) were the most studied outcomes, with significant improvements seen upon program completion. Characteristics of the yoga program varied slightly. Typically, yoga programs were 12 weeks, with 75-minute sessions. The majority of the yoga programs did not assess adherence, and details about instructor supervision, setting, and class size were not included in most studies; yoga program characteristics were not outlined in the qualitative studies. Based on observational, qualitative, and mixed method studies, prenatal yoga was perceived as an acceptable form of physical activity by pregnant women, with all participants discussing the positive influence of prenatal yoga on their pregnancy (e.g., easier labour and delivery, back pain relief).

**Conclusion:** Based on the main findings of this scoping review, there is a need for the scientific and health promotion community to develop safe and appropriate prenatal yoga guidelines. Moreover, there is a need to systematically investigate the dose-response relationship between the amount of yoga done and the maternal and fetal benefits. Lastly, future quantitative work should identify the mechanisms of yoga that make it effective in improving maternal well-being in order to create effective prenatal yoga programs.

# Homebuyer, land developer, and real estate professional perceptions of neighbourhood qualities associated with active living.

**Associate Professor Gavin McCormack**<sup>1</sup>, Ms. Autumn Nesdoly<sup>2</sup>, Ms. Dalia Ghoneim<sup>1</sup>, Prof. Tara-Leigh McHugh<sup>2</sup>

<sup>1</sup>University of Calgary, Calgary, Canada, <sup>2</sup>University of Alberta, Edmonton, Canada

Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Homebuyers (HBs) demand certain neighbourhood characteristics, land developers (LDs) supply neighbourhoods with particular built characteristics, and real estate professionals (REPs) match HBs with their desired neighbourhoods. 'Walkability', 'healthy', 'bikeability', 'vibrancy', and 'livability' are commonly used to describe neighbourhood qualities that support health and wellbeing. These qualities are communicated in the media and real estate and land development marketing materials, yet little research has explored whether these qualities have common meanings among HBs, LDs, and RE professionals. Our study explored the ways in which HBs, LDs, and RE professionals perceive and understand these neighbourhood qualities.

**Methods:** In 2019 and 2020, we conducted semi-structured telephone interviews with HBs (n=12), LDs (n=12) and REPs (n=19) from three major cities (Calgary, Edmonton, and Lethbridge) in Alberta, Canada. The interview guide consisted of five core questions, each focusing on the neighbourhood qualities of walkability, bikeability, vibrancy, livability, and health. Interview transcripts were analyzed using a process of content analysis, and findings were represented by themes related to each neighbourhood quality.

**Results:** HBs and LDs described 'walkability' as *ease of movement, contextual differences, and connections*; 'bikeability' as *supportive infrastructure, and differing preferences*; "vibrancy" as *matches peoples' values, and supportive built features*; 'livability' as *all encompassing, and safe and friendly*, and; a 'healthy' community as *opportunities for activity, and diversity*. REPs described 'walkability' as *perceived preferences, destinations and amenities, and connections*; 'bikeability' as *bikeability attributes, and controversial*; 'vibrancy' as *community feel, and evidence of life*; 'livability' as *subjective, and preferences and necessities*; and a 'healthy' community as *encourages outdoor activities, and promotes social homogeneity*. Perspectives about these neighbourhood qualities shared by HBs, LDs, and REPs were similar, and congruent with perceptions of these neighbourhood qualities as described in the academic literature. Descriptions of characteristics related to the five neighbourhood qualities overlapped, however, there was a conceptual hierarchy whereby walkability and bikeability were considered necessary for vibrancy, which was required for livability and in turn required for creating health supportive neighbourhoods.

**Conclusions:** This evidence has the potential to inform strategies for educating HBs, LDs, and REPs about the importance of neighbourhood qualities that support health and wellbeing.

# The influence of neighbourhood walkability on the effectiveness of a 12-week pedometer-facilitated physical activity intervention.

**Associate Professor Gavin McCormack**<sup>1</sup>, Prof. John Spence<sup>2</sup>, Prof. Tara-Leigh McHugh<sup>2</sup>, Prof. W. Kerry Mummery<sup>2</sup>

<sup>1</sup>University of Calgary, Calgary, Canada, <sup>2</sup>University of Alberta, Edmonton, Canada

Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Pedometer-facilitated interventions encourage physical activity (PA) via the accumulation of steps. Mixed evidence suggests that neighbourhood built characteristics, such as walkability, might influence the effectiveness of PA interventions, including interventions that encourage the use of pedometers. In a previous study, we found that perceived walkability, but not objectively-measured walkability, was positively associated with the accumulation of daily steps during a 12-week pedometer-facilitated PA intervention ('UWALK'). As a follow-up to this previous study, we investigated the moderating effect of objectively-measured neighbourhood walkability on immediate (4-week) and short-term (12-week) changes in self-reported neighbourhood-specific leisure and transportation walking, leisure-based moderate and vigorous-intensity PA, and leisure-based screen time during UWALK. We hypothesized that immediate and short-term changes in self-reported PA during this pedometer-facilitated intervention would be significantly higher among participants residing in more versus less walkable neighbourhoods.

**Methods:** This quasi-experiment undertaken in Calgary (Canada) compared behaviour changes during the 12-week intervention between two neighbourhood groups classified as 'walkable' or 'car dependent' based on an objective measure of walkability (Walk Score®). Between May 2016 and August 2017, adults were recruited to participate in UWALK via newsletters, websites, and social media. Of the 573 volunteers (adults in the contemplation and preparation stages of PA behaviour change), 466 participated in UWALK. Surveys captured sociodemographic characteristics, perceived neighbourhood walkability, neighbourhood preferences, motivation, PA and screen-based leisure. Covariate-adjusted linear mixed models estimated the differences in PA and leisure-based screen time between the neighbourhood walkability groups at baseline, 4-weeks, and 12-weeks.

**Results:** UWALK participants included mostly females (83%) and had an average age of 49.2 years. Weekly minutes of walking for transport inside the neighbourhood was higher ( $p < .001$ ) among participants from 'walkable' versus 'car dependent' neighbourhoods at baseline (42.5 vs. 21.1), 4-weeks (81.2 vs. 48.2), and 12-weeks (87.2 vs. 48.0). Regardless of neighbourhood walkability, all PA outcomes were higher and leisure screen time lower at 4-weeks and 12-weeks compared with baseline. We found no significant neighbourhood walkability group by time interactions.

**Conclusions:** Pedometer-facilitated interventions may be effective for supporting short-term changes in physical activity and sedentary behaviour regardless of whether participants reside in low or high walkable neighbourhoods.

# A systematic review of climate change, 24-hour movement behavior, and health

**Dr Eun-Young Lee<sup>1</sup>**, Ms. Charlotte Lipin<sup>1</sup>, Ms. Yeong-Bae Kim<sup>2</sup>, Ms. Mikyung Lee<sup>1</sup>, Mr. Heejun Lim<sup>1</sup>, Dr. Ian Janssen<sup>1</sup>, Prof. John Spence<sup>2</sup>

<sup>1</sup>Queen's University, Kingston, Canada, <sup>2</sup>University of Alberta, Edmonton, Canada

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** To examine potential mechanisms between climate change and movement behaviors (i.e., physical activity [PA], sedentary behavior [SB], and sleep), and how they influence human health.

**Methods:** Five databases (i.e., CINAHL, Embase, Global Health, MEDLINE, PsycINFO) were searched for English, peer-reviewed, quantitative studies up to the pre-COVID era (March 2020). To be included, studies must have climate change-related factors (e.g., ambient air pollution/temperature, lack of urban greenness, transportation noise) and at least one of the movement behaviors as either an exposure or a third variable, and health as an outcome. Evidence was summarized by the role (mediator/moderator) that either climate change or movement behavior plays on health.

**Results:** Of 14,601 documents searched, 39 studies were eligible, representing 1,300,277 participants from 19 countries (except for two ecological studies). A total of 11 non-mutually exclusive studies employed mediation and 35 studies employed moderation (quality of evidence score: 9/10). Of 40 observations from 12 studies that examined PA as a mediator, 13 null and 27 negative relationships were observed between climate change and health outcomes with PA partially explaining such relationships. Generally, poorer measures of climate change were associated with lower PA, and worse health outcomes. A total of 164 observations from 35 studies had either climate change or movement behavior as a moderator. Of these, 112 observations had movement behavior (PA: n=108, SB: n=2, sleep: n=2) as a moderator. With PA as a moderator, the relationships between climate change and health were null in 30, positive in 7, and negative in 71 observations, with any dose of PA generally attenuating the negative association between climate change and health. With climate change as a moderator (n=52), 17 null, 33 positive, and two negative associations between PA and health were observed.

**Conclusions:** Generally, the negative relationship between climate change and health was partially mediated by PA. Urban greenness and good air quality were associated with high PA and, in turn, positive health outcomes. PA may also buffer or strengthen the negative association between climate change and health; however, any dose of PA generally showed positive modification on the relationship.

# More than the worksite cafeteria: Workplace food environment clusters in small- and medium sized enterprises in the Netherlands

**Mrs. Lisanne Geboers<sup>1</sup>**, Mrs. Frédérique Rongen<sup>1</sup>, Prof. Emely de Vet<sup>1</sup>, Dr. Maartje Poelman<sup>1</sup>

<sup>1</sup>Wageningen University & Research, Wageningen, Netherlands

Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Most characterization of workplace food environments has been conducted on worksite cafeterias. However, many small- and medium sized enterprises (SMEs) do not have a worksite cafeteria and food is offered and consumed in alternative ways. This study aimed to gain better understanding of these food environment of different types of SMEs.

**Methods:** A cross-sectional study was conducted among stakeholders (responsible of food policy/availability) of 315 SMEs. Using an online survey, physical, economic, political and social-cultural aspects of the food environment in SMEs were measured. To identify different type of SMEs, a two-step cluster analysis including two determinants: location of workspace (office/off-site) and presence of worksite cafeteria (yes/no) was conducted. Subsequently, descriptive statistics and Chi<sup>2</sup>-test were conducted to assess differences between clusters.

**Results:** Four SME clusters were identified: '1: SMEs with a company cafeteria and where employees most often work off-site' (11.1%), '2: SMEs with no company cafeteria and where employees most often work off-site' (21.3%), '3: SMEs with a company cafeteria where employees most often work at the office' (13.0%), '4: SMEs with no company cafeteria and where employees work most often at the office' (54.6%). The four clusters were significantly different in specific attributes of the food environment, such as availability of a catered lunch ( $\chi^2= 41.6$ ,  $p<0.001$ ), presence of a soft drink vending machine ( $\chi^2= 39.3$ ,  $p<0.001$ ), presence of a snack vending machine ( $\chi^2= 41.4$ ,  $p<0.001$ ), and a water tap ( $\chi^2= 28.3$ ,  $p<0.001$ ). These attributes of the food environment were significantly more available in cluster 1 and 3 than in cluster 2 and 4. At SME cluster 1, food policy related to consumption of healthy and sustainable foods were more often present than in the other identified clusters. More results will be presented.

**Conclusions:** This study identified the food environment of four different types of SMEs. The results highlight that different SMEs have different food environmental features. Typical guidelines to improve food environments at the worksite (e.g., healthy cafeterias) do not always align with real-life situations. As a next step, these insights can be used to design interventions, tailored at the type of SME.



# Fit4Study: Preliminary findings of a physical activity intervention for mental health and wellbeing in undergraduate university students

**Dr. Sjaan Gomersall<sup>1</sup>**, Mr. Kevin Huang<sup>1</sup>, Dr. Emma Beckman<sup>1</sup>, Dr. Norman Ng<sup>1</sup>, Associate Professor Genevieve Dingle<sup>1</sup>

<sup>1</sup>The University of Queensland, Brisbane, Australia

Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** J. Young Adults

**Purpose:** Starting university brings many challenges which can result in considerable psychological distress. Studies have shown increasing rates of poor mental health in undergraduate students, with more than 50% of students displaying symptoms of depression and anxiety. While physical activity (PA) is a known correlate of mental health, PA rates in undergraduates are low. The aim of our study is to evaluate the effectiveness of a 4-week PA intervention “Fit4Study” on mental health in undergraduates.

**Methods:** Undergraduate students were recruited via first year psychology courses, online advertisements, and posters. Participants were invited to opt-in to either the “Fit4Study” ( $n = 47$ ) or control group ( $n = 47$ ). The “Fit4Study” group participated in a 4-week behaviour change-informed intervention that provides resources to promote PA engagement. Outcome measures were collected via self-report questionnaires at baseline and at end-intervention, including depression, anxiety, wellbeing, knowledge, and use of PA as a coping strategy, and PA. Control group participants were randomly matched based on age, gender, and international student status. Intervention effects were assessed using 2x2 mixed ANOVAs.

**Results:** Participants were aged an average of 19.8 y (85% female). Participants in the “Fit4Study” group reported a significant increase in using PA as a coping strategy when experiencing negative mental health symptoms, compared to the control at post-intervention (mean proportional change relative to control group of +40%,  $p < 0.05$ ). Within the control group, anxiety symptoms decreased between baseline ( $M = 2.13$ ,  $SD = 1.23$ ) and post-intervention ( $M = 1.72$ ,  $SD = 1.34$ ). There were no other significant outcomes.

**Conclusion:** The “Fit4Study” intervention is effective in increasing students’ use of PA as a coping strategy. These results are in line with available literature which says that perceiving PA as a coping strategy is necessary for PA to be effective in improving mental health. Given the non-significant results and small sample size, the impact of “Fit4Study” and PA on mental health may not be conclusive and further research with increased sample size is recommended.

# Surrounded by sugar: a context mapping study about sugar sweetened beverage consumption among teenagers in Amsterdam, the Netherlands

**Ms. Rian Pepping<sup>1,2</sup>**, Dr. Vincent Busch<sup>1</sup>, Associate Professor Wilma Waterlander<sup>3</sup>, Prof. Arnoud Verhoeff<sup>1</sup>, Prof. Jaap Seidell<sup>2</sup>

<sup>1</sup>Public Health Service of Amsterdam, Amsterdam, Netherlands, <sup>2</sup>VU University, Amsterdam, Netherlands,

<sup>3</sup>Amsterdam UMC, Amsterdam, Netherlands

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Approximately 25% of teenagers in Amsterdam has overweight or obesity. Consumption of sugar-sweetened beverages (SSB) is an important contributor to them developing overweight and obesity. However, it is unclear what underlying factors contribute to SSB consumption among teenagers. Therefore, this study applied a system dynamics perspective to fully understand the (interacting) beliefs, environment and social triggers that shape teenagers' SSB consumption. These results will be used to design system changes that fit teenagers' perspectives.

**Methods:** Context mapping was used to gain insight into the (latent) needs, motives and barriers among teenagers (N=48), age 12-16, with regard to SSB- and water consumption. In addition to an interview in duos, teenagers reflected on their own context through participating in assignments such as creating vlogs, timelines and photos. The interviews were conducted in 2021, some digitally and some live on location. All data was coded and processed in the online application Miro.

**Results:** The data was analyzed for emerging key themes, which were structured by context. First and foremost, teenagers consider SSB consumption as normal and part of everyday life. This theme is applicable to all contexts: SSB is present at home, at school and on social media. Also, SSB is considered cheap and prices will need to be increased significantly to discourage teenagers from buying SSB. In fact, the world teenagers live in seems designed to make them consume SSB (e.g. low prices, marketing exposure and social norms). As a result, the majority consider it normal, harmless and consumes SSB daily.

**Conclusions:** This research shows that the consumption of SSB is more prevalent and more integrated into teenagers' lives than expected. Teenagers are constantly exposed to SSB for instance on social media or around friends. It requires changes on different system levels, meaning changes on the deeper system drivers (i.e. tackling the belief that it is acceptable to market SSBs to children) as well as acting on more visible elements such as specific structures or events, e.g. implementing a SSB tax.

# Leverage points: Moving from theory and into practice

**Dr. James Nobles**

<sup>1</sup>Leeds Beckett University, Leeds, United Kingdom

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Leverage points are modifiable parts of a system, that if altered, may lead to significant changes in how that system works. Much of the work on leverage points has been conceptual. Where efforts have been made to identify leverage points in practice, they have been heavily reliant on the expertise of academic researchers. As such, several research teams have worked with policy-makers, practitioners and the public to create pragmatic tools that may help them to identify points within a system that could change how the system – or elements of the system – function. This presentation aims to: (1) introduce leverage points, (2) discuss the historic challenges faced when implementing models to identify leverage points, and (3) illustrate two pragmatic models for identifying leverage points; the Action Scales Model (ASM) and Public Health 12 (PH12) model.

**Methods:** This talk synthesises a rich history of published research in the fields of systems science and public health, before then going on to explain how the ASM & PH12 have been created to try and improve the translation of systems science tools into policy and practice.

**Results:** There are several other models available for identifying leverage points within a system. These include the initial work of Donella Meadows who published the seminal “places to intervene in a system”, that of Peter Senge’s “Iceberg Model”, and more recently, the “Intervention Level Framework” of Diane Finegood and colleagues. Whilst these models are foundational in our thinking around systems, and how to change how such systems function, they are often noted as abstract, academic, and as such, difficult to implement in practice. The ASM and the PH12 are grounded in the origins of this work but have been carefully designed to enhance their applicability outside of academia, including a focus on understandable and relevant language, visual illustrations, and pertinent examples.

**Conclusions:** Leverage points offer great potential to those interested in systems change. The ASM and PH12 are pragmatic models that can help those working in policy and practice to better understand their systems of interest and collectively identify where it might be possible to intervene.

# Using a participatory approach to identify opportunities for (re)designing occupational physical activity in homecare work to promote homecare workers' health – a study from an urban Norwegian municipality

**Ms. Ingeborg F. Liaset**<sup>1</sup>, Prof. Marius Steiro Fimland<sup>1,2</sup>, Prof. Andreas Holtermann<sup>3</sup>, Prof. Svend Erik Mathiassen<sup>4</sup>, Associate Professor Skender Redzovic<sup>1</sup>

<sup>1</sup>Department of Neuromedicine and Movement Science, Faculty of Medicine and Health Sciences, Norwegian University of Science and Technology, Trondheim, Norway, <sup>2</sup>Unicare Helsefort Rehabilitation Centre, Rissa, Norway, <sup>3</sup>National Research Centre for the Working Environment, Copenhagen, Denmark, <sup>4</sup>Department of Occupational Health Sciences and Psychology, Centre for Musculoskeletal Research, University of Gävle, Gävle, Sweden

Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** Homecare workers report having physically demanding work that may contribute to a high prevalence of musculoskeletal pain, sick leave, and early retirement. The aim of this presentation is to present a study identifying opportunities for (re)designing occupational physical activity in an urban Norwegian municipality for the purpose of promoting workers' health in accordance with the Goldilocks Work approach.

**Methods:** In collaboration with three urban Norwegian homecare units in the municipality, a modified version of the Intervention Mapping protocol was followed. In step 1 we assessed the current situation, and potential for change through participatory observations of stakeholders (n=6), reviewing the literature and examining findings regarding objectively measured occupational physical activity among homecare workers; and we assessed homecare workers' perception of their health. In addition, homecare workers' estimated Vo2max was assessed. Then we formulated goals for the (re)design. In step 2 we identified potentials for (re)designing homecare work in accordance with the developed goals. Special attention was given to a participatory approach in both steps, by involving relevant stakeholders (n=13) in planning groups and workshops.

**Results:** The assessment revealed a potential for increasing homecare workers musculoskeletal health and cardiorespiratory fitness by, 1) decreasing the large occupational physical activity variations observed between workers, and 2) increasing time in high-intensity physical activity during work. Two organizational-level redesign elements for decreasing variation in physical activity between workers were identified: 1) distribute different transportation options more evenly between homecare workers, and 2) construct daily work lists to become more equal between homecare workers with respect to occupational physical activity. We were, however, not able to identify any opportunities for increasing time in high-intensity physical activity at work.

**Conclusion:** By utilizing a participatory approach we could, to some extent, identify opportunities for increasing homecare workers' health while doing productive work. Further research should assess the acceptability of the planned initiatives among homecare workers, and their potential effects on musculoskeletal health. If proven to be acceptable and effective, and with a successful implementation, the initiatives could potentially decrease the high levels of sick leave in Norwegian homecare and thus provide a more sustainable homecare service.

# An Introduction to Intervention Optimization using The Multiphase Optimization Strategy (MOST)

**Dr. Kate Guastaferro<sup>1</sup>**

<sup>1</sup>New York University, New York, USA

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical

**Purpose:** Historically, interventions designed to change (or modify) behavioral nutrition and/or physical activity have been tested using the two-arm randomized controlled trial (RCT) design wherein the packaged intervention is tested against a suitable control. Though the RCT is well suited to demonstrate effectiveness of an intervention, the experimental design does not provide information about the inner workings of the components – does each component produce a desirable effect on the outcome of interest? how do the components work in the presence/absence of one another? does the contribution of a component offset its cost? In addition to better understanding the effectiveness of the intervention, it is imperative to balance the affordability, scalability, and efficiency of the intervention so that the intervention is translated into practice and has the potential to impact public health. In short, an alternative methodological approach to intervention development is needed.

**Methods:** One alternative is the innovative multiphase optimization strategy (MOST) framework for the development, optimization, and evaluation of multicomponent interventions. Based on principles of engineering, interventions using MOST are designed to produce the best expected outcome obtainable, given key constraints imposed by the need to maximize affordability, scalability, and/or efficiency. The strategic balance of Effectiveness against Affordability, Scalability, and Efficiency, (EASE), is accomplished through a process called optimization.

**Results:** Using alternative rigorous experimental designs, such as the factorial experiment or Sequential Multiple Assignment Randomized Trial (SMART), the scientist is able to empirically examine the contribution (i.e., effect) of intervention components, alone and in combination, on the outcome of interest. Through this experimentation, the scientist empirically examines and potentially modifies intervention components to increase intervention EASE. Ultimately, when the optimized intervention is subjected to an RCT to determine effectiveness, many of the unanswered questions have been addressed.

**Conclusion:** The presentation will provide a brief overview of intervention optimization following the three phases of MOST (preparation, optimization, and evaluation); highlight the construction of a conceptual model; and showcase the utility of the factorial experimental design.

# Our Healthy Community – Development and testing of a new model for health promotion and disease prevention in Danish municipalities

**Prof. Mette Aadahl**<sup>1,2</sup>, Prof. Charlotta Pisinger<sup>1,2</sup>, Associate Professor Henrik Vardinghus-Nielsen<sup>4</sup>, Dr. Paul Bloch<sup>3</sup>, Dr. Mette Kirstine Tørslev<sup>3</sup>, Prof. Ulla Toft<sup>1,2</sup>

<sup>1</sup>Research Centre for Prevention and Health, Frederiksberg, Denmark, <sup>2</sup>University of Copenhagen, Copenhagen, Denmark, <sup>3</sup>Steno Diabetes Center Copenhagen, Herlev, Denmark, <sup>4</sup>Aalborg University, Aalborg, Denmark

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** There is a need for new approaches and strategies to prevent chronic disease and promote health and well-being among citizens. In this presentation, we will describe the development of a new model for prevention and health promotion in Danish municipalities. The model builds on the Supersetting approach, intersectoral collaboration and community engagement and applies a broad concept of health. The overall objective was to develop and implement a new model for coordinated, integrated and evidence-based health promotion and disease prevention in Danish municipalities.

**Methods:** Two Danish municipalities were included in the development and initial implementation of the model from 2019 to 2021. This involved the following steps in each municipality: 1) Analyzing the health status, lifestyles and socio-economy at municipality level. 2) Mobilizing lead municipal administrators and politicians for intersectoral action including jointly defining thematic focus areas and target populations. 3) Mapping community-based stakeholders, physical environments and existing evidence to qualify relevant action 4) Mobilizing professional stakeholders from the public, private and civic sectors for co-creation of intervention ideas and joint action. 5) Co-creating and implementing interventions together with professional stakeholders and citizens.

The strategic model and results from the development process will be presented from the two involved municipalities. In one municipality the administration chose physical activity and well-being among children and young people as key focus area. Community-based stakeholders from non-profit organizations and public institutions, including sports clubs, leisure clubs, primary schools, and public departments jointly developed and implemented specific interventions. One specific intervention aimed to engage more children in local clubs. Coaches from three local sport clubs introduced 1<sup>st</sup> and 4<sup>th</sup> grade students at two schools to their sport (a course of eight times) during students' after-school-club time. Overall, the process fostered broad engagement of stakeholders from the public sector, the private sector, and civil society.

**Conclusion:** The model developed in Our Healthy Community builds on contextual analyses, dialogues, workshops, and co-creation processes with a wide range of stakeholders to promote local relevance, integration and sustainability of developed actions and interventions. The model will be pilot tested in two other Danish municipalities (2022-2025)



# Optimizing Infant Diet: Design Considerations and User Testing in the Growing Healthy Together Study

**Dr. Heather Wasser<sup>1</sup>**, Dr. Carmina Valle<sup>1</sup>, Dr. Brooke Nezami<sup>1</sup>, Dr. Linda Collins<sup>2</sup>, Dr. Deborah Tate<sup>1</sup>

<sup>1</sup>University of North Carolina, Chapel Hill, Chapel Hill, USA, <sup>2</sup>New York University, New York, USA

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical

**Purpose:** The intake of foods and beverages associated with obesity begins during infancy, increasing precipitously between 6-12 months of age. While the number of obesity prevention trials beginning in the first two years of life have increased over the last 15 years, the consistent use of the randomized controlled trial to test multicomponent prevention packages clouds our knowledge of effective intervention strategies. The purpose of this study is to describe how the Preparation Phase of the Multiphase Optimization Strategy (MOST) was used to design Growing Healthy Together (GHT), an mHealth 2<sup>4</sup> factorial experiment that is systematically testing the individual and interactive effects of 4 intervention components delivered via a web app on infant dietary intake at 12 months.

**Methods:** Specific Preparation Phase activities included 1) a review of preliminary studies and the extant literature to identify determinants of infant dietary intake and an initial set of intervention components, 2) development of a conceptual model that mapped each individual intervention component to a unique, proximal, theoretical mediator, and 3) an iterative user-centered design process that included a) developing user profiles, b) brainstorming and free-sketching the web app interface, c) testing a prototype with end users, and d) revising the prototype and programming the web app.

**Results:** Based on the literature and explication of the conceptual model, four components were chosen for testing in GHT: 1) caregiver diet self-regulation (ON vs OFF), 2) vegetable preparation skills (ON vs OFF), 3) enhanced responsive feeding and care (ON vs OFF), and 4) study partner inclusion (ON vs OFF). The initial architecture of the web app was substantially revised after testing with 5 end users (3 mothers, 1 father, 1 grandmother). The final web app pages (and subpages) include: 1) Home, 2) Learn (Lessons/Resources), 3) My Goals (Feedback/Progress), 4) My Veggies (Feature/GO Veggies), and 5) My Baby (Activity/Journal).

**Conclusions:** The MOST framework outlines a systematic method for optimizing behavioral interventions aimed at early life obesity prevention. GHT provides an example of how to use MOST and user-centered design to inform the build of an mHealth optimization trial aimed at improving infant dietary intake.

# Promoting healthy weight and wellbeing among children: The Generation Healthy Kids project

Prof. Ulla Toft<sup>1,2</sup>, **Dr. Louise Thomsen**<sup>1</sup>, Dr. Tine Buch-Andersen<sup>1</sup>, Dr. Dikke Høeg<sup>1</sup>, Dr. Anders Blædel Gottlieb Hansen<sup>1</sup>

<sup>1</sup>Research Centre for Prevention and Health, Frederiksberg, Denmark, <sup>2</sup>University of Copenhagen, Copenhagen, Denmark

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** Many earlier studies have shown no or little effect of lifestyle interventions on overweight measures. Therefore, new approaches are needed to combat “wicked” problems such as the obesity epidemic. Participatory and systems approaches seems promising, but the effect needs to be tested within study designs with a high level of evidence. The Generation Healthy Kids project has an innovative approach as it combines a cluster randomized controlled study design with a participatory approach using systems thinking and the Supersetting Approach. The overall aim of the study is to promote healthy weight development and wellbeing among children aged 6-9 years

**Methods:** The study consists of a pilot study (Jan-Mar 2023) and a 2-year cluster randomized controlled intervention study (Sept 2023-June 2025) that includes 24 local communities (defined as school districts; 12 intervention; 12 control). The target group is children from 1<sup>th</sup> and 2<sup>nd</sup> grade (approx. 6-9 years). The study will include approximately 2500 children.

The intervention will be developed using the Supersetting Approach. A supersetting is made up of multiple settings within a school district (school environments, after school clubs, leisure activity facilities, supermarkets, restaurants/fast food outlets, and the home). A broad range of stakeholders will be involved to develop sustainable approaches to prevent overweight among children. Interventions within each subsetting will be coordinated and integrated to achieve synergistic effects. The intervention will focus both on healthy eating, physical activity, healthy sleep- and screen habits. A standardized process of systems mapping (STICKE) and Community Capacity Building will be used in the 12 intervention areas.

**Results:** The presentation will illustrate methods to do a high-quality quantitative evaluation within a RCT-design combined with a comprehensive formative research which includes tracking implementation within each local community developing a action register, measurement of stakeholder engagement (engagement score), communication log, geographical mapping of actions and a GANTT diagram of actions and engagement.

**Conclusions:** Combining a traditional, high quality RCT approach with innovative participatory approaches such as the Supersetting Approach and systems mapping are possible and can contribute with potential groundbreaking approaches that can increase the impact of the interventions but also the quality of research.

# Optimizing a Nutrition and Physical Activity Intervention for Parents of Preschoolers: Application of the Multiphase Optimization Strategy (MOST)

**Dr. Laura Bellows<sup>1</sup>, Dr. Susan Johnson<sup>2</sup>**

<sup>1</sup>Cornell University, Ithaca, USA, <sup>2</sup>University of Colorado, Anschutz Medical Campus, Aurora, USA

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical

**Purpose:** The eHEROs (e<sup>l</sup>ectronic H<sup>e</sup>althy E<sup>n</sup>viR<sup>o</sup>nments) study aims to improve eating and physical activity behaviors of preschool-aged children via an m-Health intervention delivered to low-income, rural mothers. In designing multicomponent interventions, it is important to shift from evaluating interventions as a package and move towards understanding which specific intervention components contribute to efficacy, thus optimizing our interventions. The objective of this study is to describe the application process to optimize the eHEROs study design using the Multiphase Optimization Strategy (MOST).

**Methods:** MOST is a framework that aids in developing interventions that produce the best-expected outcomes (i.e., effectiveness), given constraints imposed on affordability, scalability, and efficiency. During the MOST preparation phase candidate intervention components are identified, a conceptual model is created, and an optimization objective is defined. Building from our previous intervention outcomes and formative research, an optimization plan was developed for the eHEROs study.

**Results:** First, 4 eHEROs intervention components were selected. This includes a custom, eHEROs mobile app as a constant component and 3 additional digital intervention components and their levels – coaching (on/off), group meetings (on/off), and nudges (high/low). Next, in the conceptual model, 3 components were linked to theoretical mediators and expected outcomes. Theoretical mediators - goal setting/reinforcement (coaching), social support (group meetings), and behavioral capability (nudges) – influence the behavioral outcomes (offering new foods, family mealtimes, and physical activity) and distal health outcome (child weight status). The development of the optimization objective considers the implementation constraints of participants (e.g., time engaging in program, digital literacy) and researchers (e.g., costs of app development and facilitation of intervention components) collectively with scalability (e.g., feasibility of future high-fidelity delivery) and efficiency (e.g., using only active intervention components). The optimization objective will be defined and specified prior to feasibility testing.

**Conclusions:** Optimizing behavioral and biobehavioral interventions has the potential to enhance public health impact by balancing effectiveness with cost-benefit and other implementation factors. The MOST preparation phase is critically important to building the foundation for the entire optimization process. Application of the MOST preparation phase activities to the eHEROs study provides insights into the optimization process for nutrition and physical activity researchers.

# Children and adolescents' experiences of smartphone applications and wearable activity trackers to monitor physical activity in the UK and Malaysia

**Ms. Nur Izzatun Nasriah Nasruddin<sup>1</sup>**, Dr. Joey Murphy<sup>1</sup>, Dr. Miranda Armstrong<sup>1</sup>

<sup>1</sup>University of Bristol, Bristol, United Kingdom

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical

**Purpose:** The emerging availability of mobile networks, smartphones and wearable sensors increases the capability to collect real-time data from many participants and allow remote physical activity (PA) monitoring. This study aimed to explore children and adolescents' experiences of smartphone applications (SA) and wearable activity trackers (WAT) to monitor PA in the UK and Malaysia.

**Methods:** A cross-sectional online survey was developed using JISC Online Surveys and administered to children and adolescents aged 5-17 years in both UK and Malaysia. The survey was conducted in English and Malay language with separate surveys developed according to age category: 5-12 years old and 13-17 years old. Older children answered the survey by themselves whilst for younger children, the survey was answered by their parents or carers. The survey consisted of questions related to demographic information, socioeconomic status, SA/WAT usage, behaviour change, motivation for use and practical issues with using SA/WAT. Descriptive statistics were used to understand SA/WAT usage, motivations for use, and practical issues.

**Results:** One hundred forty-nine participants (50.3% children, 49.7% adolescents; mean age =  $11.1 \pm 3.8$ ; 57.7% female; 58.4% Malaysian) responded to the survey. Forty-three percent of participants reported owning a smartphone (65.6% were Malaysian), with fitness or activity tracker applications installed in 12.5% of participant phones. All participants (n=64) primarily used their smartphones for calls and text (100.0%), social media (95.3%) and watching videos (89.1%). Only 16.8% (n=25) owned a WAT, with 48.0% from UK and 52.0% from Malaysia. Most WAT users (60.0%) were adolescents, with Apple Watch (36.0%) and Fitbit (32.0%) most common. Most participants with WAT (60.0%) agreed that they had positive experiences using WAT and used it mostly to measure activities (92.0%) and improve health (72.0%). Most also reported no complaints about their WAT (56.0%).

**Conclusions:** Results suggest that smartphones are commonly used by youth in Malaysia, suggesting their potential use to monitor PA in Malaysian youth. Commercial WAT were less commonly owned by both UK and Malaysian youth. Further research should be done to assess the validity of both smartphone technology and commercial WAT for monitoring PA in children in low- and middle-income countries.

# A Randomized Controlled Trial to Reduce Post-Cessation Weight Gain

**Ms. Kinsey Pebley**<sup>1</sup>, Dr. Zoran Bursac<sup>2</sup>, Dr. Robert Klesges<sup>3</sup>, Dr. Jon Ebbert<sup>4</sup>, Dr. Catherine Womack<sup>5</sup>, Ms. Julia Graber<sup>5</sup>, Dr. Melissa Little<sup>3</sup>, Dr. Karen Derefinko<sup>5</sup>, Dr. Rebecca Krukowski<sup>3</sup>

<sup>1</sup>Medical University of South Carolina, Charleston, USA, <sup>2</sup>Florida International University, Miami, USA,

<sup>3</sup>University of Virginia, Charlottesville, USA, <sup>4</sup>Mayo Clinic, Rochester, USA, <sup>5</sup>University of Tennessee Health Science Center, Memphis, USA

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical

**Purpose:** Weight gain is a barrier to smoking cessation. Previous interventions targeting weight gain while quitting smoking have largely been unsuccessful. The current study was a randomized controlled trial assessing the efficacy of two weight management interventions (focused on stability or weight loss) compared to a low-intensity, self-guided weight management group prior to a smoking cessation attempt.

**Methods:** Adults (N=305; 33.1% men, 43.3% identified as Black, 86.9% had overweight/obesity) interested in quitting smoking were randomized to one of three conditions (i.e., Stability, Loss, and Bibliotherapy) for weight management. After 8 weeks of weight interventions, participants received identical 6-week phone-based smoking cessation interventions with 6 months of varenicline provided. The Stability and Loss groups then had 5 monthly sessions focused on preventing weight regain and smoking relapse. Smoking status over time was measured by self-report and cotinine tests. ANCOVAs were used to determine differences in weight change between groups.

**Results:** Retention was 90.2% at 12-month follow-up. Participants in the Loss group lost weight at 12-months (-2.01 kg,  $SE=1.58$ ) in comparison to individuals in the Bibliotherapy group (+1.08 kg,  $SE=1.49$ ,  $p=0.0004$ ), while weight change in the Stability group (-0.30 kg,  $SE=1.56$ ) was not significantly different from the Bibliotherapy group ( $p=0.17$ ). There were no significant between-group differences in self-reported past 7-day abstinence or biochemically verified abstinence at 12 months, with almost half of participants quitting smoking. There was no differential effect between intervention group and change in weight by smoking status ( $p=0.07$ ). However, participants who quit smoking in the Stability intervention gained 2.04 kg ( $SE=1.70$ ), while Stability participants who continued smoking lost 2.57 kg ( $SE=1.65$ ). Participants who quit smoking in the Loss intervention lost 2.18 kg ( $SE=1.69$ ), and participants who continued smoking also lost 2.81 kg ( $SE=1.66$ ). Those who quit smoking in the Bibliotherapy condition gained 1.55 kg ( $SE=1.55$ ), but those who continued smoking lost 0.17 kg ( $SE=1.71$ ).

**Conclusions:** The Stability and the Loss interventions were effective for preventing post-smoking cessation weight gain, with the Loss group having the benefit of sustained weight loss. These interventions may be helpful to combat weight gain and potentially remove a barrier to smoking cessation.

# Policy Surveillance of State Obesity Legislation in California, USA (1999-2020)

**Dr. Denise Payan<sup>1</sup>**

<sup>1</sup>University of California, Irvine, Irvine, USA

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** The COVID-19 pandemic elevated the importance of addressing risk factors for chronic illness and identifying solutions to narrow racial/ethnic obesity disparities. While state obesity policies can have significant impact on population health, little is known about the types of policies introduced and enacted into law over time. Prior work has examined patterns and predictors of obesity, childhood obesity, adult obesity, and physical activity legislation across states. Investigating obesity policy within a state that has been an early adopter of obesity policy can reveal critical information about innovative policy instruments, trends, effectiveness, and the policymaking process. This study's objective is to identify and analyze patterns of obesity legislation in California, USA over a 20-year period.

**Methods:** We systematically searched for obesity prevention and reduction bills introduced in California's legislature between 01/01/1999-12/31/2020. The initial search yielded n=354 bills. Exclusion criteria were applied (e.g., not relevant, civil liability lawsuits, budget acts), leaving n=287 bills. A quantitative codebook was developed to code policy variables for each bill. We use descriptive statistics to examine the types of bills introduced and enacted. Differences in the proportion of enacted policies are compared using Chi-square tests. P values  $\leq 0.05$  are considered statistically significant.

**Results:** Among introduced bills, 45% were related to nutrition, 32% to physical activity, 31% to awareness, 25% to education, and 15% to health care, with the remaining focused on miscellaneous topics (e.g., child abuse, housing insecurity). Between 1999-2020, 46% (n=132) of introduced obesity reduction and prevention bills were enacted, and 6.6% (n=19) were passed by the state legislature but vetoed by the Governor. A high percentage (37%) of enacted bills specifically focused on children as their target population and 27% focused on schools as their primary setting, suggesting that policies framed around improving children's health may be more likely to garner political support.

**Conclusions:** State obesity policies can create healthier communities by improving environmental conditions and increasing access to health-promoting resources. Future research using this database includes examining determinants of state obesity policy and the effectiveness of these policies on population health.



# Confusion in co-production: what 'co'-words are used and how is it done in chronic disease prevention?

**Dr. Bronwyn McGill<sup>1</sup>**, Ms. Lucy Corbett<sup>1</sup>, Associate Professor Anne Grunseit<sup>2</sup>, Dr. Michelle Irving<sup>3</sup>, Dr. Blythe O'Hara<sup>1</sup>

<sup>1</sup>Prevention Research Collaboration, The University of Sydney, Sydney, Australia, <sup>2</sup>University of Technology Sydney, Sydney, Australia, <sup>3</sup>Centre for Evidence and Implementation, Sydney, Australia

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** There is mounting interest in the use of co-production in health literature, but confusion about its use in health promotion. Numerous terms (co-design, co-construct, co-create) are used and there is little evidence and guidance for using co-produced chronic disease prevention interventions in the general population. This study investigated how co-production is used for lifestyle-related behaviour change, who is usually involved in co-production for the development and evaluation of chronic disease prevention interventions, and whether (and how) the literature reports on the evaluation of co-produced chronic disease prevention interventions.

**Methods:** We conducted a systematic scoping review to examine the use of co-production in the development and evaluation of primary research studies of behaviour change programs for chronic disease prevention. We searched four electronic databases for studies reporting outcomes of interventions using a co-production approach among populations at risk of chronic disease, in any health promotion setting. Outcomes of interest included physical activity, diet and weight management. Clinically oriented interventions (targeting service delivery, rehabilitation, medication adherence) were excluded. A narrative synthesis was undertaken.

**Results:** In 71 articles that reported using co-production, co-design, co-creation, co-development, and co-construction, these terms were used inter-changeably to refer to a participatory process involving researchers, stakeholders, and end users involved in the development or evaluation of interventions. Overall, studies used co-production as a formative research process, including focus groups and interviews. There were no major differences in methods used based on the 'co-word' employed by the study. Co-produced health promotion interventions were generally not well described or robustly evaluated and tended to report on feasibility and acceptability rather than impact. The public health literature does not currently provide insight into whether co-produced interventions achieve better outcomes than those that are not co-produced.

**Conclusions:** Uniform agreement on the meanings and operationalisation of the various 'co'-words would avoid confusion surrounding their use. This would facilitate the development of guidelines and/or a co-production framework specific to physical activity and nutrition behaviour change interventions. Doing so would allow researchers to develop a shared understanding of the co-production process and how best to evaluate co-produced chronic disease prevention interventions.

# Effect of climate change impact menu labels on ordering choices and perceptions of healthfulness: a nationally representative online randomized controlled trial

**Dr. Julia Wolfson<sup>1</sup>**, Dr. Aviva Musicus<sup>2</sup>, Dr. Cindy Leung<sup>2</sup>, Dr. Ashley Gearhardt<sup>3</sup>, Dr. Jennifer Falbe<sup>4</sup>

<sup>1</sup>Johns Hopkins Bloomberg School of Public Health, Baltimore, USA, <sup>2</sup>Harvard T.H. Chan School of Public Health, Boston, USA, <sup>3</sup>University of Michigan, Ann Arbor, USA, <sup>4</sup>University of California Davis, Davis, USA

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** N. Other

**Purpose:** There is growing interest in strategies to encourage more environmentally sustainable food choices in United States (U.S.) restaurants through the use of climate-impact menu labels. Data is lacking on the ideal design of such labels to effectively encourage sustainable choices. The objective of this study was to test the effects of positive and negative climate-impact menu labels compared to a control label on the environmental sustainability and healthfulness of food choices.

**Methods:** We fielded a randomized controlled experiment using a web-based nationally representative survey fielded with the AmeriSpeak panel from March 30-April 13, 2022. Participants (n=5,049) were shown a fast-food menu and prompted to select one item they would like to order for dinner. Participants were randomized to view menus with 1 of 3 label conditions: 1) Quick Response (QR) code label on all items (control); 2) Green “LOW CLIMATE IMPACT” label on chicken/fish/vegetarian items (positive framing); or 3) Red “HIGH CLIMATE IMPACT” label on red meat items (negative framing). The main outcome was an indicator of selecting a sustainable item (i.e., one without red meat). Secondary outcomes included participants’ health perceptions of the selected item, and the Nutrition Profile Index (NPI) score of “healthfulness.”

**Results:** Both climate impact labels were effective at encouraging sustainable selections from the menu. Compared to the control, 23% more participants (95% CI: 13.7%, 34.0%,  $p<0.001$ ) selected a sustainable menu item when menus displayed high-climate-impact labels, and 10% more participants (95% CI: 1.0%, 19.8%;  $p=0.03$ ) selected a sustainable menu item when menus displayed low-climate-impact labels. Across experimental conditions, participants who selected a sustainable item rated their order as healthier than those who selected an unsustainable item. However, only participants in the high-climate-impact condition selected objectively healthier items (based on NPI score).

**Conclusions:** In this randomized controlled experiment, climate-impact menu labels—especially negatively framed labels highlighting high-climate-impact items (i.e. red meat)—were an effective strategy to reduce red meat selections and encouraged more sustainable choices. Future research should investigate different label designs to promote sustainable food choices and evaluate effects on both sustainability and healthfulness of food choices in fast-food restaurants and other settings.

# Consumer Trends in Online Take-Away Purchasing

**Miss Tamara Garcia del Toro**<sup>1,2</sup>, Dr. Francesca Pontin<sup>1,2</sup>, Dr. Stephen Clark<sup>1,2</sup>, Dr. Rachel Oldroyd<sup>1,2</sup>, Prof. Nik Lomax<sup>1,2</sup>

<sup>1</sup>Leeds Institute for Data Analytics, Leeds, United Kingdom, <sup>2</sup>University of Leeds, Leeds, United Kingdom

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical

**Purpose:** Current research in people's diet habits has been very focused in the food environment: the different contexts in which people engage with the food system. Originally, this concept referred to the physical presence of food in a person's surroundings, which affects their ability to access different foods.

The food environment has been transformed in the past decade, with the development of new services such as online grocery and take away delivery services. Alongside a shift towards more out-of-home-food consumption and the unique current historical context (COVID-19 pandemic and the cost-of-living crisis).

To better understand consumer habits around take-away purchasing, and how the growth of online food delivery services has shaped new behaviours, we have partnered with a large online take away delivery platform to use their transaction data in order to shed light on how changing customer habits are shaping the food environment.

**Methods:** Transaction data for online food purchasing was provided by the data partner, a large online food delivery service. The data included anonymised customer reference id, location and order information, as well as food outlet details. Data was accessed through the retailer's own secure platforms. Data analysis was carried out in two phases: different machine learning methods were evaluated and used to produce a classification of customers based on purchase frequency in various categories of food purchases; and an exploration of the locational characteristics of these classifications and distribution across UK geography. Spatial clusters of these classifications of purchasing habits across the UK were characterised using socio-demographic data, matched by consumer postcode information through geospatial analysis. Geodemographic data was sourced from the 2011 and 2021 census at the Output Area Level (Approximately 125 households) and retailer's data was matched using postcode information.

**Conclusion:** Studies to date have shown that areas with higher levels of deprivation have higher access to take-away food outlets, but it remains to be seen whether this higher access translates to higher purchasing in this communities. We are the first team to investigate customer transaction data to go beyond customer access and see what the actual online food ordering trends are.

# An 8-week Peer-Coaching Wellness Program to Improve Physical Activity, Diet, and Sleep among College Students

**Dr. Zi Yan<sup>1</sup>**, Dr. Jessica Peacock<sup>1</sup>, Dr. April Bowling<sup>1</sup>, Dr. Juliana Cohen<sup>1</sup>, Dr. Laura Kurdziel<sup>1</sup>, Dr. Sarah Benes<sup>2</sup>, Dr. Seungbin Oh<sup>3</sup>, Dr. Luis Saenz de Viguera<sup>1</sup>

<sup>1</sup>Merrimack College, North Andover, USA, <sup>2</sup>Southern Connecticut State University, New Haven, USA, <sup>3</sup>Boston University, Boston, USA

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** J. Young Adults

**Purpose:** This study evaluated an 8-week peer-coaching wellness program among college students in the U.S.

**Method:** Participants. A total of 52 college students were recruited and randomized into the coaching or the control group. Design. Each participant in the coaching group met with a trained peer health coach once a week (30-40minutes for each meeting) for 8 weeks to work on self-identified wellness priorities, including physical activity, nutrition, and sleep. Coaches used various coaching techniques including reflective listening, motivational interviewing, and goal setting, etc. The control group received a wellness handbook. Measures. The International Physical Activity Questionnaire (IPAQ)-short form was used to measure physical activity. A 9-item Likert scale was used to measure self-efficacy of eating healthy foods; The Pittsburgh Sleep Quality Index (PSQI) was used with a higher score indicating a poorer sleep quality. Analyses. Repeated MANOVA and ANOVA were used to explore the coaching effect on the goal-specific domain.

**Result:** . Physical Activity. 15 participants (65.21%) identified PA as a coaching goal. The interaction between intervention and group on Vigorous METs was significant  $F(1,32) = 6.42, p = .017$ ; The vigorous METs for PA goal group increased from 1013.33( $SD=1055.12$ ) to 1578.67 ( $SD=1354.09$ ); the control group decreased from 1012.94( $SD=1322.943$ ) to 682.11( $SD=754.89$ ). Diet. 15 participants (65.21%) identified diet related wellness goals. The interaction and main effects between group and intervention were not significant. Self-efficacy of eating healthy food changed from 27.4 ( $SD=8.51$ ) to 28.2 ( $SD=7.03$ ), 25.68 ( $SD=5.73$ ) to 26.47 ( $SD=5.32$ ) for the coaching and control groups, respectively. Sleep. 13 participants (56.52%) identified sleep as a coaching goal. The group differences were significant,  $F(1,28) = 5.18, p < .05$ . The Global PSQI decreased from 6.18 ( $SD=2.35$ ) to 4.36 ( $SD=2.20$ ) among the coaching group; the control group changed from 7.74( $SD=2.76$ ) to 7.26( $SD=3.58$ ).

**Conclusion:** Peer coaching showed a promising effect on improving physical activity and sleep quality among college students.

Table 1. Participants Demographic Characteristics

	Coaching Group	Control Group
Number of Participations	28	24
Gender (female)	22 (78.6%)	20 (83.3%)
Age	18.7(+7.2)	18.8(+7.0)
Race (White)	17 (60.7%)	16 (66.7%)
First Generation Student	7 (25%)	5 (20.8%)
Dropped out	2 (7.1%)	4(16.7)
Completed post-assessment	23(82.1%)	20(83.3%)

# 'Make n Take' for Aboriginal Families

**Ms. Anne Hills<sup>1</sup>**, Dr. Kerith Duncanson<sup>2,3</sup>

<sup>1</sup> College of Health, Medicine and Wellbeing, University of Newcastle, Newcastle, Australia, <sup>2</sup>College of Health and Medicine, University of Newcastle, Newcastle, Australia, <sup>3</sup>Food and Nutrition Research Program, Hunter Medical Research Institute, Newcastle, Australia

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** N. Other

**Purpose:** Aboriginal Australian mothers are twice as likely have a low birthweight baby and twice as likely to experience gestational diabetes as non-Aboriginal women. Improving maternal dietary quality during pregnancy may be a powerful modifiable risk factor for long-term health of offspring. The aim of this 12-month project was to co-design and deliver a culturally-relevant food and cooking program to improve the health status and birth outcomes in Aboriginal women in reproductive years of life living in regional New South Wales, Australia.

**Methods:** The mixed methods study involved concurrent quantitative and qualitative data collection and analyses. One dietitian and one researcher experienced in Aboriginal nutrition undertook three rounds of community consultation for co-design and recruitment purposes. Quantitative data collection included baseline diet quality (Australian Recommended Food Score) and the Cooking and Food provisioning Action Scale (CAFPAS). Change in food and nutrient intake was assessed for a subset of participants who completed a 24-hour recall pre- and post-program. As bush foods are not universally accessible, contemporary foods with similar nutrient profiles to bush foods were used and the project coordinator gathered native lilli-pilli, warrigal greens and bunya nuts to incorporate into recipes. Elders were invited to share their bush food knowledge in sessions.

**Results:** Eight 5-week programs (n=91) were delivered in 2021/22. Ninety-one women aged 15-77 years participated. The mean diet quality score (n = 29) was 31 (maximum 73) and mean CAFPAS score was 91 (maximum 110), with correlation of 0.41 between these measures. Changes in dietary intake in a subset of participants (n=7) included decreased energy (-1333 calories/day) and sodium (-598mg/day) and increased folate (95mg/day).

Qualitative analyses reinforced quantitative findings with participants reporting increased cooking-related confidence, ability and enjoyment. Cultural aspects of 'Make n Take' were valued, particularly privileging of bush foods and Aboriginal Elders sharing knowledge.

**Conclusions:** 'Make n Take' improved Aboriginal women's dietary intake, diet quality and their knowledge and pride in cultural heritage. Culturally relevant food and cooking programs show potential to improve the health status of Aboriginal women in the reproductive years of life, and positively influence the health of their children and extended families.

# Innovating dietary assessment and support: An update on present efforts within the Dutch setting

**Dr. Elske M. Brouwer-Brolsma<sup>1</sup>**

<sup>1</sup>Division of Human Nutrition and Health, Wageningen University and Research, Wageningen, Netherlands

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical

E.M. Brouwer-Brolsma, on behalf of the Pride & Prejudice Consortium

**Purpose:** Diet-related chronic diseases form a major global health concern where, so far, campaigns to promote healthier dietary choices have been of limited success. Thus, there is a need for more individual tailored dietary support instead of 'one-size-fits-all' approaches based on general recommendations.

**Methods:** We established the Dutch Pride & Prejudice consortium; a unique multidisciplinary consortium of researchers in nutrition, human-technology interaction, design, and social sciences. We joined forces to work on technology-based innovations to further improve the accuracy of dietary assessment and support to stimulate individuals towards healthier dietary behaviors

**Results:** To optimally leverage the multidisciplinary of the consortium, we established an overall strategy to further innovate current and develop new dietary assessment and support tools, including the stages of exploration, development, evaluation, and implementation. Up to now, we particularly focused on the first three stages. The explorative stage is characterized by desk-top research providing insight in already available tools and systems and their quality and characteristics, qualitative research exploring wishes and expectations of end-users and stakeholders, journey mapping of potential opportunities and challenges that end-users may experience when implementing the tools in their daily life, and research on how end-users experience the use of the new tools. The developmental phase focusses on the implementation of the results obtained in the exploration phase, i.e., by upgrading existing tools and developing new tools. The evaluation phase particularly focusses on the evaluation of the accuracy of the dietary assessment, perceived burden and motivation of (long-term) use, and the effectiveness of the dietary support system. Ongoing projects now focus on e.g., developing a sensor-based system to assess breastmilk quality and quantity while breastfeeding, dietary support application for pregnant or lactating women and their children, dietary assessment and support application for adolescents, and dietary assessment and support tool for children.

**Conclusion:** We established an interdisciplinary team of experts to make a game-changing contribution to the development, testing, and implementation of dietary assessment and support tools. The work-flow on several of these prototypes can be demonstrated.



# Comparison of omnivores, flexitarians, vegetarians and vegans in relation to their physical activity patterns and dietary behavior

**Mr. Andreas Bscheiden<sup>1</sup>**, Mr. Gerrit Hummel<sup>1</sup>, Ms. Janine Ehret<sup>1</sup>, **Prof. Nanette Ströbele-Benschop<sup>1</sup>**

<sup>1</sup>University of Hohenheim, Stuttgart, Germany

Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** N. Other

**Purpose:** Over the last years, alternative diets such as more plant-based diets have become popular. Motives for choosing a more plant-based diet are manifold and behaviours related to dietary choices appear to differ between groups following different diets. This online survey aimed to elaborate on potential differences in dietary behaviours related to the nutrition content as well as to planetary health across different dietary styles.

**Methods:** A total of 943 mainly young participants have been recruited on healthy eating pages on Instagram to take part in the online survey (with experimental component that is not part of this study). They were asked about various topics such as individual dietary behaviour, fitness, lifestyle, and their social demographics. Dietary styles were compared using  $\chi^2$ -, Kruskal-Wallis-Test, and ANOVA.

**Results:** The results show significant differences between gender groups. A higher percentage of male participants indicated an omnivore dietary style, while more female participants eat flexitarian, vegan, or vegetarian. BMI differs significantly between dietary styles with the highest BMI among omnivore participants and the lowest BMI among vegan participants. No differences were found for the frequency of sporting activities and paying attention to physical activity in general. Furthermore, participants showed significant differences between dietary styles in paying attention to avoid food additives and to calories in foods in general, and in preferences regarding cooking yourself as often as possible, and towards the preference of choosing seasonal and organic products.

**Conclusion:** The results suggest that individuals following plant-based diets pay more attention to healthy and ethical food choices whereas no differences are apparent in physical activity. It seems that following a certain dietary style is accompanied by various other food related behaviour that vary across different dietary styles.

# Development of a Teacher Food and Nutrition-Related Health and Wellbeing Questionnaire: An e-Delphi Study

Ms. Tammie Jakstas<sup>1, 4</sup>, **Dr. Tamara Bucher<sup>3, 4</sup>**, Dr. Andrew Miller<sup>2, 5</sup>, Dr. Vanessa Shrewsbury<sup>1, 4</sup>, Prof. Clare Collins<sup>1, 4</sup>

<sup>1</sup>School of Health Sciences, College of Health, Medicine and Wellbeing, The University of Newcastle, Callaghan, NSW, Australia, <sup>2</sup>School of Education, College of Human and Social Futures, The University of Newcastle, Callaghan, NSW, Australia, <sup>3</sup>School of Environmental and Lifestyle Sciences, College of Engineering, Science and Environment, The University of Newcastle, Callaghan, NSW, Australia, <sup>4</sup>Hunter Medical Research Institute, New Lambton Heights, NSW, Australia, <sup>5</sup>Priority Research Centre for Teachers and Teaching, The University of Newcastle, Callaghan, NSW, Australia

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical

**Purpose:** Internationally, teaching is a profession where individuals are known to experience high stress and burnout. A teacher's health impacts not only their own wellbeing but that of their students. Previous research on teacher health and wellbeing is limited in its consideration of the impact food and nutrition (FN) factors have on these outcomes. This study aimed to evaluate face validity of a questionnaire to assess key FN-related health and wellbeing factors in teachers.

**Methods:** Two e-Delphi rounds with multidisciplinary experts were implemented using QuestionPro software to evaluate face validity of the questionnaire. Experts were recruited internationally from the disciplines of FN research (n=7), education (n=6), psychology (n=5), and dietetics (n=5), and were blinded to other participant responses. In round one, experts reviewed the proposed eight sub-scales and 19 question-groups across the domains of wellbeing, teaching characteristics, and FN. They were asked to provide qualitative feedback, indicate agreement regarding inclusion, and rank the top three question-groups and/or sub-scales to both include and exclude. In round two, qualitative feedback was collected regarding improvements to phrasing, appropriateness of question scales used and questionnaire order. A 75% consensus vote across experts was the threshold for inclusion with final revisions considering expert feedback.

**Results:** Twenty-three experts participated in round one from Australia (n=15), Switzerland (n=3), the UK (n=2), Canada (n=1), the US (n=1) and New Zealand (n=1) with 78% having previous experience with questionnaire development. Round two included 19 (83%) experts from round one. After round one, five question groups and four sub-scales were removed with four being revised into new groups. In round two, 79% of experts (n=15) agreed with the order, and feedback indicated only minor adjustments were necessary.

**Conclusion:** This e-Delphi study established face validity of a questionnaire to measure the complexity of FN-related health and wellbeing in teachers. Future testing will evaluate construct validity and test-re-test reliability ahead of developing future FN education and support interventions for teachers.

# Bridging the gap - combine implementation and policy research for implementation evaluation of governmental actions in the field of physical activity and nutrition

**Dr. Sarah Forberger**<sup>1</sup>, Prof. Lucia Reisch<sup>2</sup>, Dr. Biljana Meshkovska<sup>3</sup>, Ms. Karolina Lobczowska<sup>4</sup>, Dr. Anna Banik<sup>4</sup>, Ms. Janine Wendt<sup>5</sup>, Dr. Annabel S. Mueller-Stierlin<sup>5</sup>, Prof. Jürgen Michael Steinacker<sup>5</sup>, Prof. Aleksandra Luszczynska<sup>4,6</sup>, Prof. Hajo Zeeb<sup>1,7</sup>

<sup>1</sup>Leibniz Institute for Prevention Research and Epidemiology - BIPS, Bremen, Germany, <sup>2</sup>El-Erian Professor of Behavioural Economics and Policy, University of Cambridge, Cambridge, United Kingdom, <sup>3</sup>Institute of Basic Medical Sciences, University of Oslo, Oslo, Norway, <sup>4</sup>Department of Psychology in Wroclaw, SWPS University of Social Sciences and Humanities, Wroclaw, Poland, <sup>5</sup>Department of Internal Medicine, Division of Sports and Rehabilitation Medicine, Ulm University Medical Center, Ulm, Germany, <sup>6</sup>Melbourne Centre for Behavior Change, Melbourne School of Psychological Sciences, University of Melbourne, Melbourne, Australia, <sup>7</sup>Health Sciences Bremen, University of Bremen, Bremen, Germany

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Tackling obesity or increasing physical activity are complex challenges that require a multi-faceted approach, considering different levels and actors where governmental actions can have a considerable influence in triggering a change in how we live. Furthermore, considering individual and structural determinates, the requirements for evaluating implementation (processes, outcomes, impact) become more challenging. Therefore, the present study aims to uncover how implementation research and public policy can complement each other in evaluating governmental actions for physical activity promotion and nutrition and what this means in detail.

**Methods:** We combined insights from eight systematic reviews and two scoping reviews on physical activity promotion and healthy eating. We analysed frameworks, their use, and the concepts covered for policy implementation evaluation. Further, implementation context, actors involved, strategies used, legal quality, and jurisdiction were synthesised. Finally, we conducted impact evaluations of governmental actions in the policy fields of schools, mass media, sports participation, transport, and sustainable urban mobility plans to underpin the results. All reviews are pre-registered and published.

**Results:** The reviews identified the “Context and Implementation of Complex Interventions” (CICI) framework as the most comprehensive framework for evaluating nutrition and physical activity policies. Using the CICI framework for implementation evaluation, we propose specifications that should be considered when using the framework for governmental action implementation evaluation because the legal, political, and implementation domain is not yet specified at the level of detail required. We suggest adding details in the domain legal: level of jurisdiction, legal quality, and instruments; domain political: actor definition, power, and competencies; and domain implementation: horizontal and vertical integration to fill this gap.

**Conclusions:** Significant differences in the underlying theoretical concepts affect the understanding of outcomes and their consequences. Combining insights from both approaches is a promising and viable approach to guide the evaluation of public policies, improve the reporting and increase the understanding of results as a basis for conclusions. However, we repeat a mantra that can be found similarly in many studies analysing public policy implementation. We need more studies that fully exploit the potential of both approaches combined.

# Evaluation of a randomised trial of three weight loss intervention(s) for night shift-workers: A mixed-methods protocol

**Ms. Corinne Davis<sup>1</sup>**, Dr. Sue Kleve<sup>1</sup>, Prof. Maxine P. Bonham<sup>1</sup>, Dr. Catherine E. Huggins<sup>1,2</sup>

<sup>1</sup>Department of Nutrition, Dietetics & Food, Monash University, Notting Hill, Australia, <sup>2</sup>Institute for Health Transformation, Global Centre for Preventive Health and Nutrition, Deakin University, Burwood, Australia

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical

**Purpose:** Shift workers are essential to the current 24-hour society worldwide, but are at greater risk for obesity, type 2 diabetes, and cardiovascular disease. The Shifting Weight using Intermittent Fasting in night shift workers (SWIFt) study is a randomised parallel trial (RCT) that compares three, 24-week weight-loss strategies. While the trial will evaluate weight-loss outcomes, further investigation is needed to explore mechanisms of action, or contextual factors (including individual, social, organisational, and environmental) that influence outcomes. An understanding of underlying intervention effectiveness assists in improving or developing similar interventions in different contexts. The overall aim of this mixed-methods study was to explore how the SWIFt weight-loss strategies work (or not work) for night shift workers.

**Methods:** This mixed-methods evaluation of the SWIFt study is underpinned by pragmatism as a theoretical perspective guiding research design. A convergent, mixed-methods experimental (or intervention) design was chosen where quantitative and qualitative data collection occurs concurrently, analysed separately, and converged in a final synthesis. Quantitative measures include participant engagement assessed via: dietary adherence (7-day food diaries, dietetic assessment), dietary consult attendance, self-monitoring adherence (provided food checklists), and rates for participant withdrawal/drop-out; analysed for frequency and proportions. Multivariate regression models will be built to determine associations between engagement measures, participant characteristics (gender, age, ethnicity, profession, shift type, night-shift intensity), intervention type, and weight change. Qualitative measures include semi-structured interviews at baseline and 24-weeks, and fortnightly audio diaries. Interviews/diaries will be transcribed verbatim and analysed using a five-step thematic framework analysis approach in NVivo. Results from the quantitative and qualitative data will be integrated via table and narrative form to improve validity of conclusions.

**Results:** A total of 250 participants have been recruited for the SWIFt study, with 170 having completed quantitative measures at 24-weeks, and 47 interviews and 6 hours of audio diaries complete. Data analysis is currently in progress.

**Conclusions:** This mixed-methods evaluation of the SWIFt study will provide an insight as to the mechanisms and contextual features that influence weight-loss outcomes of night shift workers and will provide essential information for the future implementation and scale-up of the SWIFt intervention(s).

# Using virtual reality to identify which street characteristics are important for promoting cycling: a qualitative think-aloud study.

**Mr. Benjamin Beirens**<sup>1</sup>, Prof. Delfien Van Dyck<sup>1</sup>, Dr. Lieze Mertens<sup>1,2</sup>

<sup>1</sup>Department of Movement and Sports Sciences, Faculty of Medicine and Health Sciences, Ghent University, Ghent, Belgium, <sup>2</sup>Department of Public Health and Primary Care, Faculty of Medicine and Health Sciences, Ghent University, Ghent, Belgium

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Despite several health benefits related to cycling for transport, the amount of people cycling for transport remains low. Studies have shown that the physical environment influences people's preferred mode of transport. Therefore it is important to create a stimulating physical environment for active transport. This study aims to use virtual reality as it is a safe and controlled way to identify which street characteristics are important for cycling for transport in three vulnerable groups who are less likely to eliminate risk factors (e.g. due to physical inability, lack of traffic education or lack of risk perception) i.e., adolescents, people with low SES and (older) adults.

**Methods:** For this qualitative study, data are gathered in adolescents aged 12-17 years, people with a low SES, and (older) adults aged 55+ years. The experimental set-up consists of a bike on rollers and a VIVE virtual reality system. By means of the think-aloud method, participants describe which street characteristics encourage / discourage cycling while cycling through a virtual street in Ghent. A qualitative content analysis (NVivo) is performed on the transcribed data.

**Results:** For this abstract, we will focus on the data collected for older adults since data collection for the other target groups is still ongoing. Complete results will be presented at the conference. In general, older adults like a calm street with green aspects, and prefer a cycling path separated from other road users, so they cannot be surprised by sudden actions such as opening car doors or crossing pedestrians. Furthermore, It is important that the road is wide, in a good condition, and that there are clear markings and traffic signs. If cars are present they should drive slowly, which could be regulated by traffic calming elements. However, this should not diminish space for cyclists.

**Conclusion:** Using virtual reality offers a safe and controlled opportunity to identify which street characteristics are important to stimulate active transport. The results can support governing bodies when improving physical environments for cycling. Furthermore, it demonstrates an efficient way of involving citizens in the decision-making process.

# Using agent-based modelling to explore commuter behaviour in the context of car and public transportation-centred policy scenarios

**Dr. Ivana Stankov**<sup>1,2</sup>, Associate Professor Jose David Meisel<sup>3</sup>, Prof. Olga Lucia Sarmiento<sup>4</sup>, Dr. Xavier Delclòs-Alió<sup>5</sup>, Prof. Ross A. Hammond<sup>6,7</sup>, Prof. Ana V. Diez Roux<sup>1</sup>

<sup>1</sup>Drexel University, Philadelphia, USA, <sup>2</sup>University of South Australia, Adelaide, Australia, <sup>3</sup>Universidad de Ibagué, Ibagué, Colombia, <sup>4</sup>Universidad de Los Andes, Bogotá, Colombia, <sup>5</sup>University of Rovira i Virgili, Tarragona, Spain, <sup>6</sup>The Brookings Institution, Washington DC, USA, <sup>7</sup>Washington University in St. Louis, St. Louis, USA

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** To: 1) model the interrelated and multi-level factors impacting commuter decision-making involving six modes of travel, including car, bus, bus rapid transit (BRT), motorbike, bicycle, and walking, and 2) simulate varying levels of fare subsidies, parking fee increases and congestion taxes and explore their separate and interacting impact on mode share, walking and total travel time, overall and by socioeconomic strata (SES).

**Methods:** We developed an agent-based model to dynamically represent the individual, social and environmental factors that influence commuting behaviour in Bogota, Colombia. The spatial characteristics, demographic and behavioural patterns observed in the in-silico city and its resident population (comprised of six SES groups) were informed by local travel surveys and empirical studies. We used data from the 2019 Bogota Household Travel Survey to calibrate and validate the model. This model was then used to simulate counterfactual policy scenarios to estimate their relative effectiveness in promoting active transportation and reductions in car use.

**Results:** Our model reproduced city-level commuting patterns observed in Bogota. The simulated fare subsidies did not impact private vehicle use. Low SES group commuters experienced the largest shifts in mode share, with substitutions from walking trips to BRT and bus use, which increased by 10% and 20%, respectively under the free fare scenario. Importantly, the median walking time decreased by 81 minutes, from 92 to 11 minutes among those in the lowest SES group, while the average total bus and BRT travel times remained unchanged (0.31min  $\pm$  1.33min). Both car parking fee increases, and congestion taxes resulted in modest shifts from car to bus and BRT use, particularly among those in the mid to high SES groups.

**Conclusions:** Car-centred policies are effective in driving shifts from car to public transportation use, and thereby increasing walking at the population level. On the other hand, fare subsidies could play an important role in promoting equitable access to transportation, particularly among low SES commuters who tend to walk long distances out of necessity rather than choice.



# Lifestyle factors and dysmenorrhea in female adolescents aged 15-16 years in Amsterdam

Dr. Tanja Vrijkotte<sup>1</sup>, Dr. Ehsan Motazed<sup>1</sup>, Dr. Emmy van den Boogaard<sup>1</sup>, Dr. Anne Timmermans<sup>1</sup>, **Prof. Mai Chin A Paw<sup>1</sup>**

<sup>1</sup>Amsterdam UMC, Amsterdam, Netherlands

Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** Dysmenorrhea is a prevalent menstrual disorder in adolescents, and characterized by cramping and lower abdominal pain and/or back pain. Nevertheless, research on possible related lifestyle factors is limited. This study aims to examine associations between lifestyle factors and dysmenorrhea in adolescents aged 15-16 years.

**Methods:** A cross-sectional study was conducted including 1038 females (age 15-16 years) of the Amsterdam Born Children and their Development (ABCD)-study. Lifestyle factors included were: dietary quality (based on nutritional intake), moderate-to-vigorous physical activity, screentime, sleep duration, sleep quality and perceived stress during last month, determined by self-report. Dysmenorrhea was defined as having abdominal pain and/or back pain and taking medication –pain killers and/or oral contraceptives- for menstruation-related symptoms. We used logistic regression analysis, adjusted for age, age of menarche, ethnicity and school level, to estimate adjusted odds ratios (AOR) associations between single lifestyle factors and dysmenorrhea. Additionally, we fitted a multiple lifestyle model where all lifestyle factor were included in one model.

**Results:** The prevalence of dysmenorrhea was 49.5%. In single lifestyle models, poor dietary quality (AOR:0.95;95%CI:0.90-1.00), poor sleep quality (AOR:1.07;95%CI:1.02-1.12) and perceived stress (AOR:1.05;95%CI:1.02-1.07) were significantly associated with increased odds of dysmenorrhea. The multiple lifestyle model showed perceived stress to be the only significant predictor (AOR:1.04;95CI:1.01-1.07).

**Conclusion:** Dysmenorrhea is highly prevalent among female adolescents and therefore more awareness of this public health problem is needed. Poor dietary quality, poor sleep quality and perceived stress were associated with increased odds of dysmenorrhea. These lifestyle factors could provide input for the development of effective intervention strategies to prevent dysmenorrhea.

# Peer interactions moderate the negative effect of screen time on adolescents' mental health

**Prof. Louise C. Mâsse<sup>1,2</sup>**, Dr. Olivia De-Jongh González<sup>1,2</sup>, Miss Iyoma Edache<sup>1,2</sup>

<sup>1</sup>University of British Columbia, Vancouver, Canada, <sup>2</sup>BC Children's Hospital Research Institute, Vancouver, Canada

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** N. Other

**Purpose:** The literature shows that screen time is negatively associated with adolescents' mental health. The extent to which positive peer relationships can counteract the negative effects of screen time on mental health remains unknown. Understanding the moderating role of peer relationships is particularly relevant in the pandemic context when in-person peer interactions were limited and adolescents relied more heavily on screens to connect with their peers. This study examined the association between screen time and adolescents' mental health and whether peer relationships moderate this association in the context of the COVID-19 pandemic.

**Methods:** In 2020, 402 13-year-olds (54% girls; 31% white; 27% had income less than \$70,000 CAD) in British Columbia, Canada, completed an online questionnaire which utilized validated scales/questions to assess mental health (anxiety, optimism/self-esteem, boredom), screen-time (use of screens outside of school work on weekdays, weekend days, and week), and peer relationships which included assessment of peer connectedness, belongingness and intimacy. Linear regressions, stratified by child sex, were used to examine associations between screen time and mental health. The moderating role of peer relationships was examined by introducing interaction terms with screen time.

**Results:** Compared to boys, girls reported greater levels of anxiety, lower level of optimism/self-esteem, and lower levels of peer belongingness. Screen-time (on week days, weekend days, and week) was associated with higher levels of boredom and lower levels of optimism/self-esteem among adolescents, and with greater levels of anxiety among girls. Peer connectedness and belongingness moderated the effect of screen-time on boys' levels of boredom and optimism/self-esteem, and on females' level of anxiety. Specifically, better mental health indicators were found among adolescents with higher (versus lower) levels of peer connectedness and belongingness despite their high amount of screen time.

**Conclusions:** Reducing screen time appears important to improve the mental health of adolescents. In addition, interventions that support healthy peer relationships are needed given that peer relationships seem to alleviate the detrimental effect of screen time on mental health. Developing interventions that curtail the impact of screen time on the mental health of adolescents is particularly important as screen time levels have increased with the pandemic.

# Pilot Testing of the Nourishing the Community Through Culinary Medicine program for Patients with Uncontrolled Diabetes

**Dr. Natalia Heredia<sup>1</sup>**, Ms. Lorena Macias-Navarro<sup>1</sup>, Mrs. Sarah Bentley<sup>1</sup>, Ms. Jennifer Torres<sup>1</sup>, Ms. Diana Guevara<sup>1</sup>, Mr. David Ai<sup>2</sup>, Dr. John Wesley McWhorter<sup>3</sup>

<sup>1</sup>The University of Texas Health Science Center at Houston School of Public Health, Houston, USA, <sup>2</sup>Rice University, Houston, USA, <sup>3</sup>Suvida Healthcare, Houston, USA

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** The purpose of this study was to implement and pilot test a Virtual Culinary Medicine (VCM) program, *Nourishing the Community Through Culinary Medicine*, to promote cooking and healthy eating among U.S. adults with uncontrolled T2D.

**Methods:** Patients with uncontrolled T2D were recruited from a local primary care practice. The VCM program was delivered by a dietitian and included five 90-minute weekly bilingual (English and Spanish) sessions focused on teaching useful cooking skills and techniques, making a healthy meal following a recipe, and providing basic nutrition-related education. We conducted an explanatory sequential mixed-methods pilot study to assess improvements in nutrition knowledge, cooking attitudes, skills, and behaviors, and diet. A pre-post survey design, electronic medical record data (HbA1c, Body Mass Index, Blood Pressure, HDL, LDL and Triglycerides), and post-program interviews were used to evaluate and understand patient outcomes.

**Results:** Of the 76 patients that attended at least one session (82% completed 34 sessions) and 65 had complete pre- and post-test surveys. Preliminary findings indicate that the program reduced the perception that cooking healthy food is difficult (28% pre-test to 9% post-test) and that healthy food tastes bad or bland (33% pre-test to 19% post-test). There was an increase at post-test in the number of participants indicating they adjusted their meals to be healthier (38% pre-test to 59% post-test) and consumed at least 1 serving of vegetables per day (41% pre-test to 66% post-test). Preliminary analyses of the qualitative post-test interviews indicate that the VCM program had a positive impact on patients' dietary habits, with reports of lowered HbA1c values and weight loss. Participants expressed high satisfaction with the curriculum and reported using the associated toolkit to sustain new cooking and eating habits.

**Conclusion:** This VCM program leveraged technology to promote cooking and healthy eating among patients with uncontrolled diabetes in the U.S. Preliminary analyses indicate that the program was well-liked by participants and was successful in improving diet- and cooking-related attitudes and behaviors; finalized qualitative and quantitative analyses will be presented.

# The Association Between Food Choices, as Recommended in Canada's Food Guide 2019, and Blood Pressure Status in Canadians, Using the National Canadian Health Measures Survey

**Mr. Samer Hamamji<sup>1</sup>**, Dr. Mavra Ahmed<sup>1,2</sup>, Prof. Mary L'Abbé<sup>1</sup>

<sup>1</sup>Department of Nutritional Sciences, Temerty Faculty of Medicine, University of Toronto, Toronto, Canada,

<sup>2</sup>Joannah & Brian Lawson Centre for Child Nutrition, Temerty Faculty of Medicine, University of Toronto, Toronto, Canada

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Health Canada released the updated Canada's Food Guide (CFG) 2019 and its supportive guidelines - Canada's Dietary Guidelines (CDG) which emphasize the regular consumption of healthy food choices to improve overall health and prevent diet-related chronic disease. It is therefore crucial to investigate the quality of dietary choices of Canadians, relative to the new CFG/CDG and their link to cardiometabolic risks, such as blood pressure (BP). This study aims to: (i) develop a Food Choices Assessment Score (FCAS) according to 2019 CFG/CDG; (ii) validate the FCAS against the Dietary Approaches to Stop Hypertension (DASH) diet; and (iii) examine the association between FCAS and BP in Canadian adults.

**Methods:** A FCAS was developed relative to 2019 CFG/CDG using a semi-quantitative food frequency questionnaire from the national Canadian Health Measures Survey cycles 5 & 6 (2016 to 2019). FCAS ranged from 0 to 80, and consisted of 8 components: protein foods, whole grain, fruits, vegetables; and 4 sub-groups of highly processed foods: red processed meat, processed dairy, sugary drinks, and savory snacks. FCAS was calculated for a sample menu of the DASH diet. The association between elevated systolic ( $\geq 135$  mmHg) and diastolic ( $\geq 85$  mmHg) BP – according to Hypertension Canada - and FCAS quintiles, adjusted for age, sex, smoking, physical activity, education level, household income, self-reported hypertension, and hypertension medication, was analyzed using logistic regression.

**Results:** FCAS (mean  $\pm$  SEM) was estimated at ( $29.4 \pm 0.4$  out of 80) in Canadian adults ( $n \sim 6500$ ). FCAS for DASH menu plan was estimated at 70 out of 80, as the DASH diet menu plan includes 100% fruit juices, which are not recommended in 2019 CFG/CDG. Compared with those in the lowest quintile of the FCAS, Canadian adults in the highest quintile of the FCAS had 23% and 16% lower odds of elevated systolic and diastolic BP (OR = 0.77,  $P = 0.04$ ; OR = 0.84;  $P < 0.0001$ ), respectively.

**Conclusions:** This study indicates that the 2019 CFG/CDG FCAS is a feasible tool to assess dietary choices and showed a significant association with BP as a cardiometabolic risk factor in the Canadian population.

# The Relationship Between Active Travel and Cognitive Functioning– A Systematic Review.

**Ms. Melinda Herfet**<sup>1</sup>, Prof. Anna Timperio<sup>2</sup>, Dr. Emiliano Mazzoli<sup>2</sup>, Mr. Sebastian Kindig<sup>1</sup>, Prof. Susanne Tittlbach<sup>1</sup>

<sup>1</sup>University of Bayreuth, Bayreuth, Germany, <sup>2</sup>Deakin University, Melbourne, Australia

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** It is widely known that physical activity generally improves brain structure and functions in children, adolescents, and older adults. *Active transportation* (AT), one form of physical activity, is not only an important climate measure but is also assumed to improve neuropsychological development, benefit executive and visuospatial cognitive abilities, and prevent cognitive degeneration regardless of age. However, it is known that the cultural context plays a vital role in the relationship between active transportation and cognition. Therefore, cognitive functions related to education and language are not suitable for global comparison, so only *nonverbal intelligence* (NI) is to be considered.

**Methods:** Accordingly, this systematic review aims to summarise existing studies on the relationship between AT and NI, reveal significant research gaps, and provide avenues for further research. Five electronic databases were systematically searched for articles published within the last ten years. Out of 1333 hits, 38 articles were assessed for eligibility, and eight articles were finally included in the review. A total of 9909 healthy participants across eight countries, aged 4 to 77 years and uniformly distributed regarding gender, were analysed.

**Results:** In sum, four studies resulted in significant effects of AT on NI (visuospatial skills, reasoning ability, attention), mostly in favour of girls, whereas four studies concluded no significant associations (information-processing speed, inhibitory control, and general nonverbal intelligence).

**Conclusion:** Results demonstrate the insufficient study situation and, therefore, the need for and huge potential of exploring the relationship between AT and NI.

**Keywords:** active transportation, physical activity, nonverbal intelligence, cognition

# NEFPAT Plus: A valid and reliable tool for assessing the nutrition environment in food pantries

**Dr. Cassandra Nguyen**<sup>1</sup>, Ms. Jiayi Huang<sup>2</sup>, Mrs. Caitlin Kownacki<sup>2</sup>, Mrs. Kaitlyn Streitmatter<sup>2</sup>, Dr. Jennifer McCaffrey<sup>2</sup>

<sup>1</sup>Washington State University, Seattle, USA, <sup>2</sup>University of Illinois Extension, Urbana, USA

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical

**Purpose:** One in six adults in the U.S. seek food from the charitable food system. Policy, systems, and environmental (PSE) initiatives are being implemented in food pantries and food banks to promote nutrition and health. However, evaluation of these efforts is hampered by the absence of validated tools which incorporate new national nutrition guidance. The objective of the current study was to develop such a tool and evaluate evidence of its validity and reliability.

**Methods:** This study was undertaken in four phases: 1) tool revision, 2) pilot testing, 3) content validity assessment, and 4) inter-rater and test-retest reliability assessment. The original Nutrition Environment Food Pantry Assessment Tool (NEFPAT) was revised to incorporate evidence from the national nutrition guidance, user feedback surveys, implementation experience, and newly published empirical evidence. The drafted NEFPAT+ was pilot tested by 9 professionals at 5 food pantries. After revisions, professionals were surveyed to rate the content validity of the NEFPAT+ on a 4-point scale. Finally, the inter-rater and test-retest reliability of the NEFPAT+ was estimated with Intra-Class Coefficients (ICCs) based on evaluations at 21 food pantries with 2-4 Extension staff and food pantry personnel completing independent ratings at two times, approximately one month apart.

**Results/findings:** The initial phase of revision resulted in a drafted tool of 105 strategies which took approximately 61 minutes to complete. After, the NEFPAT+ was rated content valid by 94% of 18 reviewers (mean=3.6, SD=0.6) and suggestions were used to finalize 86 strategies across 7 objectives of the tool. The ICC for the overall NEFPAT+ scores exceeded the threshold for excellent inter-rater reliability (ICC: 0.96; 99% CI: 0.75, 0.97) and for good test-retest reliability (ICC: 0.80; 99% CI: 0.60, 0.92). These estimates were not appreciably different when data were restricted to ratings completed by Extension staff (versus Extension and food pantry staff ratings).

**Conclusions:** Evidence supports the content validity, inter-rater reliability, and test-retest reliability of the NEFPAT+. The NEFPAT+ can be completed by Extension staff as external reviewers or by food pantry staff as a self-assessment. Future studies should assess how NEFPAT+ scores relate to interventions and client dietary behaviors.



# Deep learning of waking activity behavior profiles and their association with markers of cardiometabolic health

**Dr. Vahid Farrahi<sup>1,2</sup>**, Dr. Mourad Ouassalah<sup>1,2</sup>

<sup>1</sup>Research Unit of Health Sciences and Technology, University of Oulu, Oulu, Finland, <sup>2</sup>Center for Machine Vision and Signal Analysis, University of Oulu, Oulu, Finland

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical

**Purpose:** This study used a novel clustering technique for deep learning of device-measured sedentary and activity behavior profiles, and examined how these profiles are associated with markers of cardiometabolic health after accounting for the time composition of sedentary behaviors, light-intensity (LPA) and moderate-to-vigorous physical activity (MVPA).

**Methods:** The participants were 5,059 adults (aged 18-65) from the NHANES cycles 2003-4 and 2005-6, wearing a hip-worn accelerometer during waking hours with at least 4 days of valid data. Minute-by-minute accelerometer outputs (activity counts) over the course of valid measurement days for each participant were presented as an image, visualizing the duration, timing, intensity, and patterns of accumulated sedentary and activity behaviors. These images were then used for deep learning of sedentary and activity behavior profiles using convolutional autoencoders, a type of deep artificial neural network capable of learning image representation. The associations of these profiles with markers of cardiometabolic health were determined with compositional regression analyses simultaneously accommodating the time composition (isometric log-ratio transformation of sedentary time, LPA, and MVPA) and the identified profiles as a categorical variable.

**Results:** Five profiles with distinct patterns and varying average time in sedentary and activity behaviors were identified: “Consistently Idles”, “Somewhat Idles”, “Fragmentation of Sedentary Time”, “High Activity/High Sedentary”, and “High Activity/Low Sedentary”. “Consistently Idles”, characterized by the lowest time in MVPA and relatively more unfragmented sedentary time, was considered as the unhealthiest profile. Compared to the “Consistently Idles” profile, “Fragmentation of Sedentary Time” and “High Activity/High Sedentary” profiles were found to have fragmented patterns of accumulation of sedentary time and favorable differences in their cardiometabolic health markers (1.4-25.3% favorable percent changes in BMI, waist circumference, triglycerides, C-reactive protein, and markers of insulin sensitivity), after accounting for the time composition. Both “Somewhat Idles” and “High Activity/Low Sedentary” profiles exhibiting less fragmentation in the patterns of accumulation of their sedentary time had no apparent differences in most markers of cardiometabolic health, when compared to “Consistently Idles”.

**Conclusions:** Fragmentation of sedentary time may be more important than performing more MVPA and less sedentary time for better cardiometabolic health in adults.

# Accuracy of Parent-Measured Weight and Height in Preschool Children with Different Levels of Support

**Ms. Divya Patel**<sup>1</sup>, Dr. Susan B. Sisson<sup>1</sup>, Dr. Sara Vesely<sup>1</sup>, Dr. Dipti Dev<sup>2</sup>, Dr. Emily Guseman<sup>3</sup>, Dr. Norman Hord<sup>1</sup>, Dr. Kathrin Eliot<sup>1</sup>

<sup>1</sup>University of Oklahoma Health Sciences Center, Oklahoma City, USA, <sup>2</sup>University of Nebraska- Lincoln, Lincoln, USA, <sup>3</sup>Ohio University, Athens, USA

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical

**Purpose:** Weight and height measurements are commonly used to monitor growth in young children. Studies use parental estimates or remote measurements taken at home of their children's weight and height. The accuracy of these measurements is unknown. Examining the accuracy of parental measurements is critical for appropriate health risk classification for children. For behavioral and intervention research, it is necessary to develop remote protocols increasing access and reach to populations that are hard to recruit or those with transportation barriers. Developing innovative virtual methods of collecting weight and height is equally important as it will increase participant enrollment and reach, reduce costs, and participant and researcher burden. The purpose of this pilot study was to determine the accuracy of parental weight and height of their preschool children with varying levels of support.

**Methods:** 30 parents of preschool children participated in this study. One home visit was conducted per participant. Parents measured their child's weight and height using (i) instructional guide, (ii) guide and demonstration video, (iii) guide, video, and virtual monitoring. Paired t-tests were conducted to determine accuracy of parental measurements as compared to researcher.

**Results/findings:** Mean (SD) parental weights (kg) differed from the research weight ( $18.03 \pm 4.3$ ) by 0.82 (0.76) (using guide), 0.93 (0.73) (guide and video), and 0.75 (0.73) (guide, video, and virtual monitoring). Mean parental heights (cm) differed from researcher height ( $103.98 \pm 5.92$ ) by 0.92 (1.66) (guide), 0.41 (1.12) (guide and video), and 0.32 (1.12) (guide, video, and virtual monitoring). Using absolute differences, parental weights were the most accurate with all three levels of support, however, no significant differences found. Parental heights were significantly more accurate when using guide and video as compared to guide only ( $p=0.02$ ).

**Conclusion:** Parental weight and height was not different from researcher when they were provided with instructional guide and video. Virtual monitoring did not increase accuracy and is not needed in virtual protocols. Such remote measurement protocols could be easily replicated allowing for increased parental self-efficacy, accurate health risk classification in children, increased reach and reduced costs into behavioral nutrition and physical activity interventions, especially those with limited resources.

# Systematic literature review of instruments that measure the healthfulness of food and beverages sold in informal food outlets

**Dr. Catalina Medina<sup>1</sup>**, Dr. Maricela Piña<sup>1</sup>, Dr. Tania Aburto<sup>1</sup>, Ms. Julissa Chavira<sup>1</sup>, Ms. Uzzi López<sup>1</sup>, Dr. Mildred Moreno<sup>1</sup>, Ms. Armando G.- Olvera<sup>1</sup>, Dr. Citlali González<sup>1</sup>, Dr. Terry T-K Huang<sup>2</sup>, Dr. Simon Barquera<sup>1</sup>  
<sup>1</sup>National Institute of Public Health, Mexico, Mexico, <sup>2</sup>Center for Systems and Community Design, New York, USA

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose.** The purpose of this study was to review available instruments that measure the quality and particularly the healthfulness of food and beverages sold within informal food outlets.

**Methods.** PubMed, LILACS, Web of Science, and Scopus databases were used. Articles were included if they reported instruments that measured the availability or type of healthy and unhealthy foods and beverages by informal food outlets, were written in English or Spanish, and published between January 1, 2010, and July 31, 2020. Two trained researchers reviewed the title, abstract and full text of selected articles; discrepancies were solved by two independent researchers. In addition, the list of references for selected articles was reviewed for any additional articles of relevance. The quality of published articles and documents was evaluated using JBI Critical appraisal checklist for analytical cross-sectional studies.

**Results.** We identified 1,078 articles of which 14 were included after applying the selection criteria. Three additional articles were considered after reviewing the references from the selected articles. From the final 17 articles, 13 measurement tools were identified. Most of the instruments were used in low- and middle-income countries (LMIC). Products were classified as healthy/unhealthy or produce/non-produce or processed/unprocessed based on availability and type. Six studies reported psychometric tests, whereas one was tested within the informal food sector.

**Conclusions.** Few instruments can measure the healthfulness of food and beverages sold in informal food outlets, of which the most valid and reliable have been used to measure formal food outlets as well. Therefore, it is necessary to develop an instrument that manages to measure, specifically, the elements available within an informal one. These actions are extremely important to better understand the food environment that is a central contributor to poor diets that are increasingly associated with the obesity and NCD pandemic.

# Switching the global salt supply: Reducing global sodium intake using potassium-enriched salt

**Dr. Katrina Kisson**<sup>1,2</sup>, Mr. James Bullen<sup>1</sup>, Prof. Bruce Neal<sup>1,2</sup>, Dr. Ellie Paige<sup>1,2,3</sup>

<sup>1</sup>The George Institute for Global Health, Newtown, Australia, <sup>2</sup>The University of New South Wales, Sydney, Australia, <sup>3</sup>The Australian National University, Canberra, Australia

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** Excess sodium consumption is associated with increased blood pressure, a key risk factor for cardiovascular disease. Efforts to reduce global sodium intake through decreased salt consumption have been mostly unsuccessful as it is difficult to change dietary behaviour. Potassium-enriched salt, in which a proportion of sodium chloride is replaced with potassium chloride, has been shown to decrease blood pressure and the risk of cardiovascular disease. This research aims to examine mechanisms for switching the global salt supply to a potassium-enriched salt as a sodium-reduction strategy requiring little behaviour change.

**Methods:** We developed a comprehensive program of work, involving: (1) literature review to identify key enablers and challenges to changing the global salt supply; (2) quantitative analysis of global sodium and potassium intake from 1990 to 2018, using the Global Dietary Database, to identify countries with a high sodium to potassium ratio; (3) understanding the global salt and potassium supply chains; (4) reviewing salt reduction policies of countries around the world; and (5) bringing these data together to identify the best places to intervene and implement potassium-enriched salt.

**Results/findings:** This presentation will outline the broad program of work including data on the effectiveness of potassium-enriched salts within the context of behavioural interventions. The global salt supply has been changed before with universal salt iodisation. Findings from the literature review identified five key enablers to changing the salt supply including: (1) strong evidence of a population health problem; (2) establishment of global networks, recommendations and agreements; (3) government support through national programs, legislation, regulation, monitoring, and subsidies; (4) strong advocacy and communication; and (5) multi-sectoral efforts. Key challenges were related to small-scale salt producers; costs; trade concerns; and variation in salt consumption patterns. Findings for other areas within the program of work are not yet available.

**Conclusions:** A switch to potassium-enriched salt is likely to result in substantial improvements to population health through a reduction in cardiovascular disease burden and requires little behaviour change. Global implementation of public health measures is a challenge, but past initiatives such as salt iodisation show a pathway for how this can be achieved.

# Acute mood benefits of yoga: what role does exercise play?

**Dr. Jacinta Brinsley<sup>1</sup>**, Dr. Matthew Smout<sup>1</sup>, Dr. Danielle Girard<sup>1</sup>, Assistant Professor Kade Davison<sup>1</sup>

<sup>1</sup>University of South Australia, Adelaide, Australia

Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** due to the multi-composite, mind-body features of yoga, it is of interest to determine what effect exercise plays as a component of modern yoga in providing psychological and physiological health benefits, and whether benefits are enhanced with a combination of components. While the effects of regular, long-term practice are well documented, the acute effects have received less empirical investigation. Therefore, this study aimed to identify what effect moderate-intensity exercise within yoga has on mood state and cardiovascular tone in people with depression/anxiety.

**Methods:** a within-subjects, repeated measures randomized controlled crossover trial with five conditions was conducted. Participants ( $N=41$ ) with depressive or anxiety disorders and no yoga experience completed (1) yin yoga, (2) vinyasa yoga, (3) aerobic exercise, (4) stretching control, and (5) no-intervention control. Acute changes in mood and cardiovascular tone were assessed. Linear mixed models were constructed for each outcome variable with experimental condition as a fixed effect, a random intercept and an identity covariance structure. Change within conditions were analyzed using paired sample  $t$ -tests.

**Results/findings:** A significant main effect of condition on mood was observed ( $N=38$ ;  $F_{4,127.193} = 7.507$ ,  $p = <.001$ ). Participants receiving yin, vinyasa, aerobic exercise and stretching achieved comparable improvements in mood symptoms compared to no-intervention control. Cardiovascular changes were observed for aerobic exercise and vinyasa yoga. No adverse events were reported.

**Conclusions:** The acute mood benefits of a single initial session of yoga are not significantly greater than those derived from other forms of movement. Moderate-intensity styles of yoga can provide a sufficient and equivalent acute cardiovascular exercise effect to that of traditional exercise options (i.e., cycling). This is the first study to measure the acute psycho-physiological effects of different forms of yoga and the role of exercise as a component of yoga on mood. These results progress our understanding of the mechanism and implementation of yoga as a form of exercise in the context of mood and anxiety disorders.

# Adolescents' School Travel: How Far is Too Far, How Long is Too Long, and Who Thinks What?

**Prof. Sandra Mandic**<sup>1,2</sup>, Dr. Enrique García Bengoechea<sup>3,4</sup>, Associate Professor Asaduzzaman Khan<sup>5</sup>, Prof. John Spence<sup>6</sup>

<sup>1</sup>Auckland University of Technology, Wellington, New Zealand, <sup>2</sup>AGILE Research Ltd., Wellington, New Zealand, <sup>3</sup>University of Limerick, Limerick, Ireland, <sup>4</sup>Sport Ireland, Dublin, Ireland, <sup>5</sup>University of Queensland, Brisbane, Australia, <sup>6</sup>University of Alberta, Edmonton, Canada

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Home-to-school distance is the strongest correlate of active transport to school. Threshold distances for adolescents range 1.4-3.0 km for walking and 3.0-8.0 km for cycling to school, with large variability between countries. However, perceptions of reasonable distance and duration for school travel remain largely unknown. This study examined perceptions of reasonable school travel distance and duration for different transport modes among New Zealand urban adolescents.

**Methods:** Adolescents (n=1,517; 48.3% female; 12 schools) from Dunedin, New Zealand completed an online questionnaire under supervision in 2020-2022. Participants self-reported their school travel modes and perceived reasonable time and distance for school travel using different modes. The home-to-school distance was calculated using Google Maps. Data were analysed using ANOVA and Chi-square tests.

**Results:** Overall, half of adolescents perceived reasonable distances to school to be  $\leq 2.0$  km for walking and  $\leq 3.0$  km for cycling. On average, shorter reasonable walking distances were reported by adolescents living  $\leq 2.25$  km from their school ( $2.2 \pm 1.5$  km) and walkers ( $2.3 \pm 1.6$  km; all  $p < 0.05$  compared to their peers). Furthest average reasonable cycling distance was reported by adolescents who cycled ( $5.4 \pm 3.0$  km; n=15 (1% of the total sample)). Perceived reasonable school travel duration varied by mode. Approximately half of adolescents perceived  $\leq 15$  min as reasonable school travel duration for cycling and private vehicle travel and  $\leq 20$  min for walking, busing, and the entire school journey. Average reasonable travel times reported by users of specific modes were  $20.7 \pm 12.7$  min for walking by walkers,  $19.1 \pm 9.3$  min for cycling by those who cycled,  $25.3 \pm 13.2$  min for busing by bus users and  $20.2 \pm 11.9$  min driving/being driven for private vehicle users.

**Conclusions:** Adolescents stated reasonable distances for active travel that are lower than the previously reported threshold distances reported based on rates of walking and cycling to school. Reasonable school travel duration was shorter for cycling than walking. Potential interventions could attempt to reconcile these differences. These findings have implications for urban design (10-, 15- and 20-minute city), school locations, school travel planning, public transport and adolescents' physical activity.



# Evaluating the role of amino acid in type 2 diabetes risk: a Mendelian Randomization Study

**Mr. Man Yuen Jacky Mo<sup>1</sup>**, Assistant Professor Shiu Lun Ryan Au Yeung<sup>1</sup>

<sup>1</sup>The University of Hong Kong, Hong Kong, Hong Kong

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** Previous observational studies and Mendelian randomization studies suggested a potential etiologic role of different amino acids in type 2 diabetes. However, these studies may suffer from confounding or the use of potentially pleiotropic instruments respectively.

**Methods:** We extracted strong ( $p < 5 \times 10^{-8}$ ), independent ( $r^2 < 0.001$ ) genetic variants associated with nine amino acids (alanine, glutamine, glycine, histidine, phenylalanine, tyrosine, isoleucine, leucine, and valine) from summary statistics of UK Biobank ( $N \leq 115,075$ ), with exclusion of variants exhibiting pleiotropic effects. We then applied them to summary statistics of T2D from DIAMANTE Consortium ( $N_{\text{cases}} = 80,154$  and  $N_{\text{controls}} = 853,816$ ) and FinnGen study ( $N_{\text{cases}} = 37,002$  and  $N_{\text{controls}} = 215,160$ ), and glycemic traits (MAGIC consortium,  $n \leq 209,605$ ). The main analysis was inverse variance weighed (IVW) method, with sensitivity analyses including weighted median method, MR-Egger, MR-Robust Adjusted Profile Score (RAPS), and MR-Pleiotropy Residual Sum and Outlier (MR-PRESSO).

**Results:** Amongst the nine amino acids included, we found higher alanine (Odds ratio [OR] 1.51 per SD; 95% CI 1.18-1.95), isoleucine (OR 1.18 per SD; 95% CI 1.03-1.35), leucine (OR 1.16 per SD, 95% CI 1.05-1.29) and valine (OR 1.29 per SD; 95% CI 1.05-1.60) were associated with higher T2DM risk. Conversely, higher tyrosine (OR 0.90 per SD; 95% CI 0.82-0.99) was associated with lower T2DM risk. No associations were observed for the other amino acids.

**Conclusion:** This study identified several amino acids which are related to T2D risk, which helps formulation of dietary recommendations for reduction in T2D risk in the general population.

# Bidirectional day-to-day effects of movement behaviours in the population-based Study of Health in Pomerania (SHIP-TREND-1)

**Dr. Antje Ullrich**<sup>1,2</sup>, Dr. Lisa Voigt<sup>2,3</sup>, Mr. Dominic Bläsing<sup>1</sup>, Ms. Juliane Bauer<sup>4</sup>, Dr. Martin Bahls<sup>2,3</sup>, Prof. Marcus Dörr<sup>2,3</sup>, Prof. Stephan B. Felix<sup>2,3</sup>, Prof. Henry Völzke<sup>5</sup>, Prof. Carsten Oliver Schmidt<sup>6</sup>, Prof. Sabina Ulbricht<sup>1,2</sup>

<sup>1</sup>Department of Prevention Research and Social Medicine, Institute for Community Medicine, University Medicine Greifswald, Greifswald, Germany, <sup>2</sup>German Centre for Cardiovascular Research (DZHK), partner site Greifswald, Greifswald, Germany, <sup>3</sup>Department of Internal Medicine B, University Medicine Greifswald, Greifswald, Germany, <sup>4</sup>Division Work and Health, Federal Institute for Occupational Safety and Health (BAuA), Berlin, Germany, <sup>5</sup>Institute for Community Medicine, University Medicine Greifswald, Greifswald, Germany, <sup>6</sup>SHIP/Clinical Epidemiology Research, Institute for Community Medicine, University Medicine Greifswald, Greifswald, Germany

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical

**Purpose.** Research in physical activity (PA) and sedentary behaviour (SB) often neglects the intra-individual variability of these movement behaviours over time. This study examines the bidirectional day-to-day effects of accelerometer-based levels of SB, light physical activity (LPA), and moderate-to-vigorous physical activity (MVPA) among adults in the population-based Study of Health in Pomerania (SHIP-TREND-1).

**Methods.** The study was conducted in northeast Germany between 2016 to 2019. In total, 2177 individuals aged  $\geq 18$  years were instructed to wear an accelerometer for seven days. After application of accelerometer wear-time criteria ( $\geq 10$  h on  $\geq 4$  days, including  $\geq 1$  weekend day), the final sample comprised 1835 individuals (84.3%; 52% female;  $M=57.1$  years;  $SD=13.5$ ). We applied dynamic structural equation modelling using a multilevel bivariate autoregressive cross-lagged model to analyse day-to-day associations of movement behaviours for each individual.

**Results.** On average, individuals wore the accelerometer for 808.9 min per day (95% CI = 806.0; 811.9), among which 473.2 min were spent in SB (95% CI = 468.9; 477.6), 310.0 min were spent in LPA (95% CI = 305.9; 314.0), and 23.0 min were spent in MVPA (95% CI = 22.2; 23.8). The data revealed statistically significant autoregression for all movement behaviours. Bivariate cross-lagged values showed a significant effect of SB on next-day LPA ( $B = -0.06$ ; 95% CI =  $-0.10$ ;  $-0.03$ ) and next-day MVPA ( $B = 0.19$ ; 95% CI =  $0.02$ ;  $0.34$ ). Further, MVPA significantly predicted next-day LPA ( $B = -0.01$ ; 95% CI =  $-0.01$ ;  $-0.00$ ). The within-person variability of SB, LPA, and MVPA explained by the model was 9.6%, 13.9%, and 16.6%, respectively.

**Conclusions.** The amount of time spent in SB has an impact on next-day LPA and MVPA, but not vice versa. Our findings suggest that intra-individual day-to-day effects of SB and PA should be considered when studying movement behaviours.

# Challenges, needs and opportunities for emerging behavioural nutrition and physical activity researchers in (post-)pandemic times

**Dr. Brittany Johnson<sup>1</sup>**, Dr. Stephanie Chappel<sup>2</sup>, Dr. Brianne Bruijns<sup>5</sup>, Dr. Sarah Burkart<sup>3</sup>, Dr. Stephen Barrett<sup>13</sup>, Dr. Hilary Caldwell<sup>4</sup>, Ms. Kelly Cosgrove<sup>8</sup>, Dr. Daehyoung Lee<sup>6</sup>, Dr. Emma Lawlor<sup>14</sup>, Dr. Christine St. Laurent<sup>7</sup>, Ms. Sarah Shaw<sup>11</sup>, Dr. Inês Santos<sup>12</sup>, Dr. Taylor Willmott<sup>9</sup>, Ms. Kylie Wilson<sup>8</sup>, Dr. Simone Verswijveren<sup>10</sup>

<sup>1</sup>Caring Futures Institute, Flinders University, Bedford Park, Australia, <sup>2</sup>Appleton Institute, CQUniversity, Wayville, Australia, <sup>3</sup>University of South Carolina, Columbia, USA, <sup>4</sup>Healthy Populations Institute, Dalhousie University, Halifax, Canada, <sup>5</sup>School of Occupational Therapy, Western University, London, Canada, <sup>6</sup>University of Minnesota Duluth, Duluth, USA, <sup>7</sup>University of Massachusetts Amherst, Amherst, USA, <sup>8</sup>College of Health Solutions, Arizona State University, Phoenix, USA, <sup>9</sup>Adelaide Business School, The University of Adelaide, Adelaide, Australia, <sup>10</sup>Institute for Physical Activity and Nutrition (IPAN), School of Exercise and Nutrition Sciences, Deakin University, Burwood, Australia, <sup>11</sup>MRC Lifecourse Epidemiology Centre, University of Southampton, Southampton, United Kingdom, <sup>12</sup>Laboratório de Nutrição, Faculdade de Medicina, Universidade de Lisboa, Lisbon, Portugal, <sup>13</sup>Bendigo Health, Australia, Holsworth Research Initiative, La Trobe Bendigo, Bendigo, Australia, <sup>14</sup>School of Cardiovascular and Metabolic Health, University of Glasgow, Glasgow, United Kingdom

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** N. Other

**Purpose:** Emerging researchers (i.e. students and early career researchers) constitute a substantial portion of academic institutional members worldwide. Many emerging researchers experience difficult working environments often relying on grant funding, sessional teaching, and short-term contracts. The COVID-19 pandemic may have exacerbated this stress and uncertainty, and impacted the personal and professional development of emerging researchers. We sought to understand the challenges, needs, and opportunities for behavioural nutrition and physical activity emerging researchers in (post-)pandemic times.

**Methods:** Current emerging researchers in behavioural nutrition or physical activity (including sedentary behaviour, sleep) were invited via email and social media to complete an anonymous online cross-sectional questionnaire (via Qualtrics; n=25 items). The questionnaire was developed for this study and pilot tested to refine items. Consenting participants completed socio-demographics, ratings of the impact of personal and professional challenges experienced since the start of the pandemic, and career development needs on a 10-point scale (1=no impact/need, 10=significant impact/need), with descriptive elaborations for those rated  $\geq 7$ ; and desired development opportunities. Quantitative results were analysed descriptively, and qualitative analyses are ongoing.

**Results/findings:** To date, 108 emerging researchers from over 20 countries completed the questionnaire. Preliminary findings revealed the highest-rated professional challenges as travel ( $7.7 \pm 2.7$ ), networking/collaboration ( $6.9 \pm 2.3$ ), and conducting research (e.g. recruitment;  $6.5 \pm 2.7$ ). The highest-rated personal challenges were caregiving ( $4.9 \pm 3.8$ ), mental illness ( $4.6 \pm 2.9$ ) and isolation ( $4.4 \pm 2.9$ ). The highest-rated professional development needs were grant writing ( $7.1 \pm 2.7$ ), networking/collaboration ( $6.3 \pm 2.6$ ) and analysis ( $6.3 \pm 2.5$ ). The highest-rated personal development needs were career planning ( $5.9 \pm 2.3$ ), work-life balance ( $5.7 \pm 2.6$ ) and stress/resilience ( $4.8 \pm 2.8$ ). Desired career development opportunities varied, including writing groups, mentoring, and networking.

**Conclusions:** We found the pandemic has had a broad range of professional and personal impacts on students and ECRs. Yet, career development needs and opportunities appear broadly consistent with those

pre-pandemic. Our findings can inform development and tailoring of ISBNPA initiatives and can be used to encourage other professional organizations to target support to emerging researchers post-pandemic.

# Associations between menu healthiness, proximity, and availability of neighbourhood out-of-home food outlets and eating-out frequency in Great Britain: a multiverse analysis

**Ms. Yuru Huang**<sup>1</sup>, Dr. Thomas Burgoine<sup>1</sup>, Mr. Matthew Keeble<sup>1</sup>, Mr. Thomas Bishop<sup>1</sup>, Prof. David Hammond<sup>2</sup>, Prof. Jean Adams<sup>1</sup>

<sup>1</sup>University of Cambridge, Cambridge, United Kingdom, <sup>2</sup>University of Waterloo, Waterloo, Canada

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose** Many population health interventions focus on improving the healthiness of out-of-home foods, but little is known about whether healthier offerings will positively influence individual dietary behaviour. In this study, we aimed to investigate if menu healthiness, proximity, and availability of neighbourhood out-of-home food outlets are associated with eating-out frequency.

**Methods** We analysed cross-sectional online survey data in Great Britain (GB) from the International Food Policy Study in 2021 (n=3,523). We linked this with contemporaneous Ordnance Survey Points of Interest data, a comprehensive dataset containing all food outlets in GB, and defined various metrics of participants' out-of-home food outlet exposure. These included availability and proximity measures, different neighbourhood definitions (i.e., 500-1600m buffers), and incorporated healthiness scores (0-12, 0 being the unhealthiest) based on menu attributes. In multiverse analyses, where multiple reasonable analytical choices can be tested, we investigated how different exposure metrics affected the results. We used generalised linear regression models with survey weights, and the primary outcome was the number of meals purchased out-of-home in the past 7 days.

**Results** Adults in GB had access to a median of 44 (IQR 17-106) out-of-home food outlets within 1600m of their home, with a median healthiness of 6.74 (IQR 6.59, 6.91). The number of out-of-home food outlets available, regardless of their healthiness, was positively associated with the number of meals purchased out-of-home across all neighbourhood definitions (p<0.05). For example, when neighbourhoods were defined as 1600m circular buffers, there was an increase of 0.10 (95%CI 0.02, 0.17) eating-out occasions for every 100 additional food outlets in a 1600 buffer. Distance to the closest unhealthy food outlet was inversely associated with eating-out frequency (-0.04/100m, 95%CI -0.07, -0.01) irrespective of healthiness. Metrics incorporating food outlet healthiness, such as the average healthiness and proportion of healthy food outlets, were not associated with eating-out frequency, except for median healthiness of food outlets within 1000m buffers of participants' homes.

**Conclusion** Menu healthiness of out-of-home food outlets was not associated with how often people eat out. The number of food outlets available in a neighbourhood may be a more important determinant of individual eating-out frequency.

# Natural experimental evaluation of changing policies and environments: recent advances and updated guidance

**Prof. David Ogilvie**<sup>1</sup>, Prof. on behalf of the Natural Experiments Guidance Writing Group<sup>1</sup>

<sup>1</sup>University of Cambridge, Cambridge, United Kingdom

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** The use of natural experimental evaluations (NEEs) has increased in the last decade, driven by advances in research methods, greater availability of data, and rising demand for evidence to support upstream approaches to improving population health. It is important that researchers, publishers, funders, and users of intervention research are aware of recent developments and of the strengths, limitations and applicability of the range of approaches and methods now available. This presentation will provide an overview of newly updated and extended guidance for using natural experiments to evaluate population health interventions, with a particular emphasis on evaluating strategies to shift population dietary and physical activity patterns by changing policies and environments.

**Methods:** The guidance has been developed by a project team comprising researchers with expertise in NEEs, drawing on four international workshops and an online consultation with researchers, journal editors and end users of NEEs, supported by a funder-assigned oversight group and an advisory group of independent experts including researchers, a journal editor and public health specialists. The project is jointly funded by the Medical Research Council and the National Institute for Health Research.

**Findings:** NEEs can provide useful information to guide decision making about interventions. However, there is a lack of consensus about the circumstances in which they should be used, key definitions and concepts remain somewhat contested, and most extant guidance focuses on the selection and use of quantitative methods for effect size estimation. The new guidance includes consideration of the range of circumstances in which an NEE may be possible, the conditions under which an NEE is most likely to be useful, the conceptualisation and theorisation of an NEE and the choice among a wide range of potential quantitative, qualitative and mixed-method approaches, the registration of study protocols, and help for journal editors, funders, peer-reviewers, and evidence users in identifying the strengths and limitations of NEE research.

**Conclusions:** This updated and extended guidance provides a single, integrated, up-to-date guide to using natural experimental approaches to evaluate population health interventions, which will be of use to researchers, funders, publishers, and users of evidence.



# Two year follow-up study of a natural experiment in an urban park in Belgium on park use and park-based physical activity

**Ms. Amber Van Puyvelde**<sup>1,2</sup>, Prof. Benedicte Deforche<sup>1,3</sup>, Dr. Lieze Mertens<sup>1,2</sup>, Ms. Emma De Keyser<sup>5</sup>, Associate Professor Jenny Veitch<sup>4</sup>, Prof. Delfien Van Dyck<sup>2</sup>, Dr. Louise Poppe<sup>1</sup>

<sup>1</sup>Department of Public Health and Primary Care, Faculty of Medicine and Health Sciences, Ghent University, Ghent, Belgium, <sup>2</sup>Department of Movement and Sports Sciences, Faculty of Medicine and Health Sciences, Ghent University, Ghent, Belgium, <sup>3</sup>Department of Movement and Sport Sciences, Vrije Universiteit Brussel, Brussels, Belgium, <sup>4</sup>Deakin University, Institute for Physical Activity and Nutrition (IPAN), School of Exercise and Nutrition Sciences, Geelong, Australia, <sup>5</sup>Department of Gerontology, Faculty of Medicine and Pharmacy, Vrije Universiteit Brussel, Brussels, Belgium

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Previous natural experiments have not investigated whether positive effects of park renewal on park visitation and park-based PA persist over time. Therefore, this study examined the longer-term impact of park renewal on park use and park-based PA.

**Methods:** In 2020, a public urban park in Belgium was renewed including installation of broad walking and cycling paths, benches, picnic tables, outdoor fitness equipment and playgrounds. Observational data (i.e. age group, sex, activity level) were collected using the SOPARC tool in the intervention park and in a control park with similar features and amenities at four timepoints: before, immediately after, 1 year (follow-up 1) and 2 years after park renewal (follow-up 2). Previous analyses immediately after the renewal showed an increase in the number of (active) park visitors but no change in the mean PA intensity. To examine the effects of the renewal on park use and park-based PA from pretest to each follow-up, generalized linear (mixed) models were fitted.

**Results:** At both follow-ups, the total number of park visitors and the number of visitors from each sex and in each age category (except for children at follow-up 2) was higher in the intervention park compared to the pretest and to the control park. At follow-up 1, more visitors were observed in all activity categories; however, the mean PA intensity level of the visitors decreased due to a decrease in the mean PA intensity level of older adults. At follow-up 2, only an increase in sedentary and vigorously active visitors was observed and no changes occurred in the mean PA intensity.

**Conclusion:** Extensive park renewal including the installation of park features that promote PA as well as relaxation and social interaction has longer-term positive effects on park use among all age groups. The mean PA intensity level of the park visitors (except for older adults at follow-up 1) remained the same over time and more active park visitors were observed at both follow-ups, resulting in more overall PA. Park renewal may therefore be an important way to improve physical activity and physical, mental and social health among all ages.

# Connecting physical education lessons and urban sports facilities in the urban space surrounding schools

Dr. Nicky Nibbeling<sup>1</sup>, Mr. Huib van de Kop<sup>1</sup>, Dr. Mirka Janssen<sup>1</sup>, **Mr. Niek Schaper<sup>1</sup>**

<sup>1</sup>Amsterdam University of Applied Sciences, Amsterdam, Netherlands

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** J. Young Adults

**Purpose:** Adolescents are insufficiently physically active and spent too much time sitting, which provides a health risk. In the current study the municipality of Amsterdam, secondary schools, experts in urban sports and researchers work together to stimulate healthy exercise behavior of adolescents. The urban sports facilities in the city of Amsterdam are at the center of this project. A variety of urban sports facilities have been realized over the last years. It remains however unknown which adolescents actually use these facilities. When urban space planning and physical education (PE) lessons at school are aligned and adjusted to the needs and preferences of adolescents, adolescents probably feel more competent to use the urban sport facilities surrounding their schools. The goal of this project is twofold: 1) findings working principles for designing urban sports facilities in the urban space surrounding schools 2) identifying elements in secondary school physical education lessons that motivate adolescents to use the urban sports facilities.

**Methods:** This was investigated by applying design thinking methods and co creation sessions with adolescents, PE teachers, school boards, municipality and experts in urban sports.

**Results:** First results indicate that needs, wishes and barriers of adolescents with regard to the use of urban sports facilities are currently insufficiently documented. Moreover, physical education teachers lack a feeling of competence in providing urban sports classes and there is insufficient coordination between schools, the municipality and providers of urban sports. Next steps in the design thinking cycle will be discussed as well as implications for the municipality with regard to planning of urban sports facilities around school, and how to connect physical education programming inside and outside secondary schools.

# Evaluation of Behaviour Change Support to enhance young adults' adherence to study requirements within a randomised controlled trial

**Miss Anna Worthington<sup>1</sup>**, Dr. Nicola Gillies<sup>1</sup>, Dr. Rajshri Roy<sup>1</sup>, Dr. Rina Hannaford<sup>2</sup>, Dr. Andrea Braakhuis<sup>1</sup>

<sup>1</sup>The University of Auckland, Auckland, New Zealand, <sup>2</sup>Data Science Team, AgResearch Ltd, Palmerston North, New Zealand

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical

**Purpose:** Systematic design of Behaviour Change Support (BCS) within randomised controlled trials is often overlooked when behaviour change is not the primary outcome. In the Protein Diet Satisfaction (PREDITION) trial, BCS was developed using the Nine Principles framework to enhance participant adherence to study requirements of (i) achieving a basal, healthy diet, and (ii) recording dietary intake on a smartphone application.

**Methods:** In the PREDITION trial, 80 young adults were randomised to a flexitarian or vegetarian diet for 10 weeks. All participants received BCS via private Facebook groups to change dietary behaviours, and text messages to establish dietary intake recording behaviour. The outcome measures included the pre-post change in targeted dietary behaviours using a sub score of the Healthy Diet Habits Index, adherence scores, perception of barriers to changing their diet, and an impact evaluation. Descriptive statistics were presented for all outcomes, namely mean and standard deviation. The analysis included linear imputation modelling, t-tests, and chi-square analysis.

**Results:** A total of 78 participants completed the 10-week intervention. There was a significant change in the total Healthy Diet Habits Index sub score between baseline and week 10 ( $p < 0.05$ ), primarily driven by an increase in vegetable consumption by 0.6 serves/day ( $p < 0.001$ ). Participants perceived that knowledge about healthy eating became less of a barrier over time ( $p < 0.025$ ). On average, Facebook posts were seen by 66% of participants, but overall groups had a relatively low active engagement with an average of 10 reactions and 3 comments per group over the 10 weeks. Adherence to reporting dietary intake was high; with adherence scores that could range from 0 – 100, mean reporting score of the total population was  $90.4 \pm 14.6$ . Most participants agreed the text messages and Facebook groups supported them to adhere to recording dietary intake (63%) and eating healthily (60%), respectively.

**Conclusions:** Using a behaviour change framework within the design of nutrition-related trials is a promising way to increase participant adherence to study requirements, including the burdensome behaviour of recording dietary intake. Further research is required to identify the most effective and feasible components of these frameworks for researchers to use.

# The Impact of Krajicek Playgrounds in Deprived Neighborhoods: A mixed-method study

**Ms. Gioia Muru<sup>1</sup>**, Dr. Femke van Nassau<sup>1</sup>, Dr. Joske Nauta<sup>1</sup>, Dr. Dorine Collard<sup>2</sup>, Ms. Tessa Ten Tije<sup>2</sup>

<sup>1</sup>Amsterdam UMC, location VUmc, Amsterdam, Netherlands, <sup>2</sup>Mulier instituut, Utrecht, Netherlands

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose** The purpose of this study was to assess the impact of Krajicek Playgrounds (KP). The Richard Krajicek Foundation aims to provide children in deprived neighborhoods with safe public playgrounds that stimulate daily physical activity. They employ young people from the neighborhood, scholarsippers, to organize activities for the children on the KP. The research questions included: "What is the experienced value of Krajicek Playgrounds for different stakeholders compared to another regular playground?" and "What is the added value of being a Krajicek scholarshipper on the individual?"

**Methods** A mixed method design was used to collect the data. Questionnaires were distributed among policy officers, (employers of) community sport coaches and scholarsippers. Semi-structured interviews were conducted among policy offers, community sport coaches and scholarsippers. In addition, structured observations of Krajicek Playgrounds and other play areas were conducted.

**Results** For policy officers the software (i.e. activities and organized events) on the Krajicek Playground was of added value. Community sport coaches endorsed the software value, but elements of the hardware (i.e. the physical condition of the playground) were also important, such as the location of the playground and the possibility to borrow sport materials for different kinds of sports. Relative to regular playgrounds, a Krajicek Playground attracted different target groups and is easily accessible for children. Scholarsippers mentioned learning how to guide and motivate children during activities and being a Scholarshipper helped them in gaining self-confidence.

**Conclusion/disc.** According to multiple stakeholders the fact that children are able to play and exercise in their neighborhood, the activities and events and the use of scholarsippers contribute to the success of Krajicek Playgrounds. Krajicek Playgrounds also score higher on the software as well as the hardware compared to another regular playground. Being a Krajicek scholarshipper gives individuals competencies to guide a group, which leads to more self-confidence.

# A digital citizen science approach to real-time monitoring and management of climate change impacts on food and nutrition security

**Dr. Jasmin Bhawra**<sup>1</sup>, Dr. Kelly Skinner<sup>2</sup>, Mr. Duane Favel<sup>3</sup>, Ms. Brenda Green<sup>4</sup>, Dr. Tarun R Katapally<sup>5</sup>

<sup>1</sup>Toronto Metropolitan University, Toronto, Canada, <sup>2</sup>University of Waterloo, Waterloo, Canada, <sup>3</sup>Northern Village of Île-à-la-Crosse, Île-à-la-Crosse, Canada, <sup>4</sup>Île-à-la-Crosse School Division, Île-à-la-Crosse, Canada,

<sup>5</sup>Western University, London, Canada

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** To enable nutrition equity, we urgently require innovative solutions which target the adverse effects of climate change on community food security and sovereignty. Indigenous communities have a wealth of Traditional Knowledge for climate change adaptation and preparedness to strengthen food systems. Traditional Knowledge, combined with Western methods, can revolutionize ethical data collection and knowledge mobilization. This project aims to develop a sustainable digital platform that facilitates real-time decision-making in remote Indigenous jurisdictions to mitigate climate change-related impacts on health.

**Methods:** The Food Equity and Environmental Data Sovereignty (FEEDS) Project takes a participatory action, citizen science approach for early detection and warning of climate change impacts on food systems. Governed by a Citizen Scientist Advisory Council, a qualitative needs assessment was conducted with a subarctic Métis community in Saskatchewan, Canada to inform digital platform development. An environmental scan of relevant programs, key informant interviews (n=3), and two focus groups (n=8) were conducted and thematically analyzed to identify community priorities.

**Results:** Community members identified changes in wildlife patterns, land use, and early winter ice road thaw as areas of concern, particularly due to the impact on traditional food acquisition practices (i.e., hunting). While the community produces its own food through the local fishery and greenhouses, it is still dependent on a food supply from larger urban centres in southern Canada. A smartphone-based digital platform designed to geotag hazardous areas and report food insecurity in real-time, as well as the development of a backend decision-making dashboard, were identified as priorities for monitoring and mitigating negative climate change impacts on local food systems. Community conversations also highlighted the need to strengthen existing digital infrastructure necessary to support uptake and use of the FEEDS digital platform.

**Conclusions:** The FEEDS Project facilitates nutrition equity, self-determination and data sovereignty of communities through citizen-driven big data collection. The digital dashboard system provides decision makers with real-time data, thereby increasing the capacity for rapid response and self-governance. Given the urgency of climate change, digital technology provides communities with both scientific evidence and the tools to respond to emerging health crises in a timely manner.

# The association between the neighbourhood food environment and food and drink purchasing in England during lockdown: a repeated cross-sectional analysis

**Ms. Alexandra Kalbus**<sup>1</sup>, Dr. Laura Cornelsen<sup>1</sup>, Dr. Andrea Ballatore<sup>2</sup>, Prof. Steven Cummins<sup>1</sup>

<sup>1</sup>London School of Hygiene & Tropical Medicine, London, United Kingdom, <sup>2</sup>King's College London, London, United Kingdom

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** This study investigates the association between the neighbourhood food environment and food and drink purchasing during the spring 2020 lockdown in England. Under strict lockdown rules, the local food environment is hypothesised to be more relevant, potentially improving our understanding of the relationship between the food environment and behavioural outcomes.

**Methods:** Transaction-level purchasing data for food and drink items for at-home (1,221 households) and out-of-home (OOH) consumption (171 individuals) were available from the GB Kantar Fast Moving Consumer Panel for London and the North of England. The study period included 23<sup>rd</sup> March to 10<sup>th</sup> May 2020 and the same period in 2019. Outcomes included total energy purchased, energy from specific food and drink types, alcohol volume, and frequency of OOH purchasing. Exposure measures included density and proximity of supermarkets and OOH outlets within a 1 km network buffer around the home, proximity to the nearest food outlet, and composition of the food environment. Models adjusted for individual and household characteristics, population density and area deprivation were used for both years separately. Interaction terms between region and food environment exposures were explored.

**Results:** There were no consistent patterns of association between food environment exposure measures and food and drink purchasing outcomes. However, there was some evidence of associations, including a decrease of 1.4% in energy purchased from ultra-processed foods for each additional 500 m in the distance to the nearest OOH outlet (IR 0.986, 95% CI 0.977 to 0.995,  $p=0.020$ ) in 2019, and a reduction of 1.8% in total take-home energy for each additional chain supermarket per km<sup>2</sup> in the household's neighbourhood (IR 0.982, 95% CI 0.969, 0.995,  $p=0.045$ ) in 2020. Effects were similar in 2019 and 2020. Region-specific effects were observed for 2019 only.

**Conclusions:** The lack of consistent exposure-outcome relationships during lockdown, when most individuals were confined to their local food environment, indicates that the residential food environment may not be relevant for food and drink purchasing and subsequent health outcomes. The lack of region-specific effects in 2020 indicate that the pandemic acted as leveller of the relationship between the food environment and purchasing across space.



# The Evaluation of Social media to Increase Engagement Rate, Reach and health Education: The case for WoW!

**Miss Feroza Lekota**<sup>1</sup>, Prof. Victoria Estelle Lambert<sup>1</sup>, Dr. Sharief Hendricks<sup>1</sup>, Associate Professor Frederick Marais<sup>1</sup>, Mrs. Joanna Pieterse<sup>2</sup>

<sup>1</sup>Health Through Physical Activity Research Centre (HPALS), Division of Physiological Sciences, Faculty of Health Sciences, University of Cape Town, Cape Town, South Africa, <sup>2</sup>Department of Health, Service Priorities Coordination, Cape Town, South Africa

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Introduction:** In 2021, South Africans had a 51.9 percent chance of dying from an NCD. The WesternCape on Wellness program advocates for wellness, through partnership, innovation and policy in South Africa. Increasing knowledge and awareness regarding health behaviours and NCD's is an important pathway in preventing and reducing the problem at hand. Social media provides an unprecedented opportunity and innovative way to provide a solution.

**Aim & Objective:** To use a social media health campaign with expert knowledge to change healthy lifestyle actions and increase health knowledge and engagement in a para-social western cape on wellness social media group.

**Methods:** A mixed methods quantitative and qualitative analysis was undertaken. 60 lifestyle messages were posted on the WoW! Facebook group 5 times a week. Each message was disseminated by a moderator and followed a theme for the day (motivation, nutrition, transformation, fitness). Three icons were used to measure levels of participant engagement likes, shares, comments. Associated comments were extracted and coded using a codebook based on items from the supportive accountability model and peer social support analysis.

**Results:** The most common form of engagement were "likes," and engagement was higher for moderator-initiated rather than participant-initiated posts. Overall traffic to the page increased over the 3 month period from 1083 to 1300 users. Likes were the most common and easiest form of engagement ( $M=7.6$ ,  $SD\ 9.8$ ), with comments being the lowest ( $m=0.81$ ,  $SD\ 2.3$ ). The most engaged with and resonative messages were the #transformationthursday posts. Empirically physical activity behaviour increased and change in eating patterns did improve over time. The 7 main themes that were identified constituted 53.3% (112/210) of all comments in the pre and during campaign analyses. The most prevalent theme was social cohesion and connectedness at 29% (33/112). The least common theme was developing professional communication and organisational support at 4.5% (5/112).

**Conclusion:** The favourable results of the WoW! Facebook campaign shows promise for future social media-driven health campaigns to educate and prevent lifestyle related chronic conditions. Social media content for knowledge sharing should be created through a personal well-intentioned process with the support of moderators to facilitate the conversation and drive engagement.

# Feasability of a Healthy School Meals for All Policy

**Dr. Julie Metos<sup>1</sup>**, Dr. Lori Spruance<sup>2</sup>, Dr. Patricia Guenther<sup>1</sup>

<sup>1</sup>University of Utah, Salt Lake City, USA, <sup>2</sup>Brigham Young University, Provo, USA

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** The United States National School Lunch and School Breakfast programs provide an opportunity to reduce food insecurity and improve dietary intake. During the COVID-19 pandemic, school meals were provided to children at no cost regardless of income status by the Federal government, known as Healthy School Meals for All (HSMFA). Starting in school year 2022-2023, no cost meals were no longer provided. Advocates are working with state governments to assume responsibility, yet little is known about elected officials' and other stakeholder's attitudes towards HSMFA or its potential cost. The purpose of the study was to examine the feasibility of a statewide HSMFA policy in one state.

**Methods:** A mixed method approach was used to examine policymakers, school foodservice directors support and the financial implications of Healthy School Meals for All. Qualitative interviews were conducted for policymakers, surveys were conducted for school foodservice directors, and Utah State Board of Education Child Nutrition Programs data were used to determine financial costs. All (n=109) elected officials (Utah State legislatures and Utah State Board members) were contacted to participate in an interview and 25 participated. All public (n=42) and charter (n=104) foodservice directors were invited to participate in a survey and 69 completed the survey. Cost estimation models were built using participation data and reported school meals costs. A phenomenological analytic approach was used to analyze qualitative data. Survey data for foodservice directors was summarized in frequencies and percentages. Four primary cost models were calculated.

**Results/findings:** Four major themes emerged from the qualitative data; 1) awareness and experiences; 2) responsibility; 3) perspectives on school meals; 4) New opportunities. Legislators with experience volunteering with food insecurity programs or schools were supportive of HSMFA, while those without experience were not supportive. Most (81%) foodservice directors believed HSMFA should continue post-pandemic. Costs for HSMFA in Utah would cost between \$244,528,547 and \$347,354,459 per year depending on participation increases.

**Conclusions:** Discussing benefits of school meals with elected officials, involving them in school food programs, suggesting options for step-wise implementation, and providing cost estimates based on pandemic experiences may increase feasibility of a state-wide HSMFA policy.

# Acceptability of seaweed consumption among pregnant Canadian people: preliminary results

**Ms. Inès Auclair Mangliar**<sup>1,2,3,4</sup>, Ms. Marianne Rochette<sup>1,2</sup>, Mrs. Anne-Sophie Plante<sup>2,3,4</sup>, Dr. Véronique Provencher<sup>1,3,4</sup>, Mrs. Lamia L'Hocine<sup>3,4</sup>, Mrs. Lucie Beaulieu<sup>3,5</sup>, Mrs. Anne-Sophie Morisset<sup>1,2,3,4</sup>

<sup>1</sup>School of Nutrition, Laval University, Quebec, Canada, <sup>2</sup>Endocrinology and Nephrology Unit, CHU of Québec-Laval University, Quebec, Canada, <sup>3</sup>NUTRISS Research Center - Nutrition, Health and Society Center of the Institute on Nutrition and Functional Foods (INAF), Laval, Quebec City, Canada, <sup>4</sup>INAF - Institute on Nutrition and Functional Foods, Laval University, Quebec, Canada, <sup>5</sup>Department of Food Science, Laval University, Quebec, Canada, <sup>6</sup>Agriculture and Agri-Food Canada, Saint-Hyacinthe Research and Development Centre, Saint-Hyacinthe, Canada

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** N. Other

**Purpose:** Seaweeds are a sustainable source of protein containing several relevant micronutrients for pregnancy, such as folic acid, calcium and iron. This study assesses the acceptability and consumption habits of seaweed during pregnancy.

**Methods:** Pregnant French Canadians were asked to complete an online survey, which included questions on their attitude toward seaweed and their consumption pattern. These include perceived health risks and benefits for themselves and their child, frequency of consumption, reasons of consumption and type of seaweed products consumed during pregnancy. At the end, participants could express personal opinion about seaweed consumption during pregnancy. Different factors influencing seaweed consumption, such as familiarity and food neophobia, were taken into account when constructing the questions to better analyze the responses. Descriptive analyses (means  $\pm$  standard deviations and percentages) are used and qualitative analyses for open-ended questions are also conducted to highlight key points. Recruitment of participants is still ongoing with the minimum target of  $n=100$ .

**Results:** Thus far, sixty-eight individuals ( $n=68$ ) completed the survey. The mean age is  $31.2 \pm 3.8$  years and the average number of weeks of pregnancy is  $22.8 \pm 9.1$ . Most of the participants are omnivores (85.3%), with 13.2 % vegetarians and 1.5% vegans. Most participants (60.3%) have a positive attitude towards algae. They believe (54.4%) that seaweed consumption has no positive or negative effect on their health and 70.6% think that it has no effect on their baby's health either. Seaweed was consumed, mainly in sushi, during pregnancy (67.7%). The main reason for consuming seaweed was for the taste (77.7%) and the reasons for not consuming seaweed were the lack of interest and/or knowledge to incorporate it into their cooking (40.9%) and the avoidance of sushi due to the presence of raw fish (31.8%). Participants expressed concern about the lack of information regarding seaweed consumption during pregnancy, particularly raw seaweed, and whether seaweed is safe for health.

**Conclusions:** Currently, in Canada, there is no specific recommendation regarding the consumption of seaweed during pregnancy. Determining acceptability and consumption habits, as well as affiliated research on the safety of consuming seaweed during pregnancy, is needed to provide reliable guidelines.

# Physical Activity Assessment and Counseling in Adults with Down Syndrome

**Dr. Nicolas Oreskovic<sup>1,2</sup>**, Ms. Ayesha Harisinghani<sup>1</sup>, Ms. Amy Torres<sup>1</sup>

<sup>1</sup>Massachusetts General Hospital, Boston, USA, <sup>2</sup>Harvard Medical School, Boston, USA

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Background:** Individuals with Down syndrome have an increased risk for obesity compared to the general population, thought to be due to several factors including a decreased metabolism, unhealthy dietary habits, and low levels of physical activity. Numerous studies have consistently indicated that adults with Down syndrome are less physically active than the general population and do not meet physical activity recommendations. Despite the importance of counseling on physical activity, the degree to which health care providers assess and counsel adults with Down syndrome on physical activity is not known.

**Objective:** This study aims to determine whether physicians caring for individuals with Down syndrome assess and counsel on Down syndrome, and whether rates of counseling vary by medical specialty.

**Methods:** Electronic health records data were collected and reviewed on 148 adults with Down syndrome ages 18 years and older and seen at a Down syndrome clinic at Massachusetts General Hospital in Boston, USA during calendar year 2022.

**Results:** Physical activity assessment: All of the patients (148/148, 100%) followed by a Down syndrome specialist had documented physical activity assessment. Half of the patients (80/148, 54%) had physical activity assessment documented by their primary care physician. Physical activity counseling: All of the patients (148/148, 100%) subjects followed by a Down syndrome specialist had documented physical activity counseling. Less than half of the patients (64/148, 43%) had physical activity counseling documented by their primary care physician.

**Conclusion:** Wide variations in care exist in physical activity counseling by physicians treating adult patients with Down syndrome. Despite high levels of obesity and low levels of physical activity in adults with Down syndrome, primary care physicians do not routinely assess or counsel on the importance of physical activity in this high-risk population. Down syndrome specialists perform better than primary care providers in identifying and counseling on physical activity needs. Given the high prevalence of obesity in adults with Down syndrome, efforts should be made to ensure all physicians caring for adults with Down syndrome counsel on physical activity.

# Impact of Nature-Based Schoolyard Redesign on Children's Movement and Environmental Interactions During Recess

**Ms. Kylie Wilson**, Ms. Alexandra Justesen, Ms. Catherine Hudson, Dr. Jennifer Vanos, Dr. Allison Poulos  
<sup>1</sup>Arizona State University, Phoenix, USA

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Recess is a critical opportunity for children to accrue physical activity for physical and psychosocial health. Children's movement levels are influenced by the schoolyard environment, including the presence of equipment and organized activities; however, less is known about how natural components like shade and nature (e.g., trees, boulders) influence children's movement and environmental interactions. The purposes of this study were to identify how a nature-based schoolyard redesign (>\$350,000 of landscaping improvements) impacted children's movement and interactions with shade and nature during recess, and if these changes varied by gender.

**Methods:** Observations were conducted before and after a nature-based playground redesign during recess at one urban elementary school in Phoenix, Arizona (USA) in Spring 2021 and Spring 2022 using the System for Observing Play and Leisure Activity in Youth - Shade and Nature (SOPLAY-SN). Three one-way MANOVAs with post hoc Bonferroni comparisons were conducted to determine how changes impacted children's movement, and interactions with shade and nature in the overall playground, as well as within specific playground areas, and by gender.

**Results:** No overall changes in movement levels or shade interactions were observed over time; however, overall nature interactions increased. Specific to individual playground areas, sedentary behavior levels were reduced in the basketball courts and a field where large boulders were placed; interactions with shade increased in a grassy field where trees were planted; and interactions with nature increased in areas where large boulders were placed, a grassy field where trees were planted, and a grassy field where a bioswale with a water feature was installed. When examined by gender, the increase in nature interactions persisted for boys only.

**Conclusions:** Our results suggest that nature-based schoolyard renovations can impact children's movement levels, and interactions with shade and nature during recess. While more time may be needed to see the full impact of the intervention, particularly with trees that are still immature, the addition of sustainable natural features may offer a scalable way to create schoolyard environments conducive to thermal comfort and physical activity, which is particularly relevant for schools in warm climates.

# The modifying role of environmental characteristics on the effectiveness of the SLIMMER diabetes prevention lifestyle intervention

Dr. Annemien Haveman-Nies<sup>1,2</sup>, Ms. Tess Weis<sup>3</sup>, Dr. Joreintje Mackenbach<sup>3</sup>, Prof. Edith Feskens<sup>4</sup>, Ms. Josien ter Beek<sup>2</sup>, Dr. Geerke Duijzer<sup>2</sup>, **Dr. Nicole den Braver<sup>3</sup>**

<sup>1</sup>Chair group Consumption and Healthy Lifestyles, Wageningen University and Research, Wageningen, Netherlands, <sup>2</sup>GGD Noord- en Oost-Gelderland (Community Health Service), Warnsveld, Netherlands,

<sup>3</sup>Department of Epidemiology & Data Science, Amsterdam University Medical Centres, Amsterdam,

Netherlands, <sup>4</sup>Division of Human Nutrition and Health, Wageningen University and Research Wageningen, Wageningen, Netherlands

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Effectiveness of lifestyle interventions decreases over time and when they are translated from controlled to real-life settings. A supportive environment may be key in maintaining lifestyle changes in the long-term. The aim of this study was to explore whether the effectiveness of the combined lifestyle intervention SLIMMER (SLIM iMplementation Experience Region Noord- en Oost-Gelderland) in reducing fasting insulin and body weight on the long term (18 months) was modified by neighborhood food-, physical activity- and social environmental characteristics.

**Methods:** Adults aged 40-70 years, recruited between October 2011 and September 2012, were randomly assigned to the intervention arm (10-month dietary and physical activity program) and control arm (usual healthcare) and followed up for 18 months (n=240). Outcome measures for fasting insulin (pmol/L) and weight (kilograms) were collected at baseline and 18 months. Data on the food-, physical activity- and social environment were retrieved from Geoscience and Health Cohort Consortium (GECCO) and linked to participants' residential postal codes. To investigate effect modification by environmental characteristics, linear mixed models were performed, adjusted for clustering in neighborhoods, with interaction terms ( $p_{\text{interaction}} < 0.20$ ) and stratified analyses for neighborhood characteristics.

**Results:** The overall intervention effects were a decrease in body weight of -2.5kg (-3.6; -1.4) in the intervention and a decrease of -7.7 pmol/L (-14.5; -0.15) in fasting insulin as opposed to the control group. In stratified analyses, greater intervention effects were observed in the neighborhoods with supermarkets (-3.0 kg,  $p_{\text{interaction}}=0.08$ ), local food shops (-3.3 kg,  $p_{\text{interaction}}=0.13$ ), high density of green space in the neighborhood (-13.0 pmol/L,  $p_{\text{interaction}}=0.07$ ), high distance to recreational green space (-3.7 kg,  $p_{\text{interaction}}=0.15$ ), and lower neighborhood SES (-3.2 kg,  $p_{\text{interaction}}=0.17$ ). Intervention effects did not differ by presence of fast-food outlets and neighborhood walkability.

**Conclusion:** Maintaining a healthy lifestyle may be supported in neighborhoods with healthy attributes, such as supermarkets, local food shops and green space. However, neighborhoods with a lower SES and larger distance to recreational green space also seemed to support the maintenances of a healthy lifestyle. Further exploration is needed to assess which mechanisms underlie this support in maintaining a healthy lifestyle and diabetes prevention by healthy environments.



# Walking to work: the role of neighborhood walkability around the workplace

Ms. Tea Osménaj<sup>1</sup>, Ms. Thao Lam<sup>1, 2, 3</sup>, Mr. Alfred Wagtendonk<sup>1, 2</sup>, **Dr. Nicole den Braver<sup>1, 2, 3</sup>**

<sup>1</sup>Department of Epidemiology & Data Science, Amsterdam University Medical Centres, Amsterdam, Netherlands, <sup>2</sup>Upstream Team, Amsterdam, Netherlands, <sup>3</sup>Amsterdam Public Health Institute, Health Behaviours and Chronic Diseases, Amsterdam, Netherlands

Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Studies investigating walkability and transport outcomes typically focus on residential neighborhood walkability. However, walkability at destinations such as workplaces can play a key role in the decision to walk and can offer insights on worksite interventions to improve employee populations' health. Therefore, in this study we aimed to investigate the association between walkability around the workplace and commute walking of the Dutch population. Secondly, we aimed to investigate the association between combined workplace and residential neighborhood walkability and walking for commute to assess the relative importance of workplace walkability.

**Methods:** This cross-sectional study included 6,769 working-age adults that participated in the Dutch national travel survey (OVIN). Participant residential and work addresses were linked to a validated walkability index including population density, retail and service destination density, land use mix, green space, street connectivity, sidewalk density and public transport density. Commute walking was derived from the travel survey and dichotomized to any or no walking to work on the survey day (yes/no). In logistic regression models adjusted for demographic, travel and survey characteristics; we assessed the odds ratio (OR) for the association between higher workplace walkability and commute walking. Secondly, we assessed the association between combined workplace/residential walkability (high/high, high/low, low/high versus low/low) with commute walking. We tested for effect modification by age, sex, income and urbanization.

**Results:** We found significant effect modification by residential urbanization degree. For people living in rural areas, 10% increase in workplace walkability was associated with 49% higher odds of walking for commute in a fully adjusted model (OR:1.49, 95%CI:1.34-1.64,  $p_{\text{trend}} < 0.001$ ), compared to 19% in highly urban areas (OR:1.19, 95%CI:1.13-1.26,  $p_{\text{trend}} < 0.001$ ). With regard to combined workplace/residential walkability, strongest associations with commute walking were observed if both were high (OR: 3.15, 95%CI: 2.48;3.99). When either of the two was low, a high workplace walkability was slightly more strongly associated with odds of walking for commute than home walkability, though the confidence intervals overlapped (respective OR:2.81, 95%CI:2.18-3.62 and OR: 1.99, 95%CI:1.52-2.61).

**Conclusion:** Our study indicated the importance and complementary nature of walkable residence and workplace in contribution to physical activity of working individuals, through active commuting.

# Building a Methods Selector for Co-creation: A Health CASCADE study

**Mrs. Danielle Agnello<sup>1,2</sup>**, Prof. Sebastien Chastin<sup>1,2</sup>, Prof. Artur Steiner<sup>1</sup>

<sup>1</sup>Glasgow Caledonian University, Glasgow, United Kingdom, <sup>2</sup>Health CASCADE, Glasgow, United Kingdom

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** Currently, tools and guidelines exist that contain some methods for co-creation. However, these sources only include a small set of methods for a specific topic or target group. There is yet to be the creation of a comprehensive and user-friendly tool for selecting methods for a co-creation project, which includes specific characterization details and instructions on applying each method. This work aims to address that gap by conducting a comprehensive inventory of all types of methods used in co-creation, and by generating a classification system for the organization and selection of co-creation methods.

**Methods:** A novel methodology for conducting an inventory of methods was created to source methods used in co-creation. This methodology, called an adapted 'recursive search' strategy, was designed to group the 13,500 articles from the Health CASCADE open-source co-creation database by the method used. The methods sourced from the inventory were subsequently categorized by method type and sub-type. Additionally, a constant comparative method was applied to the set of methods to elicit the appropriate domains for a classification structure. The resulting domains were discussed with a group of experts and tested in co-creation projects conducted in Scotland.

**Results/findings:** The inventory resulted in the identification of 430 co-creation methods, grouped by type and sub-type. The constant comparative analysis, consultation, and field testing in Scotland identified seven domains appropriate for the classification of the co-creation methods: 1) mode of delivery; 2) needed resources; 3) level of participation; 4) type of method; 5) sub-type of method; 6) method aim; and 7) target group. The methods sourced in the inventory were populated into these domains. This resulted in the generation of a prototype tool called the Methods Selector for Co-creation.

**Conclusions:** The systematic inventory and the classification domains served as an evidence-based methodology for generating an accessible tool for the selection of methods for co-creation projects. This Methods Selector for Co-creation will be an open-source tool that is accessible online and will be further tested by the co-creators who use the tool, as well as by the Health CASCADE international training network.

# Are the 2019 Canada's Food Guide recommendations on healthy food choices consistent with the EAT-Lancet sustainable diet recommendations?

**Ms. Gabrielle Rochefort**<sup>1,2</sup>, Prof. Julie Robitaille<sup>1,2</sup>, Prof. Simone Lemieux<sup>1,2</sup>, Prof. Véronique Provencher<sup>1,2</sup>, Prof. Benoît Lamarche<sup>1,2</sup>

<sup>1</sup>Centre Nutrition, Santé et Société (NUTRISS), Institut sur la nutrition et les aliments fonctionnels (INAF), Université Laval, Québec, Canada, <sup>2</sup>École de nutrition, Faculté des sciences de l'agriculture et de l'alimentation, Université Laval, Québec, Canada

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** The 2019 Canada's Food Guide (2019-CFG) promotes the adoption of a healthy diet with an emphasis on plant-based foods. The aim of this study was to assess for the first time the alignment of the 2019-CFG recommendations on healthy food choices with the recommendations from the EAT-Lancet Commission for sustainable diets.

**Methods:** Analyses were conducted in a sample of 1147 French-speaking adults (50.2% female, mean age 42.8y) recruited between 2015 and 2017 in the cross-sectional PRÉDicateurs Individuels, Sociaux et Environnementaux (PRELISE) study in Canada. Dietary intakes were evaluated over a three-week period using a validated web-based 24hr dietary recall repeated on three unannounced occasions. The Healthy Eating Food Index (HEFI)-2019 was used to assess the alignment of dietary patterns to recommendations on healthy food choices in the 2019-CFG. The degree of adherence to the EAT-Lancet reference diet was assessed using the EAT-Lancet Dietary Index (EAT-I) developed by our research team. Mean HEFI-2019 and EAT-I scores in this population and among subgroups were estimated using the National Cancer Institute's population ratio method. The association between the HEFI-2019 and the EAT-I was examined using Pearson correlations.

**Results:** The estimated mean HEFI-2019 (/80) and the EAT-I (/80) scores in this population were 44.9 points (95%CI, 44.1 to 45.7) and 32.5 points (95% CI, 31.4 to 33.7), respectively. The mean EAT-I score was 6.3 points higher in women compared to men (95%CI, 4.3 to 8.4), 3.9 points higher in older (> 50 years) compared to younger (< 35 years) adults (95%CI, 1.2 to 6.6), 6.5 points higher in adults with a university degree compared to those with no degree, a high school diploma, or a trade diploma (95%CI, 3.4 to 9.6) and 7.4 points higher in non-smokers compared with smokers (95%CI, 4.6 to 10.0). The HEFI-2019 and EAT-I scores were strongly correlated ( $r = 0.57$ ,  $P < 0.001$ ).

**Conclusions:** Results suggest that the 2019-CFG recommendations on healthy food choices are fairly well aligned with the EAT-Lancet reference diet. This highlights the complementarity and compatibility of the 2019-CFG recommendations for sustainability and health promoting purposes.

# A Survey of Early Career Investigators' Experiences Applying for Funding from the National Institutes of Health in the USA

**Ms. Lauren von Klinggraeff<sup>1</sup>**, Dr. Christopher D. Pfledderer<sup>1</sup>, Dr. Alessandra Bandeira<sup>1</sup>, Dr. Sarah Burkart<sup>1</sup>, Dr. R. Glenn Weaver<sup>1</sup>, Dr. Bridget Armstrong<sup>1</sup>, Dr. Michael W. Beets<sup>1</sup>

<sup>1</sup>University of South Carolina, Columbia, USA

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** N. Other

**Background:** Securing competitive grant funding is critical to professional advancement for early-stage investigators (ESIs) in social and behavioral science. Collecting preliminary evidence of feasibility and/or potential for impact of behavioral interventions provides the foundation for future large-scale trials and can strengthen grant applications to successfully secure funding. This study explored the experiences of ESIs generating preliminary evidence and applying for competitive funding from the National Institutes of Health (NIH).

**Methods:** Early-stage investigators (who had completed their terminal degree in the past 10 years) involved in social/behavioral research were invited to participate in an online survey. ESIs were identified and then recruited through email using NIH award lists and professional association listservs. The survey contained questions about ESI's professional roles, the importance of funding for their careers, their ability to generate preliminary evidence for future grant proposals, and their experiences applying for funding. Data was analyzed descriptively.

**Results:** Between June and December of 2022, 383 ESIs completed the survey. Respondents were 70% female, 60% White non-Latinx, and the majority were postdoctoral researchers (45%) or Assistant Professors (33%). Across all ESIs, 81% (n=337) considered securing NIH funding important to their career goals and 89% (n=339) stated securing external funding was important for tenure and promotion in their department. Open-ended responses indicated ESIs perceive preliminary data as necessary to secure any NIH funding (e.g., K99, R21, R01) though 70% (n=272) believed it was difficult to receive funding from the NIH to conduct a preliminary study. ESIs reported being advised to gather preliminary data from mentors' projects (e.g., secondary data) or to secure internal and foundation funding to support preliminary studies. Regardless of grant type, there was broad consensus that persistence was key to securing funding.

**Conclusion:** Generating preliminary evidence to support grant applications is a key professional objective of ESIs in social/behavioral science. Though obtaining funding is thought to be necessary for career advancement, obtaining NIH funding (e.g., K99, R21, R01) seems to be dependent upon successfully securing incremental funding from other sources to generate preliminary data.

# Analyzing the structure of packaged food and non-alcoholic beverage manufacturing and grocery retailing sectors and markets in Canada: implications for food environment policy

**Ms. Alexa Gaucher-Holm<sup>1,2</sup>**, Dr. Benjamin Wood<sup>3,4</sup>, Associate Professor Gary Sacks<sup>3,4</sup>, Assistant Professor Lana Vanderlee<sup>1,2</sup>

<sup>1</sup>École de nutrition, Faculté des sciences de l'agriculture et de l'alimentation (FSAA), Université Laval, Québec, Canada, <sup>2</sup>Centre Nutrition, santé et société (NUTRISS), Institut sur la nutrition et les aliments fonctionnels (INAF), Québec, Canada, <sup>3</sup>Deakin University, Melbourne, Australia, <sup>4</sup>Global Centre for Preventive Health and Nutrition (GLOBE), Melbourne, Australia

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** National food and beverage market structure analyses can provide important insights into the power held by corporations to shape the characteristics of food environments. This study aimed to descriptively analyze the structure of Canadian packaged food and non-alcoholic beverage manufacturing and grocery retailing sectors and markets.

**Methods:** Market share data were obtained from Passport by Euromonitor International for the packaged food manufacturing sector (including 14 product markets), non-alcoholic beverage manufacturing sector (including 8 product markets), and grocery retailing sector (including 5 grocery retailing markets) as of 2020/21. Manufacturers and retailers with  $\geq 1\%$  market share in Canada were identified and characterized. Market concentration was measured for markets described above using the Herfindahl-Hirschman Index (HHI) (values  $>1800$  suggest high concentration) and the four-firm concentration ratio (CR4) (values  $>60$  suggest high concentration). Company ownership structure, including common shareholder ownership by three large global asset managers (i.e., The Vanguard Group Inc, Blackrock Institutional Trust Company, and State Street Global Advisors (US)), was assessed using data from Refinitiv Eikon.

**Results/findings:** Foreign multinational companies accounted for large components of the sampled market shares held by packaged food manufacturers (55%) and non-alcoholic beverage manufacturers (82%), compared to grocery retailers (24%). Market concentration varied across sectors and markets but was substantially greater within non-alcoholic beverage (median CR4=72; median HHI=1995) and grocery retailing (median CR4=84; median HHI=2405) sectors compared to the packaged food sector (median CR4=51; median HHI=932). Three major global asset managers owned shares in the majority of the publicly listed companies included in the analysis, many of which operate within the same sectors and markets: the Vanguard Group Inc owned at least 1% of shares in 95% of publicly listed companies, Blackrock Institutional Trust Company 71%, and State Street Global Advisors (US) 43%.

**Conclusions:** Within the Canadian food industry, substantial power is concentrated amongst relatively few large corporations. These corporations are in a position to strongly influence the characteristics of food environments and related population health and nutrition outcomes. The potential for increased government regulation of market structure (e.g., competition law) warrants further attention as part of a broad public health approach to improving population diets.

# Are students aware of their body mass and how does this affect their lifestyle behaviours?

**Miss Ellie Procter**<sup>1</sup>, Mr. Matthew Savage<sup>1</sup>, Dr. Philip Hennis<sup>1</sup>, Dr. Daniele Magistro<sup>1</sup>, Dr. Kirsty Hunter<sup>1</sup>, Dr. James Donaldson<sup>1</sup>, Dr. Ruth James<sup>1</sup>, Dr. Ryan Williams<sup>1</sup>

<sup>1</sup>SHAPE Research Group, Nottingham Trent University, Nottingham, United Kingdom

Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** J. Young Adults

**Purpose:** Increased body mass is common amongst university students, with almost two thirds gaining weight during their first year (Vadeboncoeur et al., 2015). Previously, this has been associated with poor lifestyle behaviours such as reduced physical activity and diet quality (Deforche et al., 2015). Accurate perception of body mass could influence health behaviours and can impact weight loss efforts in older adolescents (Yang et al., 2014). It is currently unknown whether university students accurately perceive their body mass and whether this is associated with health-related lifestyle behaviours and weight management. Therefore, the aims of this research were to determine if students are aware of their body mass and if this is associated with lifestyle behaviours (Study A), and to examine changes in anthropometric measures over 1 year at university (Study B).

**Methods:** Study A: 171 UK students completed an online survey including questions on body mass, moderate-vigorous physical activity (MVP), time spend sedentary, diet quality and sleep quality. These students then reported for objective body mass measurement. A paired samples t-test assessed differences between perceived and objective body mass and Spearman's rank correlation analysis explored associations between the difference in perceived and actual body mass and the behavioural survey data. Study B: An opportunistic sample of 26 UK students reported for anthropometric testing in October 2021 and again in October 2022. Paired samples t-tests assessed changes in body mass, waist circumference and waist: height ratio.

**Results:** Students underestimated their body mass ( $n=171$ ;  $0.7 \pm 2.8$  kg;  $p<.001$ ), but this had no correlation with any reported lifestyle behaviours ( $p \geq .223$ ). Student body mass increased over 1 year at university ( $n=26$ ;  $2.4 \pm 4.8$  kg;  $p=0.016$ ) as did waist circumference ( $2.0 \pm 4.4$  cm;  $p=.032$ ) and waist: height ratio ( $p=.026$ ).

**Conclusion:** Students significantly underestimated body mass, but this had no associations with lifestyle behaviours. Additionally, students gained body mass and waist circumference over an academic year, in line with previous literature. Education and weight management interventions are required to raise awareness of changes in lifestyle behaviours whilst studying at university and their impact on future health outcomes.



# The co-production of research: A recreation-focused community-based participatory research project in northern Canada

**Mrs. Lauren Ray<sup>1</sup>**, Dr. Tara-Leigh McHugh<sup>1</sup>, Dr. Tristan Hopper<sup>2</sup>

<sup>1</sup>University of Alberta, Edmonton, Canada, <sup>2</sup>University of Regina, Regina, Canada

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** There is a well documented need for participatory approaches in health promotion research. Over the past decade, there has been an increase in the number of published participatory studies. However, resources “detailing the co-production of research”, particularly in the broad field of health promotion, are lacking (Smith et al., 2022). Therefore, the purpose of this presentation is to provide a detailed description of the co-production of research from a recent community-based participatory research (CBPR) project. This CBPR project was focused on understanding how leisure and recreation can support women’s mental health during the COVID-19 pandemic in northern Canada.

**Methods:** Guided by the key principles of CBPR, this research came together through a partnership with Canadian Mental Health Association-Yukon. A Community Advisory Board was developed and guided all research processes, including the development of the research question, and processes of data generation and analysis. A particularly unique aspect of this research was the use of an in-depth participatory qualitative data analysis process that was informed by Jackson’s (2008) participatory group data analysis method.

**Findings:** Lessons learned from the co-production of this research project are represented by four themes: (a) step-by-step process, (b) sustained engagement, (c) equitable engagement, and (d) relationality and researcher responsibilities.

**Conclusion:** Through practical examples, our work highlights important considerations and advances the current understanding of the co-production process in health promotion (i.e., leisure and recreation) research. This presentation contributes to the health promotion literature by providing a detailed description of the co-production of research through a CBPR project in northern Canada.

**Keywords:** participatory research, participatory data analysis, qualitative research, mental health, recreation, women’s health

# Actual not perceived movement skill competence is associated with higher levels of physical activity and aerobic fitness in children with bronchiectasis unrelated to cystic fibrosis.

**Prof. Stewart Trost**<sup>1,2</sup>, Dr. Denise Brookes<sup>1</sup>, Ms. Taryn Jones<sup>2</sup>, Dr. Emmah Baque<sup>3</sup>, Dr. Kerry-Ann O'Grady<sup>2</sup>, Prof. Anne Chang<sup>4</sup>

<sup>1</sup>The University of Queensland, Brisbane, Australia, <sup>2</sup>Queensland University of Technology, Brisbane, Australia, <sup>3</sup>Griffith University, Brisbane, Australia, <sup>4</sup>Charles Darwin University, Darwin, Australia

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** Bronchiectasis (BE) unrelated to cystic fibrosis is a major contributor to respiratory morbidity and health care utilisation in children. Children with BE exhibit low levels of physical activity (PA) and developmental delays in movement skill proficiency are a major contributing factor (Joschtel et al. 2021). Perceptions of movement competence and health-related fitness are hypothesised to be important developmental mediators of the relationship between actual movement competence and habitual PA (Stodden 2008); however, this hypothesis has not been explored in children with BE. Therefore, we evaluated the inter-relationships between actual movement competence, perceived movement competence, device-measured PA, and aerobic fitness in children with BE.

**Methods:** Children with BE (N = 29, mean age =  $6.9 \pm 2.3$  y, 55% female) completed assessments of actual movement skill competence (TGMD-2), perceived movement skill competence (Pictorial Scale of Perceived Movement Skill Competence), moderate-to-vigorous PA (MVPA) (accelerometers), and aerobic fitness (modified shuttle test). Associations between variables were evaluated using Pearson correlations.

**Results:** Actual locomotor competence was positively associated with daily MVPA ( $r = 0.42$ ) and aerobic fitness ( $r = 0.77$ ), but inversely associated with perceived locomotor competence ( $r = -0.37$ ). Similarly, actual object control competence was positively associated with daily MVPA ( $r = 0.23$ ) and aerobic fitness ( $r = 0.49$ ), but inversely associated with perceived object control competence ( $r = -0.42$ ). Furthermore, perceived locomotor and object control competence were inversely associated with daily MVPA ( $r = -0.22$  to  $-0.40$ ) and aerobic fitness ( $r = -0.08$  to  $-0.29$ ). However, among older children ( $\geq 9$  y,  $n = 7$ ), perceived and actual movement skill competence were positively correlated ( $r = 0.33$  to  $0.50$ ); but only perceptions of locomotor competence were positively associated with daily MVPA ( $r = 0.40$ ) and aerobic fitness ( $r = 0.42$ ).

**Conclusions:** Actual movement skill competence rather than perceived competence is associated with higher levels of PA and fitness in children with BE. The observed inverse relationship between perceived and actual movement skill competence is consistent with the notion that young children demonstrate limited accuracy in perceiving their movement competence and report inflated levels of perceived competence relative to their actual competence.

# Physical activity and glucose intolerance in rural India- The TREND study

**Dr. Pradeepa Rajendra**<sup>1</sup>, Mrs. Lakshmi Natarajan<sup>1</sup>, Dr. Venkatesan Ulagamathesan<sup>1</sup>, Dr. Rakesh Hari<sup>1</sup>, Dr. Siddiqui Moneeza Kalhan<sup>2</sup>, Dr. Palmer Colin NA<sup>2</sup>, Dr. Mohan Viswanathan<sup>1</sup>, Dr. Anjana Ranjit Mohan<sup>1</sup>

<sup>1</sup>Madras Diabetes Research Foundation & Dr. Mohan's Diabetes Specialities Centre, Chennai, India, <sup>2</sup>School of Medicine, University of Dundee, Chennai, United Kingdom

Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** N. Other

**Purpose:** Diabetes has reached epidemic proportions in India, which may be due to the adoption of unhealthy lifestyle practices by individuals at risk of developing the disorder. Physical inactivity has been identified as one of the main risk factors for diabetes. This study aimed to assess the relationship between physical inactivity and glucose intolerance in a population-based study conducted in rural India.

**Methods:** The Telemedicine Project for screening Diabetes and its complications in rural Tamil Nadu (TREND) study is a door-to-door cross-sectional survey that screened 14,117/15091 individuals aged  $\geq 18$  years for diabetes/prediabetes between 2018-2021 in 30 villages of Chengalpattu/Kancheepuram districts of Tamil Nadu. In all subjects, venous oral glucose tolerance tests were done (except in self-reported diabetes). Individuals were categorized as having normal glucose tolerance (NGT), prediabetes or diabetes using WHO criteria. Physical activity was assessed using a validated questionnaire for use in India called the Madras Diabetes Research Foundation (MDRF) Physical Activity Questionnaire. Based on physical activity level (PAL), participants were categorized into inactive (PAL:1.4–1.69), moderately (PAL:1.7–1.99) and vigorously (PAL:2.0–2.4) active.

**Results/ findings:** More than half (53.1%) of the 14,117 participants were inactive, with the prevalence of inactivity being higher in women compared to men (62% vs. 41%;  $p < 0.001$ ). Moderate and vigorous activity was 27.8% and 19.0% respectively. The prevalence of diabetes and prediabetes was 14.5% ( $n=2047$ ) and 9.0% ( $n=1270$ ) respectively. Inactivity was higher among those with diabetes (60.8%), followed by prediabetes (53.8%) and NGT (51.6%) [ $p$  for trend  $< 0.001$ ], while vigorous activity was highest among those with NGT (20.2%), followed by prediabetes (16.5%) and diabetes (10.9%) [ $p$  for trend  $< 0.001$ ]. Individuals with diabetes spent more screen time (watching television) compared to those with prediabetes and NGT ( $3.1 \pm 2.0$  vs.  $2.8 \pm 1.9$  vs.  $2.7 \pm 1.8$  hours/day respectively,  $p < 0.001$ ). Regression analysis revealed that glucose intolerance was associated with inactivity even after adjusting for age, gender, BMI, family history of diabetes and systolic blood pressure (OR: 1.12, 95% CI: 1.1–1.3,  $p < 0.001$ ).

**Conclusions:** More than half the Asian Indian rural population was inactive. Inactivity was an independent risk factor for glucose intolerance.

# Social risk screening: Added benefits of screening for nutrition security along with food security

Dr. Eric Calloway<sup>1</sup>, Ms. Leah Carpenter<sup>1</sup>, Mr. Tony Gargano<sup>1</sup>, Dr. Amy Yaroch<sup>1</sup>

<sup>1</sup>Gretchen Swanson Center for Nutrition, Omaha, USA

Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** Nutrition Security is "...consistent and equitable access to healthy, safe, affordable foods essential to optimal health and well-being." There's growing momentum in the United States (U.S.) to assess nutrition security alongside food security, and increasingly healthcare organizations are screening for related social determinants of health. Until recently, there was not a validated nutrition security measure in the U.S. We aimed to explore the usefulness of adding a newly published and validated one-item nutrition security screener (NSS) to the commonly used two-item food security screener (i.e., "Hunger Vital Sign" (HVS)).

**Methods:** We asked low-income racially/ethnically diverse households (n=486) across five states in the United States to complete a survey (April-June 2021) that included the NSS, HVS, health and dietary variables, and sociodemographics. We used multivariate logistic regression to assess associations between screening status and dietary (i.e., low fruits and vegetables (LFV), low scratch-cooked meals (LSCM), high fast-food meals (HFFM), high processed meals (HPM)) and health outcomes (i.e., self-reported fair or poor general health (FPGH), self-reported diet-related chronic disease (CD)) to determine if adding the NSS to the HVS increased detection of groups at health risk. We examined screeners individually and grouped respondents using both screeners. Groups: 1) food and nutrition insecure, 2) food insecure/nutrition secure, 3) food secure/nutrition insecure, 4) food and nutrition secure.

**Results:** Screening positive (food insecure or nutrition insecure, respectively) for HVS or NSS, was similarly associated with significantly increased odds (OR range: 1.74 to 2.37) for FPGH, LSCM, and LFV. HVS positive screen was associated with HPM (OR=2.14, 95%CI=1.24-3.67) and NSS with HFFM (1.71, 1.12-2.61). Other associations were not significant. Group 1, compared to groups 2 and 3 showed higher effect sizes across outcomes. In adjusted analyses, group 1 (but not groups 2 and 3) was associated with increased odds for LFV (2.56, 1.49-4.37), FPGH (2.78, 1.54-5.02), and CD (2.13, 1.14-3.97) compared to group 4.

**Conclusions:** Individually, both screeners had similar associations; however, adding the NSS to the HVS allowed identifying the highest risk group (food and nutrition insecure). This information can help healthcare and other organizations efficiently intervene to support the highest need households.

# Healthy Liver/Hígado Sano: Pilot test of a lifestyle intervention for Hispanic patients with non-alcoholic fatty liver disease

**Dr. Natalia Heredia<sup>1</sup>**, Dr. Amelia Avery<sup>2</sup>, Dr. Jessica Hwang<sup>3</sup>, Dr. Maria Fernandez<sup>1</sup>, Dr. Cici Bauer<sup>1</sup>, Dr. Lorna McNeill<sup>3</sup>

<sup>1</sup>The University of Texas Health Science Center at Houston School of Public Health, Houston, USA, <sup>2</sup>Legacy Community Health, Houston, USA, <sup>3</sup> The University of Texas MD Anderson Cancer Center, Houston, USA

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose.** Non-alcoholic fatty liver disease (NAFLD) can lead to adverse health outcomes, including liver failure and liver cancer. Hispanic/Latinos (heretofore Hispanic) have the highest rates of NAFLD of any U.S. racial/ethnic subgroup. The most effective treatment for NAFLD is weight loss, through healthy dietary changes and increased physical activity. The purpose of this study was to pilot test a behavioral lifestyle intervention (*Healthy Liver/Hígado Sano*) for Hispanic patients with NAFLD to assess feasibility of recruitment, participant satisfaction and preliminary effectiveness on lifestyle-related variables.

**Methods.** We partnered with and received referrals of potential participants from a physician champion. Participants were contacted by study staff, assessed for eligibility, and consented. Measures included self-administered questionnaires assessing demographic, psychosocial and behavioral variables; staff-measured height and weight; 7-day use of a hip-worn accelerometer, and collection of Electronic Medical Record data at pre- and post-test. Individuals were randomized into intervention or a usual-care control group. The intervention, *Healthy Liver/Hígado Sano*, is adapted from the Diabetes Prevention Program and involves 16 weekly, group-delivered sessions.

**Results.** Of the 45 who were eligible, 33 consented and 28 individuals completed baseline and were randomized (15 to intervention and 13 to control). Among participants, 87% were female and 65% had household income <\$25,000/year. There was a 13% increase in those who said they had a good understanding of their condition (60% pre-test, 73% post-test) and a 27% increase in beliefs that healthy eating is very or extremely important for treating NAFLD (73% pre-test to 100% post-test). There was also an increase in self-efficacy; at post-test 73% indicated that were confident that they could do physical activity even if they didn't have time, compared to 53% pre-test. All intervention participants indicated that they were mostly or very satisfied with the program, and 90% indicated they would come back to the program again.

**Discussion.** We found preliminary evidence that recruitment was feasible (73% of eligible agreed to enroll) and that participants were satisfied with the intervention. We experienced difficulties with retention, mostly due to problems maintaining in contact with participants. Finalized results on the preliminary effects on lifestyle variables will be presented.

# A Systems Approach to Promote Physical activity among Youth – an introduction to the SAPPY study

**Dr. Anneke Vang Hjort<sup>1</sup>**, Ms. Sofie Rolff Carlsen<sup>1</sup>, Dr. Inger Katrine Dahl-Petersen<sup>1</sup>, Mrs. Lene Winther Ringgard<sup>1</sup>, Dr. Charlotte Demant Klinker<sup>1</sup>

<sup>1</sup>Steno Diabetes Center Copenhagen, Health Promotion Research, Herlev, Denmark

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** Participatory systems approaches to address public health “wicked” problems (such as physical inactivity among vulnerable youth) is a promising innovation in (complex) intervention research. The SAPPY study will during 2023-2026 test feasibility and evaluate outcomes and change mechanisms associated with a participatory systems approach to promote physical activity among youth aged 15-25 attending the Preparatory Basic Education and Training (PBET) school program in Denmark. PBET is an education targeting youth outside the education- or labor market and the students presents as a low socio-economic status group in high risk for developing noncommunicable diseases later in life. The overall aim with the SAPPY study is to develop an evidence-based model for future large-scale implementation. This study will present the content, outline and evaluation approach of the SAPPY study.

**Methods:** In SAPPY, we combine qualitative data and quantitative methods in a systems evaluation to study (1) individual- and system level drivers for PA across all PBET schools in Denmark (n≈8.000) as well as study (2) feasibility, (3) limited effectiveness, and (4) change mechanisms associated with a participatory systems approach across three PBET schools (n≈600). Finally, we synthesize data across 1-4 to describe an implementable and scalable systems model across all PBET schools.

**Results/findings:** The participatory systems approach intervention and the corresponding actions increase capacity and builds social networks between stakeholders. The local working groups, supervised by systems-approach-educated municipal employees, develop, and implements actions with the prospect of changing the system that drives physical (in)activity among PBET students. The system change is based on commitment and ownership of local actions, which increase the prospects of achieving sustainable change.

**Conclusion:** The SAPPY study will deliver evidence on the drivers of physical activity among a vulnerable youth population group and indicate if a participatory systems approach seems promising in altering the system that drives physical activity. Implementation and sustainability are cornerstones of the proposed study and the model is expected to be integrated into routine practice during the study period, and continue to support an increase in capacity among the participating partners and physical activity at population level among PBET students.



# Measuring sleep health in primary school-aged children: A systematic review of instruments and their content validity

Ms. Maj-Britt Inhulsen<sup>1,2</sup>, **Dr. Maartje van Stralen<sup>1</sup>**, Prof. Caroline Terwee<sup>3</sup>, Dr. Joanne Ujcic-Voortman<sup>2</sup>, Prof. Jaap Seidell<sup>1,2</sup>, Dr. Vincent Busch<sup>2</sup>

<sup>1</sup>Vrije Universiteit Amsterdam, Amsterdam, Netherlands, <sup>2</sup>Sarphati Amsterdam, Public Health Service Amsterdam, Amsterdam, Netherlands, <sup>3</sup>Amsterdam UMC, Vrije Universiteit Amsterdam, Amsterdam, Netherlands

Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** This review aimed to summarize instruments that measure one or more domains of sleep health (i.e. duration, quality, efficiency, timing, daytime sleepiness and sleep-related behaviors) in a general population of 4-12-year old children, and to assess these instruments' content validity. Other measurement properties were evaluated for instruments with indications of sufficient content validity.

**Methods:** A systematic literature search was performed in PubMed, PsycINFO, Web of Science, and EmBase. Methodological quality, content validity, and other measurement properties were assessed via the CONsensus-based Standards for the selection of health Measurement INstruments (COSMIN) methodology. Instruments with indications of sufficient content validity (i.e. relevance, comprehensiveness and comprehensibility) were further evaluated on other measurement properties (i.e. other aspects of validity, reliability, responsiveness). A modified GRADE approach was applied to determine the quality of evidence.

**Results:** Twenty instruments, containing 36 subscales, were included. None of the instruments measured all sleep health domains. For five (subscales of) instruments sufficient relevance and comprehensibility was found. The quality of evidence ranged from very low to moderate. For these five instruments all additional measurement properties were assessed. Sufficient results were found for structural validity (n = 1), internal consistency (n = 1), and construct validity (n = 1), with quality of evidence ranging from very low to high.

**Conclusions:** Several (subscales of) instruments measuring domains of child sleep health showed good promise, demonstrating sufficient relevance, comprehensibility, and some also sufficient results on other measurement properties. However, more high quality studies on instrument development and the evaluation of measurement properties are required. PROSPERO registration number: CRD42021224109.

# How do recently published Canadian front-of-pack labelling regulations compare with similar mandatory approaches in the Americas?

**Ms. Nadia Flexner<sup>1</sup>**, Dr. Christine Mulligan<sup>1</sup>, Ms. Jennifer Lee<sup>1</sup>, Dr. Mavra Ahmed<sup>1</sup>, Dr. Laura Vergeer<sup>1</sup>, Ms. Sarah Jeong<sup>1</sup>, Prof. Mary L'Abbe<sup>1</sup>

<sup>1</sup>University of Toronto, Toronto, Canada

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Mandatory front-of-pack (FOP) labelling, a cost-effective policy to promote healthy diets, has been implemented in several countries in the Region of the Americas. Recently, Health Canada (HC) published final regulations mandating that pre-packaged foods exceeding thresholds for sodium, sugars, and/or saturated fat display a 'high in' FOP symbol. This study aimed to compare the proportion of Canadian pre-packaged products that would display a 'high in' FOP symbol under HC's final regulations with two other nutrient profile models (NPMs) developed for FOP labelling implemented in the Region.

**Methods:** For this study, n=17,097 Canadian pre-packaged products were evaluated under three NPMs: HC NPM, the Chilean NPM, and the Pan American Health Organization (PAHO) NPM. The proportion of products meeting or exceeding each NPM's established thresholds for sodium, sugars, and/or saturated fat was calculated overall, and by nutrient. Cohen's Kappa ( $\kappa$ ) statistics was used to test the level of agreement between NPMs.

**Results:** Overall, 55.2% (n=9,442), 72.3% (n=12,361), and 78.0% (n=13,338) of products would be 'high in' at least one nutrient-of-concern under the HC, Chilean, and PAHO NPMs, respectively. Comparing by nutrient-of-concern, the HC, Chilean, and PAHO NPMs would identify, respectively, 28.9%, 39.8%, and 50% of products as 'high in' sodium; 24.4%, 29.8%, and 36.8% as 'high in' sugars; and 21.0%, 35.6%, and 33.4% as 'high in' saturated fats. Under all NPMs, most products would only be considered 'high in' one of three nutrients. The HC NPM had the highest proportion of products that would not display a 'high in' symbol (44.8% vs. 27.7% (Chile) and 22% (PAHO)). Fair agreement was found between the HC and Chilean NPMs ( $\kappa=0.30$ ) and between the HC and PAHO NPMs ( $\kappa=0.31$ ). While moderate agreement was found between PAHO and the Chilean NP model ( $\kappa=0.58$ ).

**Conclusions:** Results suggest that under all Regional NPMs, most Canadian pre-packaged products are 'high in' at least one nutrient-of-concern, with the Chilean and PAHO NPMs identifying more of such products than the HC NPM. This highlights the importance of implementing strict mandatory measures to alert consumers to the prevalence of pre-packaged products that are 'high in' nutrients-of-concern and to promote manufacture-driven reformulation.

# Eating Disorders In weight-related Therapy (EDIT)

## Collaboration: Rationale and study design

Dr. Natalie Lister<sup>1</sup>, Prof. Louise Baur<sup>1</sup>, Prof. Susan Paxton<sup>2</sup>, Associate Professor Sarah Garnett<sup>1</sup>, Prof. Amy Ahern<sup>3</sup>, Prof. Denise Wilfley<sup>4</sup>, Associate Professor Sarah Maguire<sup>1</sup>, Prof. Amanda Sainsbury<sup>5</sup>, Prof. Katharine Steinbeck<sup>1</sup>, Prof. Caroline Braet<sup>6</sup>, Prof. Andrew Hill<sup>7</sup>, Prof. Dasha Nicholls<sup>8</sup>, Dr. Rebecca Jones<sup>3</sup>, Ms. Genevieve Dammery<sup>1</sup>, Ms. Alicia Grunseit<sup>9</sup>, Ms. Kelly Cooper<sup>10</sup>, Mr. Theodore Kyle<sup>11</sup>, Ms. Faith Newsome<sup>12</sup>, Ms. Kylie Hunter<sup>1</sup>, Dr. Caitlin McMaster<sup>1</sup>, Dr. Brittany Johnson<sup>13</sup>, **Dr. Anna Lene Seidler<sup>1</sup>**, Dr. Hiba Jebeile<sup>1</sup>

<sup>1</sup>University of Sydney, Sydney, Australia, <sup>2</sup>La Trobe University, Melbourne, Australia, <sup>3</sup>University of Cambridge, Cambridge, United Kingdom, <sup>4</sup>Washington University in St. Louis, St. Louis, USA, <sup>5</sup>The University of Western Australia, Perth, Australia, <sup>6</sup>Ghent University, Ghent, Belgium, <sup>7</sup>University of Leeds, Leeds, United Kingdom, <sup>8</sup>Imperial College London, London, United Kingdom, <sup>9</sup>The Children's Hospital at Westmead, Sydney, Australia, <sup>10</sup>Weight Issues Network, Melbourne, Australia, <sup>11</sup>ConscienHealth, Pittsburgh, USA, <sup>12</sup>University of Florida, Gainesville, USA, <sup>13</sup>Flinders University, Adelaide, Australia

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** Systematic reviews demonstrate that, while for most participants medically supervised obesity treatment improves eating disorders risk scores, a subset of people who undergo obesity treatment have poor outcomes for eating disorders. The Eating Disorders In weight-related Therapy (EDIT) Collaboration aims to: (1) understand which participants are at risk of developing an eating disorder during medically supervised obesity treatment (specifically, behavioural weight management interventions); (2) understand which intervention components may contribute to eating disorder risk; (3) identify predictive pathways for increased or decreased eating disorder risk during weight management; and (4) develop resources and recommendations to reduce eating disorder development during obesity treatment.

**Methods:** The EDIT Collaboration brings together clinicians, researchers, and individuals with lived experience to improve treatment for people affected by obesity and eating disorders. Five related studies are planned. Study 1: Consultation. We will identify individual participant characteristics and intervention strategies which may contribute to an increase or decrease in eating disorder risk during weight management interventions, to be included in analysis. Studies 2 and 3: Individual participant data (IPD) meta-analyses. The gold standard for combining trial data and providing greater power for estimation of treatment effects of rarer outcomes and also enables reliable subgroup analyses. IPD will be used to identify individual predictors of eating disorder risk during weight management interventions. Study 4: Intervention deconstruction. We will code interventions into delivery features and intervention strategies using a project specific framework. Study 5: Predictive modelling. Data will be combined from Studies 2, 3 and 4 to identify any interactions between individual characteristics and intervention strategies which may increase or decrease risk of eating disorders during weight management.

**Results/ findings:** The EDIT Collaboration includes 52 studies (25 adolescent; 27 adult) as of December 2023 and will explore the complex risk factor interactions that precede changes to eating disorder risk following weight management interventions. The collaboration includes the integration of health consumers in project development and translation.

**Conclusion:** An important knowledge gain from this project is a comprehensive understanding of the impact of weight management interventions on eating disorder risk. Stakeholders interested in the collaboration should visit [www.editcollaboration.com](http://www.editcollaboration.com)

# Deconstructing complex interventions: piloting a framework of delivery features and intervention strategies for the Eating Disorders in weight-related Therapy (EDIT) Collaboration

Dr. Natalie Lister<sup>1</sup>, Dr. Hiba Jebeile<sup>1</sup>, Ms. Rabia Khalid<sup>1</sup>, Ms. Samantha Pryde<sup>2</sup>, **Dr. Brittany Johnson<sup>2</sup>**

<sup>1</sup>University of Sydney, Sydney, Australia, <sup>2</sup>Flinders University, Adelaide, Australia

Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** The Eating Disorders in weight-related Therapy (EDIT) Collaboration aims to identify increases or decreases in an individual's eating disorder risk during weight management interventions among adolescent and adult populations. Weight management interventions are complex and vary in the way they are delivered and the strategies they use to change behaviours. Hence, this study aims to establish a framework and protocol to identify the delivery features and intervention strategies of weight management interventions.

**Methods:** A framework was developed through literature searches and stakeholder consultation. Six studies were independently coded by two reviewers. A detailed guidebook was developed which included a descriptor for each unique code. Consensus included recording conflict resolutions and framework changes. Eighty delivery features were developed based on the Template for Intervention Description and Replication (TIDieR) checklist. We also summarised the number and range of different outcome assessment procedures, as these may unintentionally deliver important messages about the aim and intended outcome of the intervention in addition to the planned intervention content. Categories under each delivery feature item/cluster were developed for this project drawing on relevant examples from child obesity prevention and the Human Behaviour Change Project ontologies.

Intervention strategies is the broad term used to describe the behaviour change content of interventions grouped under key categories (i.e., highest level grouping) relevant to weight management interventions. Clusters (i.e., mid-level grouping) of intervention strategies were captured under the following categories: intervention intent, framing and outcomes, dietary strategies, eating behaviours / disorder eating, movement and sleep related strategies, and psychological health related strategies. There were 86 unique intervention strategies (i.e., lowest-level grouping) across these five clusters.

**Results/ findings:** More conflicts occurred for intervention strategies compared to delivery features; both required updating definitions. Average coding times were 78 minutes (SD: 48) for delivery features and 54 minutes (SD: 29) for intervention strategies.

**Conclusion:** This project provides a detailed mapping of intervention components used in weight management trials measuring effect on eating disorder risk. This framework has the potential to be transferred or adapted to examine other safety or effectiveness outcomes in adolescent and adult weight management trials.

# Momentary experiences in neighborhood public spaces

Ms. Yuwen Zhao, **Dr. Pauline van den Berg**, Dr. Ioulia Ossokina, Prof. Theo Arentze

<sup>1</sup>TU Eindhoven, Eindhoven, Netherlands

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** H. Policies and environments

A lack of physical activity is a growing challenge that impacts the health of individuals and communities. It contributes to obesity and several noncommunicable diseases, such as cardiovascular diseases, cancer, chronic respiratory diseases and diabetes. Many studies have shown that the built environment is a key factor that influences physical activity levels among local populations. Improving attractiveness of public space is often seen as a good strategy in creating healthy living environments, as attractive public space can stimulate residents to go outside and walk or cycle in the area, which contributes to their physical activity. However, knowledge about the way the built environment contributes to positive momentary experiences (emotions) of citizens is still limited, while this could give suggestions on how to implement physical environment interventions that support physical activity. Therefore, this study investigates momentary experiences in public spaces. We introduce a conceptual framework based on the Stimulus-Organism-Response (SOR) model and emotional appraisal theory. Effects of spatial and non-spatial (individual characteristics, the context of visit) variables on momentary experiences in and preferences for public spaces were investigated within this framework. A video-based stated choice experiment and an online questionnaire were used and data from 241 individuals in the Netherlands was collected. Bayesian structural equation modeling was used to analyze the data. As expected, we found that people prefer public spaces that evoke positive emotions (that make them feel relaxed, excited, safe, and comfortable). Spatial variables that positively affect momentary experiences are crowdedness (especially when it is dark), trees, grass surface, water and vertical greening. Spatial variables are found to affect individual's spatial choice both directly and indirectly through momentary experiences (emotions). Regarding non-spatial variables the results show that people who value health and pleasure more in their life experienced more positive emotions in the virtual environments. As positive emotions (momentary experiences) significantly contribute to users' public space choices, implementing these findings (e.g. adding green elements to public space) could contribute to creating attractive public space that can stimulate physical activity. Besides practical implications, this study provides a possible theoretical and methodological reference for further studies in this field.

# Description of 24-hour behavior patterns in Swedish adults: The SCAPIS study

Dr. Frida Bergman<sup>1</sup>, **Dr. Melony Fortuin-de Smidt<sup>1</sup>**, Dr. Pasan Hettiarachchi Hettiarachchi<sup>2</sup>, Dr. Daniel Arvidsson<sup>3</sup>, Prof. Mats Börjesson<sup>3,4,5</sup>, Dr. Elin Ekblom-Bak<sup>6</sup>, Prof. Örjan Ekblom<sup>6</sup>, Prof. Magnus Svartengren<sup>2</sup>, Associate Professor Patrik Wennberg<sup>1</sup>, Dr. Peter Johansson<sup>2</sup>

<sup>1</sup>Department of Public Health and Clinical Medicine, Umeå University, Umeå, Sweden, <sup>2</sup>Department of Medical Sciences, Occupational and Environmental Medicine, Uppsala University, Uppsala University Hospital, Uppsala, Sweden, <sup>3</sup>Center for Health and Performance, Department of Food and Nutrition, and Sport Science, Faculty of Education, Gothenburg University, Gothenburg, Sweden, <sup>4</sup>Center for Health and Performance, Department of Molecular and Clinical Medicine, Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden, <sup>5</sup>Sahlgrenska University Hospital, Department of Medicine, Geriatrics and Acute Medicine, Gothenburg, Sweden, <sup>6</sup>Department of Physical Activity and Health, The Swedish School of Sport and Health Sciences, Stockholm, Sweden

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

## **SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** To describe the 24-hour behavior patterns, including time spent in sleep, sedentary behavior (SB), and physical activity (PA) types by sex, body mass index (BMI) and educational levels among 50–64-year-old Swedish men and women.

**Methods:** The Swedish Cardio-Pulmonary bioImaging Study (SCAPIS) is an observational study that collected data at 6 centers in Sweden between 2014–2018. The participants were randomly selected from the general population using the Swedish population register. At 3 centers, Umeå (n=2500), Uppsala (n=5000) and Gothenburg (n=500), sleep, SB and PA data were measured with thigh-mounted accelerometers. Participants completed a questionnaire on age, sex, and education (basic education, high school/vocational education, university). Weight and height measurements were also done, and BMI (kg/m<sup>2</sup>) was calculated. An accelerometer was worn on the right thigh for 24 hours per day for 7 consecutive days. Sleep, SB and PA were determined from accelerometer data using ActiPASS, a custom-made software.

**Results:** The mean and median of each behavior (sleep, sitting, standing, walking, running, stair climbing, cycling and steps) will be calculated for the valid days of measurement and expressed as minutes or steps per day for the whole population. These behaviors will be compared between men and women (independent sample t-test or Mann Whitney U test for normally and non-normally distributed data, respectively) and between BMI groups (<25, 25–29, ≥30 kg/m<sup>2</sup>), and between educational groups by using a one-way ANOVA with Bonferroni *post hoc* test, for normally distributed variables or Kruskal Wallis test with Dunn *post hoc* test for non-normally distributed variables. In addition, 24-hr compositions of sleep, SB and PA will be presented visually as ternary plots.

**Conclusions:** A 24-hour perspective that includes sleep, SB and PA is a novel way to describe behavioral patterns in different groups compared to previous methods that evaluated these behaviors in isolation. Thigh-worn accelerometers also provide information on body posture e.g., sitting, standing as well as on activities such as cycling or running which may aid understanding of activity behaviors and may enhance compliance to physical activity recommendations.



# Monitoring the healthiness of food environments in supermarkets and out-of-home settings: assortment, price-promotions, in-store promotions and food marketing

Dr. Maartje Poelman<sup>1</sup>, **Mrs. Sanne Dijoosoepto**<sup>2</sup>, Assistant Professor Coosje Dijkstra<sup>3</sup>, Associate Professor Carlijn Kamphuis<sup>2</sup>, Ms. Charlotte Linnenbank<sup>4</sup>, Ms. Deborah Winkel<sup>4</sup>, Prof. Jaap Seidell<sup>3</sup>, Prof. Emely de Vet<sup>1</sup>  
<sup>1</sup>Wageningen University, Wageningen, Netherlands, <sup>2</sup>Utrecht University, Utrecht, Netherlands, <sup>3</sup>VU University Amsterdam, Amsterdam, Netherlands, <sup>4</sup>the Questionmark, Amsterdam, Netherlands

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Food environment transformations are urgently needed to improve population diets. In the Netherlands, national systems to monitor food consumption and population health are already in place, but systems to monitor the healthiness of food environments are lacking. This is important to provide insights in current performance of food outlets in supporting healthy food choices and to track performances over time. The aim of this study was to measure the healthiness of supermarket and out-of-home food environments, in particular the assortment, price promotions, in-store promotions, and food marketing (to children).

**Methods:** A quantitative design was used. Web-scraping techniques were used to collect data on food assortment (n=37,761 products) for 6 supermarket chains (total of 72% market value). All products were categorized by food group and whether they contribute to a healthy diet (yes/no). For an 8-week period, price-promotions were collected (n= 23,239 promotions) for 8 supermarket chains. To identify instore promotions (n=7,757 products) and instore food marketing to children (14 product categories, n=2,681 products) 40 supermarkets were visited (8 chains). Similar data was gathered for 21 out-of-home settings.

**Results:** Approximately 80% of food products in the assortment, as well as 80% of the products featuring in supermarkets' price- and in-store promotions were not supportive of a healthy diet. In addition, 73% of the check-outs offered snacks, but no healthy options. 97% of the food marketing to children was for products not supporting healthy diets. The top five most available food products in supermarkets were: non-alcoholic beverages, alcohol, sweets, biscuits, meat, and poultry (36% of the entire assortment). The five product groups with the highest share of products that align with the national dietary guidelines were: eggs, legumes, fish, fruit, and vegetables (13% of the entire assortment). Non-alcoholic drinks, sweets and confections, alcoholic beverages, dairy, and ready-to-eat meals were the most featured products in price-promotions. Even less supportive observations were found for out-of-home settings (these results will be presented).

**Conclusion:** Dutch food environments primarily consist of products and promotions that do not contribute to a healthy diet. Regular monitoring is needed to identify whether policies are effective to improve food environments.

# Barriers and enablers to healthier online grocery shopping by people with hypertension

**Mr. Damian Maganja (corresponding author)**<sup>1</sup>, Prof. Mark D Huffman<sup>1,2</sup>, Dr. Jason Hy Wu<sup>1</sup>, Dr. Kathy Trieu<sup>1</sup>

<sup>1</sup>The George Institute For Global Health, Sydney, Australia, <sup>2</sup>Washington University, St Louis, USA

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** Novel interventions are required to help people with hypertension meet dietary recommendations. The SaltSwitch Online Grocery Shopping trial is assessing an innovative intervention in online supermarkets that highlights sodium content of selected products and similar but lower-sodium alternatives. We investigated barriers and enablers to healthier purchasing behaviours as part of a process evaluation of the trial.

**Methods:** Participants were Australian adults with hypertension who are the primary household shoppers; those randomised to the intervention group (n=42 to date) were eligible for the process evaluation. Two experienced researchers conducted in-depth, semi-structured interviews to understand factors underpinning behaviours. We sought maximum variability sampling, stratifying by age, sex and frequency of shopping activity and use of the intervention. Interviews were audio-recorded and transcribed, with responses analysed using deductive and inductive content analysis using Nvivo. Barriers and enablers were organised using Story et al's multilevel framework of influences on dietary patterns.

**Results/findings:** This preliminary analysis is of 21 interviews conducted to date (mean duration 19.5 minutes, mean age 60.1 years, 71% female).

For some participants, health status was a pre-existing motivator to select healthier products (individual factor). Greater awareness of sodium content of groceries and health impacts of sodium (individual factor), stimulated by the intervention (physical environment), was reported to prompt healthier behaviours both within and outside the trial. Some participants noted the online setting helped minimise impulse purchases (physical environment).

Conversely, personal (individual factor) and family (social environment) taste/brand preferences were an important motivation for many, even amongst those aware of their health needs. Pricing/discounting was another key priority (macro-level environment). Incomplete product information online was mentioned as a barrier to identifying healthier options (physical environment).

**Conclusions:** Awareness of health conditions and risk factors may encourage healthier behaviours, though this may be overridden by personal/familial preferences and prices are of immediate concern to many. Multi-faceted interventions supporting healthier choices aligned with personal preferences, improving the financial accessibility of healthier options and increasing health and nutrition literacy may better help people with hypertension meet dietary guidelines. The online setting offers opportunities, including through innovative interventions such as ours, and challenges for healthy behaviours.

# Barriers and facilitators to General Practitioners' physical activity promotion behaviours when treating individuals with depression: a cross-sectional survey study

**Miss Jemima Cooper<sup>1</sup>**, Dr. Jeffrey Lambert<sup>1</sup>, Prof. Fiona Gillison<sup>1</sup>

<sup>1</sup>University of Bath, Bath, United Kingdom

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** Despite the evidence-based benefits of physical activity for depression, previous studies indicate the majority (72%) of General Practitioners (GPs) do not discuss physical activity (PA) with patients during consultations. Given how integral GPs are in the management of depression, the purpose of this study is to identify the barriers and facilitators experienced by GPs to better understand why they don't engage in PA promotion for depression.

**Methods:** A cross-sectional survey was administered online to a representative sample of GPs from 1,248 GP Practices throughout England across all seven NHS Integrated Care Board regions. The sampling frame was the National GP Profiles Database held by OHID. GPs and Academics were involved in the development of the survey, which was informed by the Theoretical Domains Framework (TDF). A pilot stage was used to test recruitment methods and survey acceptability with GPs. The final survey consists of thirty-two questions from a validated questionnaire to assess respondent characteristics and GPs' barriers and facilitators to PA promotion for depression. Data will be analysed using descriptive statistics, crosstabulations to investigate relationships between demographic variables and TDF domains, and analysis of variance (ANOVAs) to investigate the relative importance of barriers and facilitators GPs experience when promoting PA for depression.

**Results:** Recruitment is ongoing with a current response rate of 5%. Initial results indicate that almost half of GPs report often discussing and recommending PA as part of their routine practice for patients who consult with them about depression. However, when treating patients with depression, over 50% of GPs report discussing and recommending other types of treatment often takes priority over discussing and recommending PA. Full results will follow the analyses detailed above. Data collection will conclude by end of December 2022.

**Conclusions:** Despite depression being the most common mental disorder, this is the first national survey to assess the barriers and facilitators to GPs' promotion of PA as a treatment for depression as a primary outcome. Increasing our knowledge and understanding of GPs PA promotion behaviours may help to inform more targeted interventions for GPs working with this sub-population of mental illness.

# Using item response theory to assess and shorten the Cooking and Food Provisioning Action Scale (CAFPAS)

Mr. Simon Karlsson<sup>1</sup>, Dr. Kathryn L. Harris<sup>1</sup>, Dr. Jeanette Melin<sup>1</sup>, Assistant Professor Jacob Lahne<sup>2</sup>, Associate Professor Julia A. Wolfson<sup>3</sup>, **Dr. Elizabeth S. Collier<sup>1,4</sup>**

<sup>1</sup>RISE Research Institutes of Sweden, Gothenburg, Sweden, <sup>2</sup>Virginia Polytechnic Institute and State University, Blacksburg, USA, <sup>3</sup>John Hopkins University, Baltimore, USA, <sup>4</sup>Linköping University, Linköping, Sweden

Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** N. Other

**Background:** The Cooking and Food Provisioning Action Scale (CAFPAS) is a validated tool for measuring individuals' food agency, that is, their ability to make and meet food preparation and provisioning goals. It consists of 28 items which load on three subscales: Self-Efficacy, Attitude, and Structure. Evidence has shown that the CAFPAS is a valuable tool for assessing how food agency affects other food-related behaviors including healthy food consumption and from-scratch cooking frequency. However, this scale has not previously been assessed using item response theory (IRT), namely Rasch analysis, which can be used to identify if and which items may suffer irregularities due to misinterpretation, confusing phrasing, or do not discriminate between participants well. IRT can also be used to shorten scales, and in turn reduce cognitive load on participants in studies where several measures are employed.

**Purpose:** To assess the measurement properties of the CAFPAS using IRT and suggest a shortened version that minimizes data validity or reliability loss through a secondary analysis of data collected in two previously published studies utilizing the CAFPAS.

**Methods:** The following parameters of the three CAFPAS subscales based on a development sample (N=1853; 910 Swedish; 943 American) are evaluated: targeting, threshold ordering, item fit, unidimensionality, differential item functioning, local dependency, and person reliability. Exploratory factor analysis is also used on the Swedish data to assess the validity of the translation. Following iterative assessment of the measurement properties from different item combinations, a shortened version (11-item; CAFPAS-short) is drafted and tested using both the development sample and an additional validation sample (N=1457 Americans). Scores from the full CAFPAS and CAFPAS-short were also modelled with measures of cooking attitudes and behavior using Bayesian inference.

**Results and conclusions:** The full CAFPAS performs adequately according to Rasch analysis, although there is room for improvement. The Swedish translation of the CAFPAS has a similar underlying structure to the original English version and can be employed in studies where Swedish is the preferred language. The suggested CAFPAS-short performs similarly to the full version and may be suitable for use in studies involving several questionnaires to reduce overall survey length.

# Diabetes risk perception and metabolic profile in Asian women with a history of Gestational Diabetes Mellitus

**Dr. Seaw Jia Liew**<sup>1</sup>, Dr. Chun Siong Soon<sup>2</sup>, Mr. Yu Chung Chooi<sup>3</sup>, Dr. Mya Thway Tint<sup>1,3</sup>, Prof. Johan Gunnar Eriksson<sup>1, 3, 4, 5</sup>

<sup>1</sup>Human Potential Translational Research Program, Yong Loo Lin School of Medicine, National University of Singapore, Singapore, <sup>2</sup>Centre of Sleep and Cognition, Yong Loo Lin School of Medicine, National University of Singapore, Singapore, <sup>3</sup>Singapore Institute for Clinical Sciences, Agency for Science, Technology and Research (A\*STAR), Singapore, <sup>4</sup>Department of Obstetrics and Gynecology, Yong Loo Lin School of Medicine, National University of Singapore, Singapore, <sup>5</sup>Folkhälsan Research Center, Helsinki, Finland

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** M. Disease prevention and management

Type 2 Diabetes (T2D) risk is high in women with prior Gestational Diabetes Mellitus (GDM). However, T2D is preventable by lifestyle changes. Previously, interventions have primarily focused on diet and physical activity (PA). Less emphasis has been given to tackle other risk factors, i.e. sleep and stress. This study aims to explore: (1) T2D risk perception of post-GDM women, and (2) feasibility of reducing T2D risk through promoting a holistic lifestyle intervention.

We intend to recruit 60 healthy non-diabetic women with prior GDM from the multi-ethnic Singaporean community. We offer everyone self-monitoring opportunity (i.e. Oura Ring and Oura mobile App) that provide daily statistics (PA, total sleep time and sleep-time heart rate). Participants are randomized to either Group 1 (self-monitoring + personalized recommendation to reinforce holistic healthy behaviors targeting diet, PA, sleep and stress) or Group 2 (self-monitoring).

Risk perception is self-reported as low, moderate, high. Glycemic status is determined by a 2-hr 75 g oral glucose tolerance test (OGTT) and HbA<sub>1c</sub>. Metabolic parameters include body mass index (BMI), lipid profile, liver and kidney function tests. Dietary intake is evaluated based on food photos shared by participants, and healthy eating is defined by 'My Healthy Plate' as recommended by the Singapore Health Promotion Board. PA is evaluated based on step counts, time spent on various PA intensity and being inactive. Total sleep duration of at least 7 hours per day is considered satisfactory. Perceived stress is self-reported. Physiological stress is derived from sleep-time heart rate variability measured by the Oura Ring.

Preliminary findings: Of 31 enrolled women, 48% perceived T2D risk as high, 32% as moderate and 20% as low. Participants were predominantly Chinese (77%). Baseline characteristics (median, 1<sup>st</sup> – 3<sup>rd</sup> quartile) were: Age: 35 (32-37) years; Time since last diagnosis of GDM: 2.4 (1.8-4.1) years; BMI: 24.2 (20.0-26.5) kgm<sup>-2</sup>; HbA<sub>1c</sub>: 5.3 (5.2-5.5)%; Fasting and 2-hour plasma glucose: 4.8 (4.6-5.1) and 7.0 (5.8-7.7) mmol/L, respectively; Systolic and diastolic blood pressures: 113 (108-117) and 71 (66-79) mmHg, respectively.

This study will be completed in April 2023. Findings on risk perception, metabolic profile and lifestyle changes will be presented at the conference.

# Economic valuation of brief advice intervention as part of routine care: How much does it cost to reduce the prevalence of physical inactivity and to avert death from NCDs?

**Mr. Danusorn Potharin<sup>1</sup>**, Dr. Bundit Sornpaisarn<sup>2</sup>, Associate Professor Piyawat Katewongsa<sup>1</sup>

<sup>1</sup>Institute for Population and Social Research, Mahidol University, Nakhon Pathom, Thailand, <sup>2</sup>Centre for Addiction and Mental Health (CAMH), Ontario, Canada

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**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** Physical inactivity is a significant risk factor for a variety of noncommunicable diseases (NCDs) and the leading cause of premature death. The brief advice as part of routine care intervention (BA) for physical activity promotion has been implemented in Thailand to reduce physical inactivity across the country, but there is a lack of evaluation on this intervention. This study aims to evaluate BA implementation from the perspective of cost and effectiveness by health outcomes in Thailand during 2021–2030.

**Methods:** This study used the concept of health economics to analyze cost-effectiveness of BA and developed a model to increase the effectiveness of intervention. The data collection includes the costing, quantity assumption, and unit price of implementing BA on physical activity promotion on all levels of the Ministry of Public Health in Thailand. The data management includes exploration, model development, and verification. The OneHealth Tool program was used to analyze the cost of expanding the BA. The outcomes of analysis were showed in the form of cost-effectiveness ratio (CER) and the incremental cost-effectiveness ratio (ICER)

**Results:** The findings showed that physical activity promotion with BA may help to reduce the prevalence of physical inactivity among Thai population from 34.60% in 2021 to 23.44% by 2030 on the best model implementation of BA. Moreover, this intervention may help to reduce mortality of the Thai population. The intervention may prevent 1,469 (males) and 1,797 (females) deaths from cardiovascular disease; 1 death from diabetes (both sexes); 164 (males) and 231 (females) deaths from colorectal cancer; and 422 (females) deaths from breast cancer per year. The cost of implementing such measures is approximately 3,194 baht per person to meet sufficient physical activity.

**Conclusion:** The results informed that promoting physical activity through BA intervention in Thailand may contribute to reducing the prevalence of physical inactivity among Thai population and also reduce the mortality from cardiovascular disease, diabetes, colorectal and breast cancer.



# Visiting natural open spaces in urban areas during pregnancy and its association with physical activity engagement

Dr. Guillem Vich<sup>1</sup>, **Dr. Xavier Delclòs-Alió<sup>2</sup>**, Dr. Mikel Subiza-Pérez<sup>3</sup>, Dr. Asier Anabitarte<sup>3</sup>, Dr. Carolina Rueda<sup>4</sup>, Dr. Antoni Colom<sup>5</sup>, Prof. Carme Miralles-Guasch<sup>6</sup>, Dr. Aitana Lertxundi<sup>7</sup>, Dr. Jesús Ibarluzea<sup>8</sup>  
<sup>1</sup>ISGlobal, Barcelona, Spain, <sup>2</sup>Universitat Rovira i Virgili, Vila-seca, Spain, <sup>3</sup>IIS Biodonostia, San Sebastián, Spain, <sup>4</sup>Parc de Salut del Mar, Barcelona, Spain, <sup>5</sup>Fundació Institut d'Investigació Sanitària Illes Balears, Mallorca, Spain, <sup>6</sup>Universitat Autònoma de Barcelona, Cerdanyola del Vallès, Spain, <sup>7</sup>Universidad del País Vasco/Euskal Herriko Unibertsitatea, San Sebastián, Spain, <sup>8</sup>Health Department of the Basque Country, San Sebastián, Spain

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**SIG - Primary Choice:** N. Other

**Purpose:** We aim to 1) examine the relationship between visits to natural open spaces (NOS) in urban areas and physical activity (PA) engagement during pregnancy, 2) test whether this hypothesized association varies based on women's sociodemographic characteristics and residential environment, and 3) to examine if such association varies between the first and second trimesters of pregnancy.

**Methods:** A total of 731 women (416 from Donostia and 315 from Barcelona, Spain) were asked to wear an accelerometer and a GPS device for several days during the 1<sup>st</sup> trimester (T1) and the 2<sup>nd</sup> trimester (T2) of their pregnancy. The final sample for T1 consisted of 426 women who wore the devices correctly for at least one day. 131 women had valid participation days in both T1 and T2. Visits to NOS were defined as spending at least 5 consecutive minutes in NOS identified from the Urban Atlas of 2018. We first examine the association between NOS visits and daily PA in T1 accounting for sociodemographic and residential characteristics by means of multilevel modelling. Then, we focus on the subset of participants with valid data on both trimesters to explore this association longitudinally.

**Results:** Preliminary results show a mean of 0.48 and 1.75 daily visits to NOS among participants in Barcelona and Donostia in T1, respectively. We observed a significant bivariate association between visits to NOS and daily PA, especially in terms of moderate-to-vigorous PA (increasing median MVPA from 39 to 48 minutes,  $p=0.000$  from ANOVA test). We initially observed that both visits to NOS and PA levels increase in T2, strengthening the association between visits to NOS and PA.

**Conclusions:** Our preliminary results suggest that an association between visiting natural open spaces and physical activity during pregnancy exists in both the first and the second trimester. This finding highlights the need to promote access to such spaces in dense urban areas as a facilitator of healthy and active lifestyles throughout pregnancy. Further steps in this analysis will focus on the factors influencing the association between NOS visits and PA across trimesters, as well as to examine the characteristics of such visits.

# Exploring the associations of physical activity, sedentary behavior and sleep with food cravings and weight as a moderator

**Miss Flore De Vylder<sup>1</sup>**, Dr. Lieze Mertens<sup>1,2</sup>, Dr. Delfien Van Dyck<sup>1</sup>, Dr. Greet Cardon<sup>1</sup>, Dr. Lien Goossens<sup>3</sup>  
<sup>1</sup>Department of Movement and Sport Sciences, Faculty of Medicine and Health Sciences, Ghent University, Ghent, Belgium, <sup>2</sup>Department of Public Health and Primary Care, Faculty of Medicine and Health Sciences, Ghent University, Ghent, Belgium, <sup>3</sup>Department of Developmental, Personality and Social Psychology, Faculty of Psychology and Educational Sciences, Ghent University, Ghent, Belgium

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** Food cravings are a key motive for food intake and are regularly experienced by the majority of the population, predominantly by women. They are defined as "an intense desire or urge to consume specific foods". Studies have linked food cravings with failed diet attempts, increased food intake and possible weight gain over time underlining the importance of research on the determinants of food cravings in our obesogenic society. This pilot study aims to determine if sleep, sedentary behavior and physical activity are related to food cravings, and examines weight status as a potential moderating factor.

**Methods:** For this exploratory study, data was collected in a sample of 53 healthy Belgian adults, aged 18 to 64 years. Based on BMI, participants were divided into three subgroups 'normal weight' (n=30), 'overweight' (n=12) and 'obese' (n=11). The Food Cravings Questionnaire-Trait-reduced was used to assess the frequency and intensity of food cravings. Physical activity, sedentary behavior and sleep quantity was measured for 7 days using the Axivity AX3 accelerometer. Open Movement (OM Gui) software was used for the analysis of accelerometer data. Sleep quality was measured using the Pittsburgh Sleep Quality Index (PSQI).

**Findings:** For this abstract we will focus on the descriptives only, since data analysis is still ongoing. Complete results will be presented at the conference. Of the total sample 50.9% was defined as 'high cravers'. This percentage was higher in adults with obesity (63.5%). Light physical activity was higher in the adults with overweight and obesity, although big differences were observed between participants with a range from 36-171 min/day. Very divergent results were also found for moderate to vigorous physical activity (range: 39-343 min/day), sedentary behavior (range: 451-909 min/day) and sleep quantity (range: 287-672 min/day). Participants with overweight and obesity had more severe difficulties regarding sleep quality than the adults with a normal weight.

**Conclusion:** The results of this pilot study will offer more insight into sleep, sedentary behavior and physical activity as determinants of food cravings. They can support future research aiming to develop interventions that lead to effective behavior change in high cravers in different weight categories.

# Developing a framework for engagement in NewTools, a research project with partners across the Norwegian food system

**Ms. Anne Lene Løvhaug**<sup>1</sup>, Prof. Lisa Garnweidner-Holme<sup>1</sup>, Dr. Marianne Hope Abel<sup>2</sup>, Dr. Arnfinn Helleve<sup>2</sup>, Ms. Kaja Lund-Iversen<sup>2</sup>, Dr. Helle Margrete Meltzer<sup>2</sup>, Dr. Hanne Fjerdingby-Olsen<sup>3</sup>, Dr. Helen Engelstad Kvalem<sup>4</sup>, Dr. Laura Terragni<sup>1</sup>

<sup>1</sup>OsloMet – Oslo Metropolitan University, Oslo, Norway, <sup>2</sup>Norwegian Institute of Public Health, Oslo, Norway,

<sup>3</sup>Norwegian University of Life Sciences, Ås, Norway, <sup>4</sup>Norwegian Scientific Committee for Food and Environment, Oslo, Norway

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Many cross-sectional research partnerships are currently established to address food systems challenges and promote healthier, environmentally friendly diets. These partnerships involve stakeholders having different mandates and values and conflicts of interest (COI) may impair processes and outcomes. Frameworks stating principles and rules for engagement can facilitate cooperation and prevent COI. However, very few examples exist on how research partnerships develop such frameworks and what these look like. We address this gap by describing the development and key content of a framework for engagement in NewTools, a Norwegian cross-sectional research partnership aiming at more sustainable food production and consumption through developing and testing two food profiling systems: one for nutritional quality and one for environmental and social sustainability.

**Methods:** A group of researchers and project coordinators in NewTools developed the framework using a process consisting of a purposeful selection of existing frameworks for engagement and internal project documents; discussions within the research group, and consultations within the NewTools consortium.

**Results:** *Development:* WHO's Framework for Engagement with Non-State Actors and NewTools' governing documents were selected to inform the initial stages of the process. The research group discussed e.g., engagement needs, balancing transparency towards workload, and how to identify and manage COIs. The NewTools consortium was consulted twice which led to minor adjustments.

*Framework:* The finalized framework is a practical guidance which complements the projects' legal documents, in an accessible language. Its key content is: 1) Overarching principles [e.g., transparency, regular information, adhering to defined roles and responsibilities] 2) Descriptions of roles and responsibilities [e.g., all partners have the right to being involved and heard, researchers make final decisions] 3) Procedures to ensure involvement and transparency in meetings, written input, seminars, sharing of data and other engagement forms and 4) Descriptions of conflict areas and conflict mediation. The framework may be revised during the project period.

**Conclusions:** This study provides an example on how research partnerships aiming to promote healthier and more sustainable diets can develop frameworks to facilitate engagement and help prevent COI. This may inform and support cross-sectional work contributing to meeting the Sustainable Development Goals.

# Identification of children and adolescents at high risk of obesity: Development and external validation of a prediction risk score

Dr. Christoph Buck<sup>1</sup>, Dr. Rajini Nagrani<sup>1</sup>, Dr. Tanja Vrijkotte<sup>2</sup>, Dr. Anton Schreuder<sup>2</sup>, Dr. Fabio Lauria<sup>3</sup>, Prof. Luis Moreno<sup>4,5</sup>, Prof. Stefaan De Henauw<sup>6</sup>, Prof. Lauren Lissner<sup>7</sup>, Prof. Toomas Veidebaum<sup>8</sup>, Dr. Dénes Molnár<sup>9</sup>, Dr. Charalambos Hadjigeorgiou<sup>10</sup>, Prof. Wolfgang Ahrens<sup>1,11</sup>, Dr. Claudia Böhrhorst<sup>1</sup>, Prof. Iris Pigeot<sup>1,11</sup>, Mrs. - on behalf of the GrowH! consortium

<sup>1</sup>Leibniz Institute for Prevention Research and Epidemiology - BIPS, Bremen, Germany, <sup>2</sup>Department of Public and Occupational Health, Amsterdam Public Health Research Institute, Amsterdam UMC, University of Amsterdam, Amsterdam, Netherlands, <sup>3</sup>Institute of Food Sciences, National Research Council, Avellino, Italy, <sup>4</sup>GENUD (Growth, Exercise, Nutrition and Development) Research Group, University of Zaragoza, Instituto Agroalimentario de Aragón (IA2), Instituto de Investigación Sanitaria de Aragón (IIS Aragón), Zaragoza, Spain, <sup>5</sup>Centro de Investigación Biomédica en Red de Fisiopatología de la Obesidad y Nutrición (CIBEROBN), Instituto de Salud Carlos III, Madrid, Spain, <sup>6</sup>Department of Public Health and Primary Care, Faculty of Medicine and Health Sciences, Ghent University, Ghent, Belgium, <sup>7</sup>School of Public Health and Community Medicine, Institute of Medicine, Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden, <sup>8</sup>Department of Chronic Diseases, National Institute for Health Development, Tallinn, Estonia, <sup>9</sup>Department of Pediatrics, Medical School, University of Pécs, Pécs, Hungary, <sup>10</sup>Research and Education Institute of Child Health, Strovolos, Cyprus, <sup>11</sup>Department of Mathematics and Computer Science, University of Bremen, Bremen, Germany

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**SIG - Primary Choice:** N. Other

**Background:** Early life is critical in the development of obesity and a huge range of childhood risk factors has been found to affect adult obesity risk. Machine learning methods have become widely used to handle a large number of risk factors and their interrelation for future risk prediction. Within the JPI GrowH! project, we used data from the IDEFICS/I.Family cohort to identify key overweight/obesity (OW/OB) factors to develop a risk score that enables the identification of individuals early in life with high risk for future OW/OB. External validation was conducted using data of the ABCD cohort.

**Methods:** We considered data of N = 5,601 children aged 2- to <12-years without OW/OB at baseline providing information on 85 risk factors and follow-up weight status four to six years later. We used random forest regression models to select behavioural and early life factors for the development of risk score models by age strata (2- to <6-year-olds, >6- to <12-year-olds) based on variable importance. Risk score models were calculated based on the selected set of variables using logistic regression models per age stratum. Accuracy, sensitivity and specificity of predicting OW/OB four to six years later were calculated for model evaluation, internal validation using a holdout sample, and external validation.

**Results:** Besides commonly known risk factors such as parental education, baseline BMI z-score, BMI of mother and father, age, and sex, we selected 11 behavioural and early life factors in each age group for risk score development. Internal validation of risk score models to identify children who become OW/OB in four to six years showed high accuracy (>70%), good sensitivity (73% and 78%) and satisfactory specificity (74% and 73%) in both age groups. External validation showed higher sensitivity (82% to 97%), but specificity was very low (19% to 53%), particularly for predicting OW/OB in adolescence.

**Conclusion:** The developed risk scores enable the identification of children potentially developing OW/OB in future allowing targeted prevention. Predictions for older children were less accurate highlighting the focus of risk scores based on early life factors for pre-school children. External validation revealed that generalisability of risk scores is limited.

# The geographic context of physical activities – How to overcome the challenges in capturing the environmental exposure?

**Dr. Tiina Rinne<sup>1</sup>**

<sup>1</sup>Aalto University, Espoo, Finland

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** H. Policies and environments

The value of multilevel research and intervention approaches in health promotion is well recognized. The social ecological approach suggests that the spatial context among other factors influence physical activity behavior. Ample research documents that physical environment factors such as mixed land use, street connectivity, accessibility, density, quality of the traffic environment, nature, and green spaces are associated with various types of physical activity behavior. Yet, to date many inconsistent associations remain, which might be explained by conceptual and methodological challenges in measuring the spatial dimensions of physical activity.

It has been suggested that research applying the principles of the social ecological models could benefit from a profound theoretical and methodological scrutiny to create more comprehensive multilevel study and intervention settings. Furthermore, research that is interested in the environmental effects on human health behavior has been urged to move beyond notions of contextual influences that rely solely to fixed locations such as residential areas, administrative boundaries or static buffered areas defined around individuals' homes.

Geospatial passive and active sensing systems enable diverse opportunities for research interested in environmental effects on physical activity. Here, passive sensing is generally associated with fast wireless communication, cyber infrastructure and the IoT and the collection of real-time geospatially referenced information without any active forms of stakeholder engagement (e.g., mobile phone data) whereas active sensing technologies draw on voluntary contributions of people to collect geospatial data (e.g., participatory mapping methods). This presentation focuses on geospatial active and passive sensing methods and their usability in capturing the environmental context of physical activities. Furthermore, this presentation explores what is known from the literature about the conceptual and methodological aspects of capturing the spatial context in physical activity research. Finally, the presentation will discuss how to close the methodological gap in capturing the geographical context that exists within the wide spectrum of health-place research.

# Physical behaviors during work and leisure time in different occupational groups - a descriptive study.

**Dr. Frida Bergman**<sup>1</sup>, Dr. Melony Fortuin-de Smidt<sup>1</sup>, Dr. Pasan Hettiarachchi<sup>2,3</sup>, Dr. Peter Johansson<sup>2,3</sup>, Dr. Viktoria Wahlström<sup>1</sup>, Dr. Andreas Hult<sup>1</sup>, Prof. Lisbeth Slunga Järvholm<sup>1</sup>, Prof. Magnus Svartengren<sup>2,3</sup>, Associate Professor Patrik Wennberg<sup>1</sup>

<sup>1</sup>Umeå University, Umeå, Sweden, <sup>2</sup>Uppsala University, Uppsala, Sweden, <sup>3</sup>Uppsala University Hospital, Uppsala, Sweden

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**SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose** The aim of this study is to investigate the differences in device-measured physical behaviors during work and leisure time between different occupational groups.

**Methods** This study is based on data collected in the Umeå cohort (n = 2 500) of the Swedish CARDioPulmonary biolmage Study (SCAPIS). In SCAPIS, a random selection of men and women aged between 50-64 years from the general population were invited for an extensive health examination. In Umeå, measurements with thigh accelerometers were performed for 24 hours a day for 7 consecutive days to measure physical behaviors, including lying, sitting, standing, walking, running, stair walking and cycling, as well as sleep. In addition, the participants also recorded their work hours in a diary. Physical behaviors during work and leisure time will be analyzed based on the self-reported work hours. The thigh accelerometer data will be processed using the ActiPASS software. Occupational belonging, reported in the SCAPIS questionnaire, will be coded to occupational groups according to the Nordic Classification of Occupations.

**Results/findings** Mean and median values of time spent in physical behaviors will be calculated for the valid days of measurement. Differences between different occupational groups in time spent in physical behaviors during work hours and during leisure time will be presented. A one-way ANOVA with Bonferroni *post hoc* test will be used for normally distributed variables, and a Kruskal-Wallis test with Dunn *post hoc* test will be used for non-normally distributed variables.

**Conclusion** Large epidemiological studies investigating device-measured physical behaviors at work and leisure time in different occupational groups are still scarce. More knowledge about this would aid in the development of primary prevention efforts and interventions. This study will lay the groundwork for our future analyses investigating health effects of physical behaviors in the different domains of work and leisure.



# Measuring children's active travel - validity and reliability of participatory mapping method against accelerometry

**Dr. Tiina Rinne<sup>1</sup>**, Dr. Samad Esmaeilzadeh<sup>2</sup>, Dr. Päivi Berg<sup>2</sup>, Ms. Pirjo Hakala<sup>2</sup>, Dr. Arto J. Pesola<sup>2</sup>

<sup>1</sup>Aalto University, Espoo, Finland, <sup>2</sup>XAMK South-Eastern Finland University of Applied Sciences, Mikkeli, Finland

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

Active travel is a frequent, practical, and easily accessible source of physical activity for children. Studies have shown that children who walk their school trips are likely to engage in more overall physical activity and seem to meet the global physical activity guidelines compared to children who travel by motorized transportation. Examining children's active travel and related associations with health outcomes requires valid, accurate and reliable measures of their active travel habits. Accelerometry has gained ground as a present-day go-to device-based method for assessing physical activity. Besides accelerometers, self-report travel, and time use diaries and physical activity questionnaires are popular methods to estimate active travel and physical activity. These methods are generally accepted as valid, convenient, and affordable. However, the self-report retrospective physical activity questionnaires are often thought being less accurate in estimating physical activity and compared to device-based methods, they are reported being subject to recall bias and measurement errors. Despite their popularity and the multiple advantages both these methods have, there is one important element accelerometers and self-reported questionnaires lack. That is their inability to capture the environmental exposure of physical activities. Given that a vast amount of research confirms that multiple factors of the everyday environments are strongly associated with children's active travel, the questions about the environmental exposure and the spatial effect on active travel should be carefully considered. Public Participatory GIS (PPGIS) is an example of advanced spatially sensitive web-based participatory mapping method that allows for the collection of localized experiential and behavioral knowledge from large population samples that can be analyzed together with the register-based GIS data. PPGIS method enables the identification of people's space-time trajectories and the frequency and duration of exposures during active travel. However, there exists no previous research that would have analyzed the reliability and the validity of PPGIS in capturing active travel. This paper investigates the test-retest reliability and internal consistency of PPGIS-measured active travel, and validity of PPGIS measured active travel against device-measured active travel among Finnish 10 to 12 years old children and discusses the pros and cons of using PPGIS methods in capturing active travel.

# Are psychosocial factors associated with the risk of running related injuries?

**Mr. Michal Sebera<sup>1</sup>**, Prof. Steriani Elavsky<sup>1</sup>, Mr. Jiří Skýpala<sup>1</sup>

<sup>1</sup>University of Ostrava, Ostrava, Czech Republic

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** N. Other

**Introduction and Purpose** Running is one of the most popular physical activities among people who try to engage in physical activity to keep themselves healthy. Although the health benefits of running are significant, there is also a significant risk of injury. Training and biomechanical risk factors for running related injuries are widely described in the literature, whereas there are not many studies on psychosocial factors in runners. Therefore, the aim of this study was to assess whether psychosocial factors can be linked to running-related injuries reported prospectively in recreational runners.

**Methods and analysis** The design of the study was a 1-year prospective study with 108 participants (age  $36,3 \pm 8,4$  years; height  $1,70 \pm 0,1$  m; weight  $71,5 \pm 13,2$  kg). Running behavior was measured by Polar M400 HR GPS watches across 21 days (the first of three data collection bursts throughout the year-long study). The primary outcome was running-related injuries reported in 1year follow-up. The primary exposure variables were running-related characteristics (volume, duration, speed, pace) and psychosocial factors (sleep quality, physical and mental health, self-determination, motivation, stress, depression) assessed upon entry into the study.

Linear regression models were used to assess whether psychosocial factors predicted prospectively reported injuries after accounting for effects of running-related characteristics.

**Results and Conclusion** Of the psychosocial factors examined, only sleep quality was associated with injury. However, a limitation was the low number of injured runners, so further studies with larger sample sizes are needed.

# Comparing Canada's 2018 proposed and 2022 final Front-of-Pack labelling regulations using a generic food composition database and nationally representative dietary intake survey data

**Dr. Mary L'Abbe**<sup>1</sup>, Ms. Jennifer Lee<sup>1</sup>, Dr. Christine Mulligan<sup>1</sup>, Dr. Mavra Ahmed<sup>1</sup>, Ms. Nadia Flexner<sup>1</sup>

<sup>1</sup>University of Toronto, Toronto, Canada

Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** In July 2022, Canada published its final Front-of-Pack (FOP) labelling regulations, mandating pre-packaged foods meeting and/or exceeding thresholds for nutrients-of-concern (i.e., saturated fat, sugars, sodium) display a 'high-in' FOP symbol, which differed from the proposed regulations introduced in 2018. This study compared the proposed and final FOP labelling regulations by examining the difference in the prevalence of foods requiring a FOP symbol and nutrient intakes from foods that would display a FOP symbol.

**Methods:** Using a generic food composition database (Canada Nutrient File), all foods were categorized according to proposed and final FOP labelling regulations: exempted from regulations, not display a FOP symbol as all nutrient levels are below thresholds, or would display a FOP symbol. Differences in the proportion of each category, according to the proposed and final regulations were compared. Using nationally representative dietary survey data (Canadian Community Health Survey 2015), intakes of energy and nutrients-of-concern from foods that would display a FOP symbol according to the proposed and final FOP labelling regulations were compared.

**Results/findings:** Compared to the proposed FOP labelling regulations, less foods would display a FOP symbol (49% vs. 43%) according to the final regulations, while more foods would be exempted (21% vs. 28%). Less foods would display a FOP symbol was observed for sodium (30% vs. 27%) and saturated fat (21% vs. 18%), but not sugars (14% vs. 13%). Similarly, energy intakes of Canadian adults from foods that would be exempted from final FOP labelling regulations increased (32% vs. 24%) compared to the proposed regulations, while intakes from foods that would display a FOP symbol decreased (49% vs. 43%). Intakes were lower from foods that would display FOP symbols for saturated fat (37% vs. 16%) and sodium (36% vs. 30%), but not sugars (27% vs. 25%).

**Conclusions:** Our findings show that an increase in the proportion of foods that would be exempted due to changes to the final FOP labelling regulations could negatively impact energy and/or nutrient-of-concern intakes by Canadian adults. FOP labelling regulations should be further examined, monitored, and evaluated over time to ensure policy objectives are met.

# Evaluating the maintenance of the VAMOS Program during the COVID-19 pandemic: a repeated-measure analysis of a community-based intervention in 15 cities in Brazil

**Mrs. Marina Christofolletti<sup>1</sup>**, Dr. Leandro Garcia<sup>2</sup>, Dr. Laurent Malisoux<sup>3</sup>, Dr. Tania Benedetti<sup>1</sup>

<sup>1</sup>Federal University of Santa Catarina, Florianópolis, Brazil, <sup>2</sup>Queen's University Belfast, Belfast, United Kingdom, <sup>3</sup>Luxembourg Institute of Health, Strassen, Luxembourg

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** Health promotion interventions in Primary Health Care (PHC) are effective in bringing about health behavior changes. However, the COVID-19 pandemic imposed challenges to the long-term maintenance of behavioral changes achieved by PHC interventions. This study aimed to describe the maintenance in the practice of physical activity, eating habits, quality of life and body mass index (BMI) during the COVID-19 pandemic in participants of the Active Life Improving Health Behavior Change Program (VAMOS).

**Methods:** The VAMOS Program was a community-based PHC-centered intervention aiming at motivating people to adopt an active and healthy lifestyle. The program was a face-to-face intervention based on health education, with 18 sessions. PHC professionals conducted the program, which was implemented in 15 cities in the South of Brazil (16 groups). Data were collected using a validated instrument at baseline (April to August 2019, n=327), post-intervention (November to December 2019, n=191), and 16 months after (maintenance) (June to July 2021, n=118). The outcomes were leisure-time physical activity (min/week), eating habits (food consumption scale [FCS]), perceived quality of life (negative/positive) and BMI. The exposure was the data collection phase (baseline, post-intervention, and maintenance), and the covariates were age, sex, race, BMI, marital status, educational level and urban-rural classification. Multilevel mixed-effects generalized linear and logistic regression models (odds ratio [OR]) were used. The random effects were the participant and the group identification, and the fixed effect was the data collection.

**Results:** Physical activity was lower at the maintenance period compared to baseline (-44.8 min/week,  $p = 0.031$ ) and was not different compared to post-intervention. Eating habits had a continuous improvement over time (2.1 [ $p = 0.001$ ] and 1.5 [ $p = 0.024$ ] FCS-points, respectively). Perceived quality of life in maintenance had higher odds of being positive compared to the baseline (OR: 2.03,  $p = 0.031$ ) and had no difference with the post-intervention. BMI did not change over time.

**Conclusions:** Overall, participants of the VAMOS Program had no deterioration of the health behaviors during the COVID-19 pandemic, with improvements in some indicators post intervention. Physical activity decreased, but gains in eating habits and perceived quality of life since baseline were maintained.

# Trajectories of physical activity in relation to risk of neuropathy in Swedish adults with type 2 diabetes.

**Mr. Thomas Vogt<sup>1</sup>**, Dr. Emerald Heiland<sup>1</sup>, Prof. Karl Michaëlsson<sup>1</sup>, Prof. Liisa Byberg<sup>1</sup>, Dr. Beatrice Kennedy<sup>1</sup>, Associate Professor Hannah Brooke (corresponding author)<sup>1</sup>

<sup>1</sup>Uppsala University, Uppsala, Sweden

Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** The relationship between longitudinal trajectories of physical activity and the risk of neuropathy in individuals with type 2 diabetes has not been elucidated. Understanding this relationship will strengthen future interventions and improve the personalisation of healthcare. We aim to describe longitudinal trajectories of physical activity, and to examine their associations with neuropathy-related outcomes.

**Methods:** We will conduct a population-based cohort study including all adults with newly diagnosed type 2 diabetes and at least one record in the Swedish National Diabetes Register in 1996-2020 (n~200,000). Physical activity is a time-updated, self-reported 5-level variable from “no” to “daily” physical activity corresponding to 30-minutes walking (or equivalent). The incidence of neuropathy will be assessed through ICD-10 code E.11.4 from nationwide hospital inpatient and outpatient registers. Directed Acyclic Graphs will be used to determine which confounders to include in the main model. We will use group-based trajectory modelling to identify individuals with similar patterns of physical activity over time. We will then use Cox Proportional Hazards models to compare the hazard rates for neuropathy-related outcomes between groups of patients belonging to different trajectories of physical activity. Individuals will be followed from diabetes diagnosis, to death, migration, or end of follow-up (December 2020), whichever comes first. We will also consider interactions by sex, and investigate the associations in men and women separately.

**Results:** Approximately 200,000 individuals, aged 18-75 years, are registered with incident type 2 diabetes from 1996 onwards. We will present descriptive summaries of this population, graphical representations of the physical activity trajectories, and hazards ratios with 95% confidence intervals for the associations between trajectories of physical activity and neuropathy.

**Conclusions:** This study will highlight how longitudinal trajectories of physical activity are associated with risk of neuropathy in individuals with type 2 diabetes. Our findings may further inform on the potential for physical activity initiation to reduce neuropathy development, which may allow clinicians to provide tailored intervention efforts to their patients.

# Evaluation of an automated dietary assessment technology for snacking behaviours

**Miss Femke de Gooijer**<sup>1,2</sup>, Mr. Alex van Kraaij<sup>2</sup>, Prof. Edith Feskens<sup>1</sup>, Assistant Professor Marlou Lasschuijt<sup>1</sup>, Dr. Guido Camps<sup>1,2</sup>

<sup>1</sup>Wageningen University and Research, Wageningen, Netherlands, <sup>2</sup>OnePlanet Research Centre, Wageningen, Netherlands

Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** Snacks, foods and caloric drinks consumed in between regular meals, play a significant role in the modern diet. What drives snack choice and snacking behaviour has predominantly been studied using self-reports or in controlled laboratory settings. Both methodologies lack of validity and therefore there is a need for new technologies which objectively capture snacking behaviour outside the laboratory. The aim of this study was to evaluate the *SnackBox*, a new technology for assessing snacking behaviour in real-life settings with little effort of the user and interference by the researcher.

**Methods:** The *SnackBox*, a plateau (15 x 30 cms) containing electronics with three sensing coasters on top, stores three different snacks or beverages and automatically measures how much (in grams) is consumed of each component and at what time of the day (Figure 1). To evaluate the *SnackBox*, 47 office workers (29 female, 1 unknown, mean age = 28.8, SD = 4.1) used the *SnackBox* at their workplace and in their home for five days over a two week period to record their snack consumption. On measurement days, participants completed 5-hour dietary recalls in an application on their mobile phone. Ad libitum portions of snacks and beverages were provided for the participants and after the study period, left-overs were measured to determined true consumption (in grams). Intra-correlation coefficients (ICC) of absolute agreement were used to evaluate the relationship between the true consumption and estimated weights recorded with both the *SnackBox* and the self-report. Lastly, the User Experience Questionnaire was used to assess usability of both the dietary recall application and the *SnackBox*.

**Results/findings:** The *SnackBox* showed higher reliability (ICC = 0.80, CI = 0.72, 1.85) in estimating the weight of the total amount of snacks consumed compared to the 5h dietary recall application (ICC = 0.60, CI = 0.45, 0.70). Participants scored the usability of the *SnackBox* significantly higher compared to the usability of the recall application.

**Conclusions:** This study shows that the *SnackBox* is an accurate and low-burden tool that can be used to assess snacking behaviours in real-life settings.



# Knowledge of physical activity guidelines amongst final year medical students in Scotland: Changes over a decade.

**Dr. Gemma Ryde<sup>1</sup>, Ms. Isabelle Schlegel<sup>1</sup>**

<sup>1</sup>University of Glasgow, Glasgow , United Kingdom

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** The need to increase physical activity (PA) in clinical populations is well known. However, a survey by Dunlop and Murray of final-year medical students in Scotland in 2013 found medical students' knowledge of PA guidelines and confidence in their training to deliver PA advice was low. The authors recommended improving undergraduate medical PA education in Scotland which has been implemented by some universities. This study assessed current final-year medical students in Scotland's knowledge of PA guidelines and confidence in their training to deliver PA advice 10 years after the original study.

**Methods:** An online survey was sent to final-year undergraduate medical students via email and electronic message boards across four medical schools in Scotland. This survey included ten questions about physical activity including knowledge of the PA guidelines, PA's importance compared to other morbidity risk factors and students' confidence in their medical training to deliver PA advice. This survey was a modified version from Dunlop and Murray's 2013 survey to include updated PA guidelines (now both aerobic and strength-based) and collects participant demographic information (age, gender, university and PA levels) for analytic purposes. Results will be discussed in relation to findings in 2013 to ascertain whether there has been improvement in these measures over the last ten years.

**Results/findings:** The survey was launched in November 2022 and will close February 2023. To date 101 students have completed the survey (177 students in 2013). Participants were mainly female (70%) and aged 23.5±4.1 years. Provisional analysis suggests more students in the current study were aware of the PA guidelines than in 2013 (48% v 40%), but fewer were able to correctly identify them (26% v 68%). When asked if they felt they had been adequately trained to provide PA advice to the general population, 20% in the current sample reported they were, compared to 52% from the previous study.

**Conclusions:** With the need for medical professionals to be able to prescribe physical activity, the provisional results from this study suggest they are less able to do so than 10 years ago.

# Co-creators' psychological experiences of the co-creation of a workplace health plan to reduce sedentary behaviour: A Health CASCADE study.

**Ms. Lauren McCaffrey<sup>1</sup>**, Ms. Mira Vogelsang<sup>1</sup>, Associate Professor Maria Giné-Garriga<sup>2</sup>, Dr. Bryan McCann<sup>1</sup>, Dr. Philippa Dall<sup>1</sup>

<sup>1</sup>Glasgow Caledonian University, Glasgow, United Kingdom, <sup>2</sup>Blanquerna Universitat Ramon Llull, Barcelona, Spain

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose** Despite growing recognition that co-creation experience can impact engagement with the co-creation process and the success of co-created output, there is a lack of research investigating people's experience of participating in co-creation. Understanding co-creation experience could inform optimal development and use of the co-creation process. The purpose of this study was to explore the co-creators' experience of co-creating a health intervention plan to reduce sedentary behaviour.

**Methods** A case study design implementing mixed methods was adopted to gain a comprehensive understanding of the co-creation experiences of employees (n=10) from one small-to-medium enterprise in Scotland. Workshops (n=8; 90min; across 10 weeks) were video recorded. Participatory observations (during workshops) and researcher reflections (after workshops) covered pre-set topics of setting, atmosphere, behaviour of individuals and group dynamics. After the final workshop, semi-structured interviews will be conducted with the co-creators. Instances of physiological arousal/depression (measured during workshops using an Empatica E4 wristband) will be time synchronised to the video recordings and selected clips will be presented to participants during the interview. Interviews will be audio-recorded, transcribed and analysed thematically for deeper exploration of these experiences, such as range of emotions and key psychological components.

**Findings** Preliminary findings from observations reveal that the co-creators have increased their knowledge of sedentary behaviour and, importantly, their own sedentary patterns. In general, co-creators were observed to be satisfied with and to have enjoyed taking part in the workshops. Additionally, the co-creators displayed trust during the workshops by being vulnerable, speaking up, asking questions, laughing and making jokes. This contributed to fostering team cohesiveness, essential for open non-judgemental discussion. It became evident that working relationships and group dynamics are central to the success of the process. Facilitators can positively impact the co-creators' experience by acknowledging the co-creation process can be dynamic. Interviews conducted after the co-creation workshops will enrich the preliminary analysis of the observational findings.

**Conclusion** An increased understanding of the experience of participating in co-creation processes may help to inform implementation of co-creation processes, could benefit the co-creators' and improve the co-created intervention.

# Adults' perceptions of the healthiness of sugary drinks across five countries from 2018 to 2021: evidence from the International Food Policy Study

**Mrs. Virginie Drolet-labelle**<sup>1,2</sup>, Mrs. Christine M White<sup>3</sup>, Dr. Gary Sacks<sup>4</sup>, Dr. Jean Adams<sup>5</sup>, Dr. Sharon I Kirkpatrick<sup>3</sup>, Dr. Alejandra Jauregui<sup>6</sup>, Dr. James F. Thrasher<sup>7</sup>, Dr. Lilia Pedraza<sup>6</sup>, Dr. Christina Roberto<sup>8</sup>, Dr. Véronique Provencher<sup>1,2</sup>, Dr. David Hammond<sup>3</sup>, Dr. Lana Vanderlee<sup>1,2</sup>

<sup>1</sup>Centre Nutrition santé et société (NUTRISS), Institut sur la nutrition et les aliments fonctionnels (INAF), Université Laval, Québec, Canada, <sup>2</sup>École de nutrition, Faculté des sciences de l'agriculture et de l'alimentation (FSAA), Université Laval, Québec, Canada, <sup>3</sup>University of Waterloo, Waterloo, Canada, <sup>4</sup>Deakin University, Melbourne, Australia, <sup>5</sup>University of Cambridge, Cambridge, United Kingdom, <sup>6</sup>Instituto Nacional de Salud Pública, Cuernavaca, Mexico, <sup>7</sup>University of South Carolina, Columbia, USA, <sup>8</sup>University of Pennsylvania, Philadelphia, USA

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose** Sugary drink (SD) consumption is a public health concern globally. This study aimed to examine: 1) differences in SD's perceived healthiness across countries over time, and 2) relationships between perceived healthiness of SDs and SD intake.

**Methods** Adults (>18 y) from Australia, Canada, Mexico, the United Kingdom (UK), and the United States (US) completed cross-sectional online surveys conducted annually between 2018 and 2021 as part of the International Food Policy Study (n=83,048). Participants indicated perceived healthiness of a branded soft drink (cola) and another beverage type (chocolate milk, sports drinks, 100% fruit juice and others) on a scale from 1 (very unhealthy) to 7 (very healthy). Intake of 20 beverage categories in the past 7 days was also assessed (yes/no). Logistic regression models examined differences in beverage perceptions by country, and stratified models examined trends of time and associations between perceptions and intake within countries, adjusting for socio-demographics.

**Results/findings** In all countries, regular cola was perceived as unhealthy by 77.1% of the respondents, followed by sports drinks (36.2%), chocolate milk (30.7%) and 100% fruit juice (18.0%). US participants were less likely to perceive most SDs as unhealthy compared to all other countries. There was moderate evidence of decreasing likelihood of perceiving regular cola as unhealthy between 2018 and 2021 in Australia and UK. There was also moderate evidence of increasing likelihood of perceiving cola as unhealthy in US and Mexico, and strong evidence of increasing likelihood of perceiving 100% fruit juice, sports drinks and chocolate milk as unhealthy in Mexico over the same period. Participants in all countries who perceived a beverage as unhealthy were less likely to have consumed it in the past 7 days. Analyses regarding other SDs (diet soda, energy drinks, etc.) will be presented.

**Conclusion** Across countries, many adults perceived SDs as healthy despite being high in added and free sugars. The results show evidence of trends in beverage perceptions in some countries that may result in greater SD intake and encouraging trends in others. In Mexico, major shifts in beverage perceptions may suggest that environmental or policy factors are shifting cultural attitudes towards SDs.

# Adult co-creators' psychological experiences of the co-creation process: A Health CASCADE scoping review.

**Ms. Lauren McCaffrey**<sup>1</sup>, Dr. Bryan McCann<sup>1</sup>, Associate Professor Maria Giné-Garriga<sup>2</sup>, Ms. Qingfan An<sup>3</sup>, Prof. Greet Cardon<sup>4</sup>, Prof. Sebastien Chastin<sup>1</sup>, Ms. Rabab Chrifou<sup>4</sup>, Prof. Sonia Lippke<sup>5</sup>, Mr. Quentin Loisel<sup>1</sup>, Ms. Giuliana Longworth<sup>2</sup>, Ms. Katrina Messiha<sup>6</sup>, Ms. Mira Vogelsang<sup>1</sup>, Ms. Emily Whyte<sup>1</sup>, Dr. Philippa Dall<sup>1</sup>  
<sup>1</sup>Glasgow Caledonian University, Glasgow, United Kingdom, <sup>2</sup>Blanquerna Universitat Ramon Llull, Barcelona, Spain, <sup>3</sup>Umeå University, Umeå, Sweden, <sup>4</sup>Ghent University, Ghent, Belgium, <sup>5</sup>Jacobs University Bremen, Bremen, Germany, <sup>6</sup>Amsterdam UMC, Vrije Universiteit Amsterdam, Amsterdam, Netherlands

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** There is a growing investment in the use of co-creation, reflected by an increase in co-created products, services and interventions. Although there is a growing recognition of the significance of co-creators' experience to the success of the process and potential impact on the co-created output, there is a gap in the aggregation of the literature regarding their experience. The purpose of this scoping review is to uncover the breadth of existing empirical research on co-creator's experience, how it has been defined, assessed, and its key characteristics.

**Methods:** Development of the search strategy was guided by the research question, Arksey and O'Malley's scoping review methodology guidelines and through collaboration with the Health CASCADE consortium. A wide range of key words were used to capture co-creation. Key words for co-creation experience covered a range of psychological components, including emotional experience. Comprehensive searches were conducted in the Health CASCADE Co-creation Database (~13501 articles pre-screened for co-creation key words) and Scopus, with additional snowball searches of included articles. Data is being extracted on the co-creation process, how experience was assessed, and co-creators' experience during the process and psychological impact as a result of engagement in the process. The results of the review will be presented narratively in accordance with the PRISMA-ScR guidelines.

**Results:** The initial search identified 10,700 papers (after removal of duplicates), 10,066 were excluded during title and abstract screening. Full-text screening of 634 papers has been completed by least one reviewer (screening by second reviewer ongoing), indicating 150-200 articles may be included. Preliminary data extraction indicates that the process of co-creation is often poorly reported, using a wide range of terminology and frequently with key information missing. Co-creation experience is often undefined, and its method of assessment varied. We anticipate that further articles will be excluded during data extraction as our definition of co-creation is refined.

**Conclusions:** The scoping review provides an overview of the extent of literature reporting on co-creators' experience and the state of research in this area. The findings offer useful insights into co-creators' experience of participating in the co-creation process and provide guidance for future research.

# Validity of objective and subjective methods to estimate total daily energy expenditure determined by the doubly labeled water technique in a sample of adults from Rio de Janeiro, Brazil

**Prof. Luiz Anjos<sup>1</sup>**, Miss Francine Bossan<sup>2</sup>, Associate Professor Vivian Wahrlich<sup>1</sup>, Assistant Professor Karina Pfrimer<sup>3</sup>, Prof. Eduardo Ferrioli<sup>4</sup>

<sup>1</sup>Universidade Federal Fluminense, Niterói, Brazil, <sup>2</sup>Universidade do Estado do Rio de Janeiro, Rio de Janeiro, Brazil, <sup>3</sup>Universidade de Ribeirão Preto, Ribeirão Preto, Brazil, <sup>4</sup>Universidade de São Paulo, Ribeirão Preto, Brazil

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** The purpose of the study was to estimate the validity of objective (accelerometer - ACC) and subjective (24-hour physical activity recalls - 24hPAR) methods to determine the total daily energy expenditure (TDEE) in comparison to the doubly labeled water (DLW).

**Methods:** A convenience sample of 39 adults (21 women) living in the tropics (Rio de Janeiro, Brazil) had anthropometric (body mass and stature), basal metabolic rate (BMR) and body composition (DXA) data collected in a visit to the laboratory. Prior to receiving the DLW dose, participants were instructed to provide a baseline urine sample, were instructed to collect a urine sample daily over 14 consecutive days and to wear an ACC (Actigraph GT3X) at their waist. Four 24hPAR (2 face-to-face and 2 over the phone) were performed. The equation suggested by Sasaki et al. (2011) was used to convert the ACC data to TDEE. The MET coefficients from the Compendium of Physical Activity were used to convert the reported activities in the 24hPAR into energy expenditure which was summed to yield the TDEE24hPAR. The physical activity level (PAL) was calculated as TDEEDLW / BMR.

**Results:** Mean age and BMI (SD) were 30.6 (11.1) years and 23 (2.7), respectively. BMR was higher in men ( $1482.7 \pm 161.0$ ) than in women ( $1205.2 \pm 131.1$ ) kcal/day. TDEE was also always higher in men regardless of the method used (DLW:  $2654.5 \pm 384.4$  and  $1909.3 \pm 330.1$ ; 24hPAR:  $2831.0 \pm 309.7$  and  $2201.0 \pm 335.9$ ; and ACC:  $2220.9 \pm 297.9$  and  $1805.2 \pm 330.2$  kcal/day; in men and women, respectively). Mean PAL was 1.50 (0.17) ( $1.50 \pm 0.15$  and  $1.49 \pm 0.19$ , in men and women). TDEE estimated by ACC, in women only, and TDEE estimated by 24hPAR, in men only, were significantly different from TDEEDLW (- 4.1% and + 8.2%, respectively).

**Conclusion.** Objective and subjective methods provided inaccurate TDEE estimates depending on sex.

# Perceived Stress, Diet Quality, and Weight Satisfaction Predict Perceived Health in College Students

**Ms. Caitlyn Winn<sup>1</sup>**, Ms. Kayla Parsons<sup>1</sup>, Ms. Leigh Neptune<sup>1</sup>, Ms. Amelia Sullivan<sup>1</sup>, Ms. Emma Watras<sup>1</sup>, Dr. Jade McNamara<sup>1</sup>

<sup>1</sup>University of Maine, Orono, USA

Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** J. Young Adults

**Purpose** The college environment is stressful and demanding, often leading to poor diet quality (DQ) and weight dissatisfaction in college students. This study aimed to investigate the role of perceived stress, DQ, body mass index (BMI), and weight satisfaction on perceived health in college students.

**Methods** A cross-sectional convenience sample of undergraduates completed an online health survey. DQ was measured using the Short Healthy Eating Index (sHEI), perceived stress was measured using the Perceived Stress Scale, and weight satisfaction was measured using discrepancies between reported weight and desired weight. Perceived health was measured using a single item that asked respondents to rate their health as “poor/fair” or “good/excellent.” A logistic regression assessed the effects of weight satisfaction, BMI, DQ, and stress on perceived health.

**Results** Students (N=873) were 20.9 ( $\pm 2.3$ ) years old, primarily White (87.1%), and female (70.2%). The logistic regression model was statistically significant,  $X^2 = 8.26$ ,  $p = .043$ . The overall model explained 34% variance in perceived health status and correctly classified 72% of cases. DQ was a significant positive predictor of perceived health ( $\beta = .017$ ,  $p = .043$ ), whereas weight dissatisfaction ( $\beta = -.045$ ,  $p < .001$ ) and perceived stress ( $\beta = -1.55$ ,  $p < .001$ ) were significant negative predictors. BMI was not a significant predictor of perceived healthfulness in this population.

**Discussion & Conclusion** These results indicate that students with better DQ and less perceived stress experience better perceived health than their peers. Interestingly, while weight satisfaction was a significant predictor of perceived health, BMI was not. These results emphasize the importance of a healthy diet, improved body image, and stress reduction in undergraduates' perceived health, highlighting the need for health and wellness programming that addresses these factors as a means to support the health of college students.



# Altering the food environment to promote sustainable meat consumption: promise, progress, and strategies to nudge consumers to reduce meat consumption

**Dr. Tessa Englund**<sup>1</sup>, Dr. Susan Chen<sup>2</sup>, Dr. Valisa Hedrick<sup>3</sup>, Dr. Vivica Kraak<sup>3</sup>

<sup>1</sup>University of North Carolina at Chapel Hill, Chapel Hill, USA, <sup>2</sup>San José State University, San José, USA,

<sup>3</sup>Virginia Tech, Blacksburg, USA

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Encouraging consumers to reduce and replace meat consumption and shift toward a plant-rich, sustainable dietary pattern is needed to transition to a sustainable food system that supports human and environmental health and sustainability. This systematic review assembled and synthesized the available evidence for nudge interventions implemented in real-world food environment settings to influence consumers to reduce purchases, selection, and consumption of non-seafood meat products.

**Methods:** Five electronic databases (Business Source Complete, CINAHL, PsycINFO, PubMed, Web of Science) were searched according to PRISMA guidelines for peer-reviewed English-language studies published between 2000-2021. Articles were included if they reported objective measures of non-seafood meat purchases, selection, or intake from nudge interventions conducted in real (i.e., non-hypothetical) choice environments, and characterized according to the Typology of Interventions in Proximal Physical Micro-Environments (TIPPME) intervention framework.

**Results:** Of 2,655 unique references identified, 34 eligible intervention studies that were conducted in eight countries across Europe and North America were included. Most studies used nudge strategies to influence behavior related to general dietary patterns by reducing (e.g., calorie reduction) or encouraging consumption of specific foods (e.g., fruits and vegetables), and were not directly aimed at reducing meat consumption. More than half (19 of 34, 56%) of the identified nudge interventions resulted in statistically significant reductions in meat consumption or choice (e.g., selection or purchase) behaviors; the remainder of nudge interventions tested found no significant difference (11 of 34, 32%) or did not report significance testing for meat choice outcomes (4 of 34, 12%). Interventions that manipulated the size of products were most frequently associated with significant reductions in meat choice outcomes (7 of 9), followed by position (4 of 7) and information interventions (4 of 7).

**Conclusions:** Nudge strategies may influence behaviors and reduce meat consumption in real-world settings, especially those altering product size. Future research is needed to systematically design, evaluate, and report on the effectiveness of nudges targeted to reduce meat consumption using established frameworks, such as TIPPME. Future studies should also implement and evaluate the potential of nudge strategies across various food environments, population contexts, and outcomes (e.g., health, economic, and sustainability-related factors).

# A cross-sectional exploration of factors influencing food insecurity among adults residing in peri-urban settings in Flanders, Belgium

Ms. Yasemin Inac<sup>1,2,3,4</sup>, **Mrs. Suzannah D'hooghe**<sup>1,4,5</sup>, Dr. Stefanie Vandevijvere<sup>1</sup>, Dr. Karin De Ridder<sup>1</sup>

<sup>1</sup>Sciensano, Department of Epidemiology and Public Health, Brussels, Belgium, <sup>2</sup>Ghent University, Faculty of Sciences, Department of Geography, Ghent, Belgium, <sup>3</sup>Sciensano, Department of Chemical and Physical Health Risks, Brussels, Belgium, <sup>4</sup>Vrije Universiteit Brussel, Faculty of Psychology and Educational Sciences, Department of Educational Sciences, Brussels, Belgium, <sup>5</sup>Ghent University, Faculty of Medicine and Health Sciences, Department of Public Health and Primary Care, Ghent, Belgium

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** Food insecurity and its consequences have not yet received much attention in Belgium. Even though food insecurity may result in insufficient dietary intake, overweight or obesity and the development of non-communicable diseases. The objective of this study was to report the prevalence of food insecurity and investigate associations between sociodemographic and lifestyle-related determinants and food insecurity among adults residing in peri-urban municipalities.

**Methods:** This cross-sectional was conducted among 567 participants in two peri-urban municipalities in Flanders, Belgium. Data on sociodemographic and lifestyle factors, dietary habits, and food security status were collected between May and October 2021 using a questionnaire. Diet was based on self-reported intake of fruit, vegetables, fast food, snacks and sugar-sweetened beverages. BMI was determined from self-reported height and weight. Adjusted multinomial logistic regression analyses were performed to explore the association between food insecurity, sociodemographic and lifestyle factors.

**Results/findings:** The overall prevalence of food insecurity was 17.5% (N=99). Of the food-insecure participants, 85.6% (N=83) reported that they often or sometimes feared food shortages. While 50.5% (N=49) of food insecure participants were often or sometimes short of food without money to buy more in the previous three months. Adjusted multinomial logistic regression showed that participants who received food through a food bank (OR 4.34 (95% CI 2.70 to 9.41)), reported low subjective health (OR 1.90 (95% 1.24 to 2.99)) and difficulties in their monthly financial situation (OR 5.68 (95% 3.65 to 9.38)) were more likely to experience food insecurity.

**Conclusions:** Our study shows a relatively high prevalence of food insecurity among peri-urban residents in Flanders. This adds to the literature that food insecurity is prevalent even in high-income countries with a good social welfare structure. It is important to widen food security research to include countries with good welfare structures since food insecurity is associated with many adverse health outcomes. Therefore, more research on the underlying determinants of food insecurity and which (sub)groups are most affected in Belgium is urgently needed.

# Head teachers' perceived importance of Food and Health in grade 1-4 in Norway.

**Dr. Camilla Sandvik**<sup>1</sup>, Dr. Merete Hagen Helland<sup>2</sup>, Dr. Anne Selvik Ask<sup>3</sup>, Dr. Eli Kristin Aadland<sup>4</sup>

<sup>1</sup>Nord University, Levanger, Norway, <sup>2</sup>University of Stavanger, Stavanger, Norway, <sup>3</sup>University of Agder, Kristiansand, Norway, <sup>4</sup>Western Norway University of Applied Sciences, Bergen, Norway

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** N. Other

**Purpose** To investigate how head teachers perceive the school subject 'Food and Health' (FH) and how they prioritise it in primary years, as high quality food education - from an early onset - is essential to teach children healthy and sustainable cooking skills and eating habits. Head teachers' attitudes and opinions can have a significant influence on the quality of teaching FH in schools, but no research has been carried out previously for grades 1-4.

**Methods** Eight semi-structured interviews were carried out with head teachers from different schools in four main regions of Norway to gain insight into how head teachers' perceived FH in grade 1-4, covering how teaching of FH was carried out, which teaching aids were used, number of lessons taught, and their knowledge of the curriculum. Data were analysed using thematic analysis.

**Results** Most head teachers saw few or little challenges related to teaching FH in the lower primary level, claiming that FH was treated equal to other subjects. When probed, we found that the subject was given low priority. The head teachers seemed to have little interest in FH, and gave class teachers much freedom in designing, planning and carrying out their teaching. Head teachers with formal training in FH and / or own teaching experience in the subject, had a higher interest in the subject, perceived it as more important and had more insight into how FH was taught at their school.

**Conclusions** The importance of FH in grade 1-4 seemed to vary at random between the schools in our study, based on head teachers' own interest, competence and values. This may lead to undesired variation in the quality of teaching, and to young students not achieving the competence aims in FH. Clearer guidelines and expectations from national education authorities, alongside with follow-up checks on the amount of lessons and quality of teaching, could be a way forward to improve teaching quality in FH for grade 1-4 in the future.

# Investigation of a 12-weeks community-based training intervention in children with obesity: Importance of intensity and exercise modality.

**Dr. Charlotte Eggertsen**<sup>1,2</sup>, Mr. Jeppe Bech Pedersen<sup>4</sup>, Prof. Søren Hagstrøm<sup>1,2</sup>, Dr. Esben Thyssen Vestergaard<sup>3</sup>, Associate Professor Ryan Godsk Larsen<sup>4</sup>, Associate Professor Morten Bilde Simonsen<sup>5</sup>

<sup>1</sup>Department of Pediatrics and Steno Diabetes Center North Denmark, Aalborg University Hospital, Aalborg, Denmark, <sup>2</sup>Department of Clinical Medicine, Aalborg University Hospital, Aalborg, Denmark, <sup>3</sup>Department of Pediatrics, Regional Hospital Randers, Randers, Denmark, <sup>4</sup>Department of Health Science and Technology, Aalborg University, Aalborg, Denmark, <sup>5</sup>Department of Materials and Production, Aalborg University, Aalborg, Denmark

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose** Childhood obesity is a major public health concern. Physical activity as part of a multidisciplinary lifestyle intervention is a keystone in treating obesity. High-intensity interval-training (HIIT) has shown several physiological benefits, including weight reduction and cardiovascular health. Few studies have monitored the intensity during HIIT or compared different types of exercises. This study is part of a randomized controlled project investigating the effect of HIIT in a group of children with obesity, and focuses on the training intensity of different activities in a community-based training setting.

**Methods** Sixty-three children with obesity were enrolled in a 12-weeks training intervention, with three weekly sessions. Each session included 4x4 minutes of HIIT focusing on one of three specific exercise modalities; Ball games, CrossFit, or running. Heart rate (HR) was measured to quantify time spent in high (>85% of max HR) intensity activity. In nine of the HIIT sessions, enjoyment (Physical Activity Enjoyment Scale) and perceived exertion (Borg CR-10 scale) were recorded. A three-way (sex, modality, intensity) mixed ANOVA was used to compare the HR data. Friedman and Wilcoxon Signed-rank tests (post hoc) were used to compare enjoyment and perceived exertion between types of activity.

**Results** The participants' median age was 12.3 years, with a body-mass index of  $28.84 \pm 4.04$ . Ball games elicited less time in the high-intensity zone ( $4.96 \pm 5.75$  minutes) than CrossFit ( $7.73 \pm 7.25$  minutes,  $P = 0.010$ ) and running ( $6.36 \pm 5.80$  minutes,  $P = 0.025$ ). No gender interaction was observed ( $p=0.995$ ). The enjoyment of physical activity was rated high, on average 4.5 for all activities (scale from 1 (lowest) – 5 (highest)), but no significant difference was found. The perceived exertion was rated lower by adolescents compared to children in ball games ( $5.1 \pm 1$ ) compared to CrossFit ( $6 \pm 1$ ,  $P = 0.017$ ) and running ( $6 \pm 1$ ,  $P = 0.004$ ). Furthermore, with all participants combined, ball games were perceived as less exhausting than CrossFit ( $P = 0.002$ ) and running ( $P = 0.003$ ).

**Conclusions** The participants had high enjoyment ratings during all three modalities. CrossFit and running seem favorable to elicit more time in the high-intensity zone compared to ball games. This should be considered in future training interventions.

# Beyond eating for health: Protein foods within the Dietary Approaches to Stop Hypertension (DASH diet) are associated with lower greenhouse gases and land use

**Ms. Nicole Kling**<sup>1</sup>, Dr. Kurt Rosentrater<sup>1,2</sup>, Dr. Maren Wolff<sup>1</sup>, Dr. Lorraine Lanningham-Foster<sup>1</sup>

<sup>1</sup>Department of Food Science and Human Nutrition, Iowa State University, Ames, USA, <sup>2</sup>Department of Agricultural and Biosystems Engineering, Iowa State University, Ames, USA

Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** N. Other

**Purpose:** The objective of this study was to assess the greenhouse gases (GHG), land use, and water withdrawals associated with protein foods within the Dietary Approaches to Stop Hypertension (DASH diet). Previous research has assessed the GHG associated with the DASH diet, but no studies have explored other environmental indicators, limiting our ability to understand the sustainability of this dietary pattern.

**Methods:** Over 400 Midwesterners aged 35-70 years old with hypertension were recruited in part of a yearlong exercise intervention. Participants received group and individual DASH diet counseling throughout the year. Dietary data was collected Automated Self-Administered 24-Hour (ASA-24) Recalls System. Diets were evaluated based on their adherence to the DASH diet using a nutrient-based DASH score. Using the Purchaser model (cradle-to-consumer) of the Carnegie Mellon University's Economic Input-Output Life Cycle Assessment ([www.eiolca.net](http://www.eiolca.net)), we predicted the GHG, land use, and water withdrawals associated with the protein foods within individual's diets. Multiple linear regressions were used to view associations between individual DASH nutrient scores and environmental impacts of total, animal, and plant protein foods.

**Results/findings:** More adherent DASH diets, as indicated by higher individual DASH nutrient scores, were associated with less GHG and land use from total and animal protein foods but more GHG and land use from plant-protein foods, with a few exceptions. The pattern was not clear for water withdrawals. Diets with the greatest adherence had around 25-50% lower GHG and land use from total protein foods than diets with the lowest adherence. Differences in dietary GHG and land use may be due to decreased consumption of total and animal protein foods, selection of less environmentally demanding animal protein foods, such as poultry instead of beef, and increased consumption of plant protein foods.

**Conclusions:** Based on this evaluation of protein foods, we predict that the adoption of the DASH diet may have environmental benefits, in terms of GHG and land use. As the DASH diet seems to have simultaneous health and environmental benefits, this diet could be promoted using either frame. Further research should explore the use of environmental sustainability as a motivator for adoption of the DASH diet.

# Are Danish vocational schools ready to promote students' health and wellbeing? A cross-sectional study informed by theory of organizational readiness

**Ms. Clara Heinze<sup>1,2</sup>**, Ms. Lene Winther Ringgaard<sup>1</sup>, Ms. Charlotte Klinker<sup>1</sup>

<sup>1</sup>Steno Diabetes Center Copenhagen—Copenhagen University Hospital, Herlev, Denmark, <sup>2</sup>National Institute of Public Health, University of Southern Denmark, Copenhagen, Denmark

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Background and purpose:** Vocational school students exhibit significant risk behaviours in terms of e.g. poor diet, low levels of physical activity, and poor mental health. Effective health promotion programmes targeting vocational students are needed. Higher levels of organisational readiness predict a more successful implementation of health promotion programmes, and knowledge about organisational readiness prior to implementation can help pinpoint how to optimize support to the schools. In this study, we assessed school organisational readiness prior to implementation of a participatory whole of systems programme - the 'Data-driven health promotion at vocational schools' programme - which aims to promote a health enhancing environment at vocational schools. Moreover, the study examined if school, and/or staff characteristics predict differences in organisational readiness.

**Methods:** This is a cross-sectional study, based on questionnaire data collected in January to March 2022. Questionnaires were distributed to all staff members (n=213) across eight vocational schools before the intervention. The eight schools were located in two regions and four municipalities, with two schools from each of four educational tracks (technical, business, agriculture and food service and social and health service). The questionnaire was developed based on the 'organisational readiness framework', established by Scaccia et al, and pilot tested and validated prior to data collection. This framework will also guide the analysis, which is completed in spring 2023. Organisational readiness is measured as the total sum or aggregate across three dimensions and ten sub-dimensions: Motivation (relative advantage, compatibility, complexity, and priority), General Capacity (culture, climate, and staff capacity), and Innovation-specific Capacity (knowledge, skills, and abilities).

Predictors of different levels of organisational readiness are investigated using Multiple linear regression analysis. Covariates included are staff characteristics (age, gender, education) and school characteristics (educational track, region and school size).

**Results:** In total 123 staff members answered the questionnaire (≈60%). Data on organisational readiness and related predictors will be presented.

**Conclusion:** The results of this study will be used to inform the implementation and future sustainment of programme implementation. Our conceptualization and operationalization of organisational readiness may be useful in future studies, i.e., in studies where enhancing readiness and capacity is a main objective.



# Comprehensive evaluation of a large-scale food prescription program in Houston, TX, USA.

Dr. Nalini Ranjit<sup>1</sup>, Dr. Henry Brown<sup>1</sup>, Ms. Jennifer Aiyer<sup>1</sup>, **Dr. Shreela Sharma<sup>1</sup>**

<sup>1</sup>University of Texas Health Science Center, School of Public Health, Houston, USA

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** Food prescription (FoodRx) programs are gaining interest from funders, policy makers, and healthcare payers as a value-based care strategy. A small body of research suggests that such programs effectively impact health outcomes; however, the quality of existing studies is variable, and little is known about implementation feasibility, or cost-effectiveness of such programs. This study utilized a quasi-experimental design with non-equivalent controls, to evaluate clinical impacts and cost-effectiveness of the Houston Food Bank's multi-institution FoodRx program implemented at scale. The impact analysis was supplemented with follow-up qualitative studies to evaluate implementation outcomes.

**Methods.** For the impact analysis, we completed a secondary analysis of data collected between May 2018 and March 2021. Enrollment data were obtained from 16 healthcare partners (HCPs) and prescription redemption data from across 40 food pantries in Houston, Texas. The primary outcome, 6-month change in HbA1c, was obtained from HCPs. Exposure was defined as at least one redemption from a food pantry within 6 months of enrollment. Generalized linear mixed models were used to estimate change in HbA1c by exposure status. Qualitative data were obtained from clinic staff, pantry staff, and program participants, to examine their perceptions of and experiences with the program. Simulation models were used to estimate increases in Quality Adjusted Life Years (QALYs) from participation.

**Results.** Exposed patients experienced a -0.28% ( $p=0.007$ ) greater change in HbA1c than unexposed patients, over six months. A dose-response effect of number of redemptions on A1c was evident. A key process finding was that the redemption rate was low (52%). Use of Food Rx versus control resulted in 0.07 incremental gain in QALYs, corresponding to \$288 in averted medical costs. Qualitative data revealed several addressable reasons for low redemption.

**Conclusions.** Our study of a large food prescription program involving multiple health care and food pantry sites provides robust evidence of a modest decline in HbA1c levels among participants. FoodRx programs can be cost-effective, but an important gap to address is poor redemption rates.

# Children's COOPeration Denmark (Child-COOP): Promoting physical activity in children aged 6-12 years - a 3-year controlled system dynamics trial

**Dr. Helene Kirkegaard**<sup>1</sup>, Dr. Knud Ryom<sup>2</sup>, Dr. Therese Lockenwitz Petersen<sup>3</sup>, Dr. Anneke Vang Hjort<sup>4</sup>, Dr. Eskild Klausen Fredslund<sup>1</sup>, Prof. Steven Allender<sup>5</sup>, Dr. Anne-Louise Bjerregaard<sup>3</sup>, Prof. Helle Terkildsen Maindal<sup>2</sup>, Dr. Charlotte Demant Klinker<sup>4</sup>, **Dr. Jane Nautrup Østergaard**<sup>1</sup>

<sup>1</sup>Steno Diabetes Center Aarhus, Aarhus University Hospital, Aarhus, Denmark, <sup>2</sup>Department of Public Health, University of Aarhus, Aarhus, Denmark, <sup>3</sup>Steno Diabetes Center Zealand, Holbæk, Denmark, <sup>4</sup>Steno Diabetes Center Copenhagen, Copenhagen, Denmark, <sup>5</sup>Global Centre for Preventive Health and Nutrition (GLOBE), Institute for Health Transformation, School of Health and Social Development, Deakin University, Geelong, Australia

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Background:** Lack of physical activity (PA) and sedentary behaviour in Danish children is a major challenge, and early awareness is important, as PA behaviour often tracks into adolescence and adulthood. PA behaviour is shaped by a complex interplay between a wide range of factors at individual, family, community and society levels. Interventions building on a participatory system dynamics approach has been suggested as a feasible way to address such complex problems.

**Purpose:** To present the Child-COOP trial which aims to examine if a community-based participatory system dynamics approach can promote (increase and sustain) healthy PA behaviour in children aged 6-12 years through local changes in the system that drives PA behaviour locally.

**Methods:** The three-year Child-COOP trial is designed as a controlled waiting list study with five Danish municipalities each participating with an intervention community and a control community (2023-2026). The intervention consists of an evidence based system dynamics process. First, local child health data will be collected, as both baseline data and as a way to engage key stakeholders from the communities and the municipalities. Second, the key stakeholders in each intervention community will develop a causal loop diagram of drivers of PA behaviour in children aged 6-12 years in their local community. Third, based on the causal loop diagram, stakeholders from the municipality, private sectors and the civic will be involved in developing and implementing actions to promote healthy PA behaviour through system changes. The effectiveness of trial will be evaluated through individual and systems outcomes comparing the intervention and control communities. Individual outcomes include objective measures of PA, physical literacy and anthropometrics as well as subjective health and well-being data. System outcomes include social network, community readiness and capacity. Further, a health-economic cost consequence analysis will be performed and a process evaluation will inform a final systems program theory on "what works for whom under what circumstances".

**Conclusion:** The potential of this participatory system dynamics trial includes opportunities for community engagement and local capacity building to promote healthy PA behavior in childhood. Further, Child-COOP will evaluate whether to recommend this approach for national scaling up.

# Exercise preference and motivators in young adult women who exercise regularly

**Ms. Chloe Jones**, Dr. Danielle Wadsworth

<sup>1</sup>Auburn University, Auburn, USA

Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** J. Young Adults

**Purpose:** Young adult women participate in less exercise than young adult men, yet motivators and preferable modes for exercise to increase the chances of adherence in this population are understudied. Therefore, the purpose of this study is to identify preferences and motivators for exercise in young adult women who regularly participate in exercise to inform the structure and context of future physical activity and/or exercise interventions.

**Methods:** Using a survey, young women (18-34 years) who exercised regularly identified their preferred mode of exercise, exercise volume, and motivators to exercise using the Exercise Motivations Inventory-2 (EMI-2). Preferred mode of exercise and volume were examined, and MANOVA tests were conducted to explore differences in motivators amongst the group.

**Results:** Women ( $n = 269$ ;  $M = 27.04 \pm 4.70$  years) identified weightlifting as their preferred mode of exercise (32.3%). A MANOVA was used to determine if motivators for exercise differed based upon volume of muscle-strengthening (MS) training (low= 0-1 days; moderate= 2-3 days; high=  $\geq 4$  days). Significant differences were found amongst the three groups ( $\Lambda = 0.800$ ,  $F [30, 488] = 1.924$ ,  $p = 0.003$ ). Women who engaged in a high volume versus low volume of MS activities had higher levels of motivation from revitalization ( $p = 0.035$ ), enjoyment ( $p = 0.004$ ), challenge ( $p = 0.002$ ), social recognition ( $p = 0.009$ ), appearance ( $p = 0.028$ ), and strength and endurance ( $p < 0.001$ ).

**Conclusion:** Future exercise intervention studies should examine the perception of weightlifting as a primary mode of exercise amongst young, inactive women. Additionally, both intrinsic (mental) and extrinsic (physical) motivators for exercise should be conveyed to inactive women as results suggest both impact the maintenance of regular exercise amongst this sample.

# Sustainability analysis of the Mediterranean diet: results from the French NutriNet-Santé study

**Dr. Julia Baudry**<sup>1</sup>, Mrs. Floriane Neves<sup>1</sup>, Dr. Denis Lairon<sup>2</sup>, Dr. Benjamin Allès<sup>1</sup>, Dr. Brigitte Langevin<sup>3</sup>, Mrs. Joséphine Brunin<sup>1</sup>, Mrs. Florine Berthy<sup>1</sup>, Prof. Ina Danquah<sup>4</sup>, Dr. Mathilde Touvier<sup>1</sup>, Prof. Serge Hercberg<sup>1</sup>, Dr. Marie-Josèphe Amiot<sup>5</sup>, Mr. Philippe Pointereau<sup>3</sup>, Dr. Emmanuelle Kesse-Guyot<sup>1</sup>

<sup>1</sup>Sorbonne Paris Nord University, Inserm U1153, INRAE U1125, CNAM, Nutritional Epidemiology Research Team (EREN), Epidemiology and Statistics Research Center – University Paris Cité (CRESS), Bobigny, France, <sup>2</sup>Aix Marseille Université, Inserm, INRAE, C2VN, Marseille, France, <sup>3</sup>Solagro, Toulouse, France,

<sup>4</sup>Heidelberg Institute of Global Health (HIGH), Medical Faculty and University Hospital, Heidelberg University, Heidelberg, Germany, <sup>5</sup>MOISA, INRAE, CIRAD, CIHEAM, SUPAGRO, Montpellier, France

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** N. Other

The Mediterranean diet is often proposed as a model of a sustainable diet. This study aimed to evaluate the associations between adherence to the Mediterranean diet and sustainability domains in a cohort of French adults, using multiple criteria including nutritional quality, environmental pressures, monetary cost, and dietary pesticide exposure. Food intakes of 29,210 NutriNet-Santé volunteers were assessed using a semi-quantitative food frequency questionnaire. Adherence to the Mediterranean diet was evaluated using the validated literature-based adherence score (MEDI-LITE). The associations between the MEDI-LITE and the various sustainability indicators were assessed using analysis of covariance models, adjusted for sex, age and energy intake. Higher adherence to the MEDI-LITE was associated with higher nutritional quality scores, better overall nutrient profile as well as reduced environmental impact (land occupation: Q5 vs. Q1: -35%, greenhouse gases emissions: -15%, and cumulative energy demand: -17%). In turn, monetary cost increased with increasing adherence to the Mediterranean diet (Q5 vs. Q1: +15%) while higher adherents to the Mediterranean diet had overall higher pesticide exposure due to their high plant-based food consumption. Higher levels of adherence to the Mediterranean diet were associated with some other Mediterranean lifestyle features: higher frequency of elevated-level of physical activity and organic food consumption, and lower consumption of ready-made products. In this large cohort of French adults, greater adherence to the Mediterranean diet was associated with nutritional and environmental benefits, but also with higher monetary cost and greater exposure to pesticides, illustrating the necessity to develop large-scale strategies for healthy, safe (pesticide- and contaminant-free), and environmentally sustainable diets for all.

# Early childhood feeding with Swedish Milk Cereal Drink, does it promote (un)healthy growth?

**Dr. Annelie Lindholm<sup>1</sup>**, Prof. Lauren Lissner<sup>2</sup>, Associate Professor Monica Hunsberger<sup>2</sup>

<sup>1</sup>School of Health and Welfare, Halmstad University, Halmstad, Sweden, <sup>2</sup>School of Public Health and Community Medicine, University of Gothenburg, Gothenburg, Sweden

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** Early rapid weight gain (RWG) is associated with overweight and abdominal adiposity in children, and these factors are in turn related to adverse health consequences later in life. Early nutrition has been identified as an important risk factor. In Sweden, milk cereal drink (MCD) is recommended to be introduced at 6 months and continued during introduction of complementary foods, often longer. The aim of this study was to investigate if MCD consumption was associated with RWG in infancy and elevated waist-to-height ratio (WHtR) later in childhood.

**Methods:** This study is based on longitudinal data in the Swedish cohort of the IDEFICS study between birth and 15 years. Early growth data from archival health records and information from parents regarding MCD consumption, maternal BMI and family income was available for 1391 children. After excluding 38 children born prematurely, n=1353. RWG was defined as a change > 0.67 in weight standard deviation scores (SDS) between 6–12 months. Follow up data regarding waist circumference and height were available in around half of the children who were re-examined at ages 7–15 years. Logistic and linear regressions were used to study associations between MCD and early RWG and subsequent predictive value of RWG on WHtR later in childhood.

**Results/findings:** MCD was consumed by 59% of the children and 80% of them consumed it for more than three months. RWG, which was observed in 18% of the children between 6–12 months was associated with MCD consumption ever/never (OR: 1.47 95% CI: 1.05–2.07 p: 0.026), when corrected for maternal BMI, birth weight, sex of child and household income. When investigating WHtR in the 646 children at follow up, RWG between 6–12 months was associated with WHtR (B: 0.008 95% CI: 0.001–0.014 p: 0.025) when corrected for baseline WHtR, MCD consumption, sex and age at follow up. In the full model considering the total observation time the MCD effect was not independent of RWG.

**Conclusions:** Our results indicate that early RWG is associated with higher WHtR later in childhood. Our results also raise the possibility that MCD consumption may be involved in later development of centralized adiposity.

# Lifestyle Factors and Their Impact on Gastrointestinal Symptoms in Young Adults With and Without Irritable Bowel Syndrome

**Dr. Alexa Evenson<sup>1</sup>**, Ms. Shelby Stovern<sup>1</sup>

<sup>1</sup>College of Saint Benedict/Saint John's University, Saint Joseph, USA

Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** The purpose of this research was to investigate the relationship between gastrointestinal (GI) symptoms, breath hydrogen, physical activity, stress, sleep, anxiety, and dietary intake in young adults with and without Irritable Bowel Syndrome (IBS). Studies indicate certain lifestyle variables are often more prominent in individuals with IBS including higher rates of anxiety, higher intensity physical activity, restriction of certain foods, and disrupted sleep.

**Methods:** Young adults (n=14 IBS and n=24 non-IBS; ages 18-22) participated in the study. Fasted participants consumed a low-FODMAP smoothie. Breath hydrogen and salivary cortisol were measured at Baseline, 1, 2, and 3 hours. GI symptoms were measured at baseline, .5, 1, 1.5, 2, 3, 12, and 24 hours. Questionnaires including the STICSA, IPAQ-SF, NCI Dietary Screener, PSS, and PSQI were used to measure State and Trait anxiety, physical activity, dietary intake, perceived stress, and sleep. Independent t-tests, spearman rho, and backwards stepwise regression were used to analyze variables with significance set at  $p < .05$ .

**Results/Findings:** Dietary variables, physical activity, and sleep did not correlate to breath hydrogen or GI symptoms in either Non-IBS or IBS group ( $p > .05$ ). There were no differences between non-IBS and IBS groups in any dietary variable including fruits, vegetables, fiber, dairy, added sugar, whole grains, physical activity, stress, or sleep ( $p > .05$ ). There were no differences in State or Trait anxiety between the non-IBS and IBS groups ( $p > .05$ ). The results of the regression analysis indicate that in IBS participants, Total State and Trait anxiety and cortisol levels explained 56.9% and 5.9% of the variance in GI symptoms, respectively, ( $F(3,10)=5.472$ ,  $p=.017$ ). GI symptoms were not predicted by any lifestyle variable in non-IBS participants ( $p > 0.5$ ).

**Conclusion:** In this sample of individuals with and without IBS, lifestyle factors such as dietary intake, physical activity, anxiety, and sleep did not differ significantly between groups. Anxiety and cortisol levels were large factors in predicting GI symptoms, but only in IBS participants. It may be warranted to assess anxiety and physiological stress markers in those with IBS to potentially improve GI symptoms.



# Beyond the Classroom: Nutrition Knowledge, Stress, and Dietary Intake Self Efficacy in Undergraduate Introductory Nutrition Students

**Dr. Alexa Evenson<sup>1</sup>, Dr. Emily Heying<sup>1</sup>**

<sup>1</sup>College of Saint Benedict/Saint John's University, Saint Joseph, USA

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** J. Young Adults

**Purpose:** The broad purpose of this research was to investigate the relationship between nutrition knowledge, perceived stress, and self-efficacy of consuming fruits and vegetables, and fiber in undergraduate students enrolled in introductory nutrition courses at a residential, liberal-arts institution. Studies indicate that self-efficacy is associated with nutrient and food group intake in college students but understanding the role of nutrition knowledge and other factors on self-efficacy is less well-known.

**Methods:** Participants (n = 336) included undergraduate students between the ages of 18-24 enrolled in introductory nutrition courses. Data was collected at the beginning (pre) and end (post) of the course via an online survey. The survey entailed a 12-item nutrition knowledge assessment, the Patient Centered Assessment and Counseling for Exercise (PACE+) dietary surveys for self-efficacy of consuming fruits and vegetables, and fiber and the perceived stress scale (PSS). Paired t-tests and backwards stepwise regression were used to analyze the data with significance set at  $p < .05$ .

**Results/Findings:** Nutrition knowledge and perceived stress increased significantly ( $p < 0.0001$ ,  $p = 0.049$ , respectively) between pre (Mean:  $6.0 \pm 1.9$ ;  $16.4 \pm 6.2$ , respectively) and post measurements (Mean:  $8.6 \pm 2.4$ ;  $17.3 \pm 6.8$ , respectively). There was no change in fruit and vegetable, or fiber intake self-efficacy scores ( $p > .05$ ). The results of the regression analysis indicated that pre-nutrition knowledge and post-self-efficacy explained 13.1% and 5.9% of the variance in post-nutrition knowledge, respectively ( $F(2, 137) = 10.67$ ,  $p < .001$ ). Pre-fruit and vegetable self-efficacy and post-nutrition knowledge explained 35.1% and 1.4% of the variance in post-fruit and vegetable self-efficacy, respectively, ( $F(2, 337) = 97.147$ ,  $p < .001$ ). Pre-fiber self-efficacy and post-nutrition knowledge explained 30.7% and 1.9% of the variance in post-fiber self-efficacy, respectively, ( $F(2, 337) = 81.575$ ,  $p < .001$ ). Ethnicity, purchasing food on or off-campus, and perceived stress were not significant predictors of post-nutrition knowledge, post-fruit and vegetable self-efficacy, or post-fiber self-efficacy.

**Conclusions:** Nutrition knowledge and perceived stress increased, which is to be expected at the end of the semester. Self-efficacy scores did not increase, which may indicate that students either already had the self-efficacy prior to enrolling in the course or the course content made them realize they had more to learn when making dietary choices.

# 24-hour time-use composition, brain volume and cognition in healthy older adults: cross-sectional findings of the ACTIVate study

**Miss Maddison Mellow**<sup>1</sup>, Dr. Dot Dumuid<sup>1</sup>, Prof. Timothy Olds<sup>1</sup>, Dr. Ty Stanford<sup>1</sup>, Dr. Jurgen Fripp<sup>2</sup>, Dr. Ying Xia<sup>2</sup>, Dr. Alexandra Wade<sup>1</sup>, Dr. Bryan Paton<sup>3</sup>, Prof. Jill Dorrian<sup>4</sup>, Prof. Michael Breakspear<sup>3</sup>, Dr. Mitchell Goldsworthy<sup>5, 6</sup>, Dr. Ashleigh Smith<sup>1</sup>

<sup>1</sup>Alliance for Research in Exercise, Nutrition and Activity (ARENA), University of South Australia, Adelaide, Australia, <sup>2</sup>Australian e-Health Research Centre, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Brisbane, Australia, <sup>3</sup>The University of Newcastle, Newcastle, Australia, <sup>4</sup>Behaviour-Brain-Body Research Centre, University of South Australia, Adelaide, Australia, <sup>5</sup>Hopwood Centre for Neurobiology, South Australian Health and Medical Research Institute (SAHMRI), Adelaide, Australia, <sup>6</sup>Lifespan Human Neurophysiology Group, School of Biomedicine, University of Adelaide, Adelaide, Australia

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** Physical activity (PA) in older adulthood can slow grey matter atrophy and maintain cognition, however the 24-hour day is also made up of sedentary behaviour (SB) and sleep. No studies have investigated how the balance (composition) of all activities across the 24-hour day is associated with grey matter volume in healthy older adults, or whether brain volume impacts the relationship between 24-hour time-use composition and cognition.

**Methods:** Magnetic Resonance Imaging (MRI) was undertaken in 378 healthy older adults (mean age  $65.6 \pm 3.0$ , 123 males) to measure total grey matter (GM) volume and several regions of interest (frontal lobe, temporal lobe and hippocampal volume). 24-hour time-use patterns (time spent in sleep, SB, light PA and moderate-to-vigorous PA (MVPA)) were captured using accelerometry. Three domains of cognition (memory, executive function and processing speed) were measured using a series of tests in the CANTAB test battery. Correlations between all variables were explored. Then, log-ratio multiple linear regression models were used to (1) investigate associations between 24-hour time use and brain volume outcomes, and (2) investigate interactions between 24-hour time-use composition and brain volume for cognitive outcomes.

**Results/Findings:** There were no relationships between MVPA, light PA, SB or sleep (considered independently or as a 24-h time-use composition) and brain volume outcomes. Significant time use \* total GM volume ( $p=0.04$ ) and time use \* frontal lobe volume ( $p=0.02$ ) interactions were found for memory outcomes. Predictive modelling of these relationships demonstrated that reallocating time to MVPA was associated with better memory, but only in those with smaller total GM and frontal lobe volumes (i.e., below cohort mean). There were minimal predicted associations between reallocating time to or from SB, sleep and LPA with memory outcomes, and this did not differ by volume.

**Conclusions:** This study found no associations between 24-hour time-use composition and GM volume in healthy older adults. Reallocating time towards MVPA is associated with better memory for those with lower brain volumes vs higher brain volumes. These relationships should be explored longitudinally to uncover temporal effects.

# Fit and Fabulous: Using Community-Based and Novel Methods to Assess Cardiorespiratory Fitness and Physical Activity Among American Emerging Adults who are Underrepresented in Behavioral PA Research

**Assistant Prof. Sarah Espinoza<sup>1</sup>, Dr. Eydie Kramer-Kostecka<sup>1</sup>**, Dr. Laura Hooper<sup>1</sup>, Dr. Daheia Barr-Anderson<sup>1</sup>, Dr. Dianne Neumark-Sztainer<sup>1</sup>

<sup>1</sup>University of Minnesota, Minneapolis, USA

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** Project EAT (Eating and Activity over Time) is a well-established longitudinal research program in the U.S. Using multiple methods (surveys; qualitative approaches), EAT research has informed activity, nutrition, and weight-related health interventions for decades. This poster will describe the unique community-based methods and novel assessment tools used for an EAT substudy that evaluated cardiorespiratory fitness (CRF) and physical activity (PA) among a diverse sample of emerging adults who are typically underrepresented in behavioral PA research.

**Methods:** In 2022, a subsample of EAT participants who completed surveys in 2010 and 2018 ( $N=1,568$ ; baseline  $M_{age}=14.3$  years $\pm 2.0$ ) attended in-person visits to evaluate CRF. Since U.S.-based CRF research disproportionately samples participants who are White, wealthy, and lower weight status, we oversampled participants who identified as Black, Indigenous, or Persons of Color (BIPOC) and those with BMI $>25$ . At visits, we measured anthropometrics and body composition with height boards and bioelectrical impedance analysis scales. To assess CRF, participants completed the YMCA 3-Minute Step Test, a minimally discomforting submaximal exercise test, at community gyms near their homes. We took additional measures to make CRF visits feasible and worthwhile for participants, including offering childcare, trial passes to gyms, and monetary incentives. Physical activity was assessed multiple ways: participants reported their weekly hours of PA using the modified Godin-Shephard Leisure Time Physical Activity Questionnaire (also used in EAT 2010, 2018 surveys) and completed two National Cancer Institute ACT24 (Activities Completed over Time in 24 Hours) recalls to capture their activities over separate days. This was the first time EAT participants completed the ACT24, an assessment tool that captures granular PA data, such as energy costs, associated with specific activities.

**Results:** We successfully enrolled 95 participants (64.2% female; 75% BIPOC;  $M_{age}=27.2$  years old;  $SD_{age}=1.9$ ;  $M_{BMI}=28.2$ ;  $SD_{BMI}=5.9$ ; mode $_{monthlyincome}=\$3,300-\$4,199$ ) who completed CRF, anthropometric, and PA assessments. Initial analyses show age- and sex-normed CRF ratings ranged from Excellent–Average ( $n=43$ ; 45.3%) to Below Average–Very Poor ( $n=52$ ; 54.7%).

**Conclusions:** Using community-based methods and valid assessments, we generated much-needed data on CRF and PA among diverse American adults. Scholars should consider how using accessible methods can increase representation in behavioral PA research.

# Pedestrian Safety & Walkability: Examining Relationships Across the Rural Continuum

**Dr. Marilyn E. Wende<sup>1</sup>**, Dr. Dana M. Alhasan<sup>2</sup>, Dr. Renée Umstattd Meyer<sup>1</sup>

<sup>1</sup>Baylor University, Waco, USA, <sup>2</sup>University of South Carolina, Columbia, USA

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Rates of pedestrian injury/death are high in rural areas, showing fatality rates six times higher compared to most urban areas. However, few studies have examined the relationship between walkability and pedestrian crashes by urban-rural status to address disparities in pedestrian outcomes. This presentation examines the relationship between walkability and pedestrian crashes across Texas, overall and by urban-rural status.

**Methods:** This ecological study occurred at the block group-level in Texas, USA (N=15,811). Our continuous walkability measure (1-20), obtained from the Environmental Protection Agency's National Walkability Index (NWI;2021), includes land use mix, intersection density, and distance to transit stops. Pedestrian crash locations were ascertained from Texas Department of Transportation to create a block group-level count for 2021. Urban-rural status was determined using Rural-Urban Commuting Area codes (metropolitan, micropolitan, small rural areas, isolated rural areas), based on population density, urbanization, and commuting patterns. Choropleth maps were created to display walkability and pedestrian crashes. Negative binomial regression, with an offset for population size, was used to estimate rate ratios (RR), adjusting for population density, percentage Non-Hispanic White residents, zero-car households, and low-wage workers.

**Results:** Average annual pedestrian crash count was 0.58 (SD:1.2; range:0-35), 0.29 (SD:0.72; range:0-9), 0.17 (SD:0.47; range:0-4), and 0.18 (SD:0.54; range: 0-4) in metropolitan, micropolitan, small rural, and isolated rural areas. Overall, one-unit walkability increase was associated with 17% more pedestrian crashes (RR=1.17 [95% CI:1.16-1.18]). One-unit walkability increase was associated with 17% (RR=1.17 [95% CI:1.16-1.18]), 15% (RR=1.17 [95% CI:1.09-1.21]), and 21% (RR=1.21 [95% CI:1.11-1.32]) more pedestrian crashes in metropolitan, micropolitan, and small rural areas, respectively. In isolated rural areas, walkability was not associated with pedestrian crashes (RR= 0.99 [95% CI:0.87-1.14]).

**Conclusions:** NWI is made up of macroscale features that indicate whether active transportation to destinations is possible in any given location, regardless of safety, so findings demonstrated that increased walkability was associated with increased pedestrian crashes in non-isolated areas. Future research can incorporate *microscale* and safety-related walkability features, such as sidewalks and road buffers, to inform intervention efforts in more rural locations where active transportation is less common and spaces for leisure walking are critically needed.

# The Effect of a Home Visiting Program on Pregnant Clients' Moderate-Intensity Physical Activity: A Quasi-Experimental Design with a Propensity Score Matched Comparison Group

Dr. Angela Dyer<sup>1</sup>, Dr. Christa Lilly<sup>2</sup>, Dr. Sara Amadon<sup>3</sup>, Dr. Danielle Davidov<sup>2</sup>, **Dr. Christiaan Abildso<sup>2</sup>**

<sup>1</sup>West Virginia University Office of Health Affairs, Morgantown, USA, <sup>2</sup>West Virginia University School of Public Health, Morgantown, USA, <sup>3</sup>Child Trends, Bethesda, USA

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** N. Other

**Purpose:** In the U.S., home visitation program workers provide evidence-based, in-home services to address health disparities experienced by disadvantaged pregnant women and/or families with young children. Low-income pregnant women are less active than wealthier ones. Thus, the purpose of this study was to evaluate the impact of the Maternal Infant Health Outreach Worker (MIHOW) peer-delivered home visitation program curriculum on pregnant clients' moderate-intensity physical activity (MPA).

**Methods:** This longitudinal study consisted of 98 intervention and 56 comparison group participants with MPA assessed at trimesters one, two and/or three using the Pregnancy, Infection, and Nutrition (PIN3) self-report instrument. A nonrandomized quasi-experimental research design was utilized to evaluate the change in metabolic equivalent of task (MET) minutes of MPA per week changed in the intervention group relative to a propensity score matched comparison group of pregnant women. Generalized linear mixed modeling with a zero inflated negative binomial distribution was used as the statistical analysis strategy.

**Results/findings:** Median MET-minutes of MPA per week for the intervention group was 1,947 (IQR 315-3,570) at trimester 1 (~10 hours of walking) and 2,238 (IQR 130.5-4,578) at trimester 2, decreasing to 792 (IQR 210-2,772) at trimester 3. Analyses showed that (1) the expected log absolute MPA MET-minutes per week decreased 1.27 less for the comparison group than for the intervention group by trimester 3 [ $\chi^2(1) = 4.77$ ,  $p = .0289$ ], (2) the expected log absolute MPA MET-minutes per week was 1.49 lower for the comparison group than for the intervention group across time [ $\chi^2(1) = 8.12$ ,  $p = .0044$ ], and (3) the log odds of not participating in any absolute MPA MET-minutes per week was 1.46 lower for the comparison group than for the intervention group [ $\chi^2(1) = 4.63$ ,  $p = .0314$ ].

**Conclusions:** The home visitation workforce includes roughly 18,500 individuals in the US - a substantial resource to help overcome the significant health disparities experienced by low-income pregnant women. The results suggest a need for more quantity or quality of MPA content in the curriculum, a greater emphasis on reducing sedentary time, and home visitor training on effective MPA curriculum delivery.

# Exploring Potential Scales to Measure the Acculturation of Hispanic Immigrants to U.S. Dietary Behaviors

**Assistant Professor Maria Romo Palafox<sup>1</sup>**, Ms. Grace K. Moore<sup>1</sup>

<sup>1</sup>Saint Louis University, St. Louis, USA

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** U.S. Hispanic health outcomes research uses proxy measures of acculturation (i.e., the process wherein immigrants adopt the practices of a host culture), such as language or identity, to study diet-related outcomes (e.g., obesity and infant feeding styles). This methodological gap could lead to misleading conclusions about Hispanic health and perpetuate health disparities. This exploratory study tested the association between the Short Acculturation Scale for Hispanics (SASH), the Acculturation Rating Scale for Mexican Americans II (ARSMA-II), and an investigator-designed self-reported measure of dietary acculturation.

**Methods:** Preliminary, exploratory analysis of an ongoing online survey (2021-2022) with Hispanic immigrant mothers of children  $\leq 18$  years who provided demographic data, responded to the SASH, ARSMA-II, and to a Likert scale rating their diet as more similar to the U.S. diet or to the typical diet of their country of origin. SASH and ARSMA-II scores were computed per their respective methodologies; self-reported dietary acculturation is measured using the mean response to four eating scenarios (at home, with friends, at restaurants, and with family).

**Results:** Twelve Hispanic mothers of children  $< 18$  years of age immigrated from Mexico, Colombia, Honduras, Peru, and Costa Rica. Participants' age of immigration ranged from 17-46, and years lived in the U.S. ranged from  $< 1$  to 19 years. Preliminary independent t-tests suggest that there is a significant difference between self-reported dietary acculturation (mean=3.01) and SASH scores (delta=0.83, 95% CL 0.19-1.46;  $p=0.02$ ), general Hispanic Orientation (delta=1.14, 95% CL 0.45-1.78;  $p<0.01$ ), Hispanic identity (delta=1.63, 95% CL 0.65-2.61;  $p<0.01$ ) and Anglo identity (delta=-1.98, 95% CL -2.6 - -1.36;  $p<.0001$ ). Conversely, there was no significant difference between self-reported dietary acculturation and general Anglo Orientation (delta=-0.02, 95% CL -1.26 - 1.22;  $p=0.9710$ ).

**Conclusion:** Current acculturation measures fail to capture the multifaceted process of dietary acculturation, nor can they discern beneficial from harmful dietary changes and could hinder our understanding of diet-related health outcomes (e.g., obesity) of immigrant populations. Moreover, a comprehensive exploration of dietary acculturation could explain why Hispanic immigrants experience better health outcomes than white U.S. natives, yet Hispanics born to immigrants experience worse health outcomes and lead to the development of effective behavioral interventions.



# Child Report of Food Insecurity is Not Associated with Increased Consumption of Ultra Processed Foods

**Dr. Matthew Landry<sup>1</sup>**, Dr. Matthew Jeans<sup>2</sup>, Dr. Jaimie Davis<sup>2</sup>

<sup>1</sup>Stanford University, Palo Alto, CA, USA, <sup>2</sup>University of Texas at Austin, Austin, TX, USA

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** Excessive consumption of highly processed foods is a proposed mechanism to explain how children from food insecure households have lower diet quality and higher prevalence of obesity. The objective of this study was to examine dietary intake by processing category in food secure and food insecure children.

**Methods:** Cross-sectional data were used from TX Sprouts, a school-based cooking, gardening, and nutrition intervention of low-income, elementary school children (n=751). Food items from two, 24h dietary recalls were coded by extent and purpose of industrial processing (NOVA food classification system categories: ultra-processed, moderately processed, and minimally processed/unprocessed). Percentage of total energy intake by processing level were computed per day and averaged per child. Food security status was self-reported by the children via the validated 5-item Child Food Security Assessment. Mixed effect regression models were used to estimate the associations between percentage of calories consumed by processing level and food security status. Models were adjusted for child's age, sex, ethnicity, and if the child was eligible for free or reduced-price school meals.

**Results:** The sample was 47% male, mean age 9.8 years; 57% Hispanic; 63% eligible for free or reduced-price school meals. Food insecurity was not associated with a higher percentage of total energy intake of ultra-processed foods (46.4% vs. 46.0%; 95%CI: -2.6,1.5). Food insecurity was also not associated with a higher percentage of total energy intake of moderately processed or minimally processed/unprocessed foods.

**Conclusions:** Among a sample of low-income elementary aged school children, our findings do not support an association between child report of food insecurity and increased consumption of ultra-processed foods. Results do suggest an opportunity to decrease ultra-processed food consumption among low-income children in general. Further research is needed to explain the biobehavioral mechanisms behind lower diet quality and higher prevalence of obesity in food insecure children.

# Influence of body mass index z-score on social connections during a school-based obesity intervention

**Dr. Katherine Arlinghaus<sup>1</sup>**, Dr. Tyler Prochnow<sup>2</sup>

<sup>1</sup>University of Minnesota School of Public Health, Minneapolis, USA, <sup>2</sup>Texas A&M University Department of Health Behavior, College Station, USA

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** Prior research indicates weight status is related to a persons' social network and youth with a higher body mass index report more difficulties with peer relationships. The purpose of this study was to use social network analysis to examine how adolescent body mass index z-score (zBMI) relates to social connections in a school-based behavioral obesity intervention.

**Methods:** Adolescents in a public charter school in Houston, Texas were recruited to participate in a behavioral obesity intervention during their physical education (PE) class. During the first and last weeks of the semester-long intervention, adolescents (n=156) nominated up to three female and three male friends they felt closest to in PE. Height and weight were also directly measured at the beginning and end of the intervention. These measures were used to calculate zBMI. Exponential random graph modeling was used to determine if zBMI was related to social connections in PE. Separate models were conducted for each timepoint.

**Results:** Participants had a mean age of 13.51 years old (SD: 1.45) and mean zBMI of 1.09 (SD: 0.96). Most participants identified as Hispanic (85.3%) and female (52.6%). Participants with higher zBMI at baseline were significantly less likely to feel close to others in the class (PE=-0.11, p=.04); however, this effect was not significant at the end of the intervention. zBMI scores did not significantly alter the odds of students being nominated as a friend at either timepoint (PE=0.09, p=.11; PE=-0.02, p=.73).

**Conclusions:** Consistent with prior research, findings indicate zBMI to be related to social connections. However, zBMI was only related to the number of friend connections the adolescent reported, not the number of friend connections the adolescent received, which indicates that difficulties with peer relationships reported in other studies may be based on the adolescent's perception of their social connections, not their actual social connections. Further, because this association was only found at baseline, these results imply that participation in a behavioral obesity intervention as a PE class may help youth of higher zBMI feel more confident in their social connections.

# “Fitstagram”: Describing fitness-related Instagram use, information seeking, and physical activity engagement among a sample of emerging adults

**Miss Stephanie Grace**<sup>1</sup>, Marla E Eisenberg<sup>2</sup>, Maureen Weiss<sup>3</sup>, Dr. Dunja Antunovic<sup>3</sup>, Dr. Daheia Barr-Anderson<sup>3</sup>

<sup>1</sup>University of Minnesota, Twin Cities, Minneapolis, USA, <sup>2</sup>Medical School, University of Minnesota, Twin Cities, USA, <sup>3</sup>School of Kinesiology, University of Minnesota, Twin Cities,

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** J. Young Adults

**Introduction:** Emerging adults (aged 18 to 29) are using social media to learn about physical activity (PA). Instagram is a popular site among this age group, where fitness-related content is abundant. Young people may seek PA information on Instagram that could influence their PA engagement. Characterizing fitness-related Instagram use (i.e., Instagram use that involves accessing PA- or fitness-related content) with contextual factors, like PA information seeking and engagement, aids comprehension of why fitness-related social media use may be worth considering when promoting PA among emerging adults.

**Purpose:** To describe fitness-related Instagram use, PA information seeking, and PA engagement among a sample of emerging adults.

**Methods:** One hundred emerging adults in the US who used Instagram regularly ( $\geq 30$  minutes/day) answered an online survey. Participants reported daily time spent on Instagram in general and characteristics of their fitness-related Instagram use including daily viewing frequency, types of content accessed (e.g., trainers/athletes, everyday people), types of engagement with content (e.g., likes, shares, posts), and reasons for viewing (e.g., to learn about health/wellbeing, to inspire me to change my body shape). PA information seeking and engagement were also measured. Descriptive statistics and frequencies were analyzed using SAS studio.

**Results:** Participants were  $23.0 \pm 3.6$  years old. Most identified as women (74%) and white (78%). Participants spent  $1.3 \pm 1.0$  hours/day on Instagram, on average. Most reported accessing fitness-related content (94%). Of those, majority accessed it 1-5 times/day (52%) and viewed content featuring trainers/athletes (65%). Content appearing on feed (88%) and sharing content with friends (38%) were common passive observing and active contributing activities, respectively. Inspiring exercise or improving health/wellbeing was the most reported reason for accessing content. Most sought information about PA often (43%), including seeking it online, broadly (38%). Light, moderate, and vigorous PA engagement were  $8.6 \pm 9.4$ ,  $5.2 \pm 6.0$ , and  $2.9 \pm 3.4$  hours/week, respectively.

**Conclusion:** Fitness-related Instagram use seems to be common, which is important for understanding how young people use social media as a source of information and inspiration to exercise. PA promotion programs may benefit by modeling characteristics of trainers/athletes' posts while simultaneously sharing high-quality PA information to maximize young people's interest and maintain integrity of content.

# Gut microbiota modulation of lipid and immune response to fermented rye intervention

**Miss Wenyun Li**<sup>1</sup>, Associate Professor Yuwei Liu<sup>1</sup>, Prof. Rikard Landberg<sup>2</sup>, Dr. Kun Xue<sup>1</sup>, Prof. Gengsheng He<sup>1</sup>

<sup>1</sup>Fudan University, Shanghai, China, <sup>2</sup>Chalmers University of Technology, Gothenburg, Sweden

Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** Rye intervention has received increasing attention in treatment of cardiovascular and immune diseases. In this study, we supposed that whole grain rye intervention has beneficial effects on lipid metabolism and inflammation, and microbial metacommunity could account for the different response to high fiber intervention between subjects with obesity and normal weight.

**Methods:** A parallel dietary intervention was conducted and 182 subjects with normal weight or obesity who had a low habitual consumption of high fiber cereal foods were randomly assigned to FRB or RW group for 12 weeks. Fasting blood sample collection and gut microbiota determination were performed at week 0 and 12. Bacterial communities were measured by 16S rRNA sequencing. Taxonomic features were identified by STAMP software. KEGG pathway was analyzed by Tax4Fun2 package in R software.

**Results:** 1. Compared with RW group, the FRB group had significantly lower low-density lipoprotein cholesterol (LDL-C) (-0.30 versus -0.09 mmol/L, FRB versus RW group) and high-sensitivity C-reactive protein (hs-CRP) (-0.02 versus 0.03 mg/dL, FRB versus RW group) after 12-week intervention. No significant difference was found in total cholesterol (TC) and triglyceride (TG) levels between two groups. 2. In subjects with obesity, hs-CRP was significantly reduced in FRB group, while TC, LDL-C and TG showed no significant changes after intervention. In subjects with normal weight, TC, LDL-C and TG levels were significantly reduced in FRB group, while hs-CRP remained unchanged. 3. In subjects with obesity, the relative abundance of Lachnospiraceae was significantly increased in FRB group, and Gammaproteobacteria, Enterobacteriaceae and Enterobacterales were significantly increased in RW group at week 12. In subjects with normal weight, the relative abundance of Lachnospiraceae was significantly increased in FRB group, while no gut microbiota significantly changed after RW intervention. Moreover, the Lachnospiraceae and Lachnospiraceae abundance were negatively associated with LDL-C and hs-CRP in FRB group. 4. The predicted functions of the microbiota under FRB intervention in subjects with obesity were related to Glycerolipid metabolism.

**Conclusion:** Rye intervention had different health benefits on obesity or non-obesity, and gut microbiota could partly account for the different response to rye intervention. Personalized interventions were needed according to BMI.

# Thermal perception, physical activity, and transit use of adults in a humid subtropical climate

**Assistant Professor Kevin Lanza**<sup>1</sup>, Associate Professor Baojiang Chen<sup>1</sup>, Associate Professor Paquito Bernard<sup>2</sup>, Associate Professor Jennifer Vanos<sup>3</sup>

<sup>1</sup>The University of Texas Health Science Center at Houston, Austin, USA, <sup>2</sup>University of Quebec in Montréal, Montréal, Canada, <sup>3</sup>Arizona State University, Tempe, USA

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** 47% of U.S. adults self-reported meeting federal guidelines for aerobic physical activity in 2020. Studies have shown high outdoor temperatures to be associated with lower physical activity levels, yet none have focused on the psychological element of thermal comfort in relation to physical activity. We determined how thermal perception of adults relates to physical activity and public transit use.

**Methods:** This cross-sectional study occurred in Austin, TX, USA where June–September is greater than 33°C (91°F) on average. Over September–November 2022, we distributed an electronic quantitative survey to a municipal database of ~9,000 Austin residents, which included the International Physical Activity Questionnaire - Short Form and items about transit use during a typical week and what temperature outside starts to feel too hot to go on a neighborhood walk. Before regression modeling to test how temperatures considered too hot were associated with weekly MVPA minutes and transit use, we utilized the pseudo-score test to assess whether piecewise linear relationships existed. Final models adjusted for survey items on age, sex, race/ethnicity, work status, income, general health, and presence of different neighborhood environment elements (e.g., sidewalks).

**Results:** The 1,087 adults (mean = 53 years, 49% female, 78% White, \$100,000–\$149,000 median household income) who completed the survey self-reported 437 (SD = 570) MVPA minutes weekly, and 13% were transit users. Average temperature considered too hot was 33°C (SD = 4°C). Temperature considered too hot did not exhibit a significant association with minutes of MVPA ( $\beta = 0.02$ ; 95% CI [-0.09, 0.13]) ( $p > 0.05$ ) up until 31°C (88°F) when the association changed to an increase ( $\beta = 0.20$ ; 95% CI [0.01, 0.38]) ( $p < 0.05$ ). Each one-unit increase in temperature considered too hot was associated with an 8% (95% CI [3, 14%]) higher likelihood of using transit ( $p < 0.01$ ).

**Conclusions:** Adults who self-report high temperature thresholds for walking outdoors may be more likely to engage in physical activity and use transit, serving as early evidence for developing psychological interventions that promote physical activity in warm climates in the face of climate change.

# Children's eating behaviours and related constructs: Conceptual and theoretical foundations and their implications for measurement and intervention

Prof. Alan Russell<sup>1</sup>, Dr. Elena Jansen<sup>2</sup>, Dr. Alissa Burnett<sup>3</sup>, Ms. Tracy Lee<sup>3, 4</sup>, **Dr. C. Georgie Russell<sup>3</sup>**

<sup>1</sup>Flinders University, College of Education, Psychology and Social Work, Bedford Park, Australia, <sup>2</sup>Johns Hopkins University School of Medicine, Division of Child & Adolescent Psychiatry, Department of Psychiatry & Behavioral Sciences, Baltimore, USA, <sup>3</sup>Deakin University, Institute for Physical Activity and Nutrition (IPAN), School of Exercise and Nutrition Science, Geelong, Australia, <sup>4</sup>Deakin University, CASS Food Research Centre, School of Exercise and Nutrition Science, Geelong, Australia

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** There is a substantial body of research on children's eating behaviours (e.g., food responsiveness and fussiness) and related constructs (e.g., eating in the absence of hunger, appetite self-regulation). This research provides a foundation for understanding children's dietary intakes and healthy eating behaviours, as well as efforts at intervention, whether in relation to food avoidance, overeating and/or trajectories to excess weight gain. The success of these efforts and their associated outcomes is dependent on the theoretical foundation and conceptual clarity of the behaviours and constructs. This, in turn contributes to the coherence and precision of the definitions and measurement of these behaviours and constructs. Limited clarity in these areas ultimately creates uncertainty around the interpretation of findings from research studies and intervention programs. At present there does not appear to be an overarching theoretical framework of children's eating behaviours and associated constructs, or for separate domains of children's eating behaviours/constructs. The main purpose of the present review was to examine the possible theoretical foundations of some of the main current questionnaire and behavioural measures of children's eating behaviours and related constructs.

**Methods:** We reviewed the literature on some of the most prominent measures of children's eating behaviours for use with children aged ~0-12 years. We focused on the explanations and justifications for the original design of the measures and whether these included theoretical perspectives, as well as current theoretical interpretations (and difficulties) of the behaviours and constructs.

**Results:** We found that the most commonly used measures had their foundations in relatively applied or practical concerns rather than theoretical perspectives.

**Conclusions:** We concluded that although existing measures have served the field well, to advance the field as a science, better contribute to knowledge development, measurement, and intervention design, increased attention should be directed to the conceptual and theoretical foundations of children's eating behaviours and related constructs. Suggestions for future directions will be outlined.



# Study design features and bursts of ecological momentary assessments: evaluating effects via randomised controlled trials embedded within a cohort study

**Dr. Sarah Edney**<sup>1</sup>, Ms. Claire Marie Jie Lin Goh<sup>1</sup>, Ms. Xin Hui Chua<sup>1</sup>, Ms. Alicia Low<sup>2</sup>, Ms. Janelle Chia<sup>2</sup>, Ms. Daphne Koek<sup>2</sup>, Dr. Karen Cheong<sup>2</sup>, Prof. Rob Van Dam<sup>1,3</sup>, Assistant Professor Chuen Seng Tan<sup>1</sup>, Dr. Falk Müller-Riemenschneider<sup>1,4</sup>

<sup>1</sup>National University of Singapore, Singapore, Singapore, <sup>2</sup>Health Promotion Board, Singapore, Singapore,

<sup>3</sup>The George Washington University, Washington DC, USA, <sup>4</sup>Charité-Universitätsmedizin Berlin, Berlin, Germany

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose** To evaluate the effects of study design features on response rates to ecological momentary assessment (EMA) bursts embedded within an ongoing cohort study.

**Methods** Over a 7-month period (April to Oct 2021), three bursts of EMA were implemented within the Health@NUS cohort study. The response rate (% of completed EMA surveys) at each burst was examined. Two consecutive randomised controlled trials (RCTs) were conducted to evaluate the efficacy of (1) four different incentive structures (with fixed and bonus components) and (2) two different schedule lengths (7 or 14 days), on EMA response rate. Group differences were examined using ANOVA.

**Results** Participants (N=384) were university students (60% female, mean age 23±1.3 years). Changing the reward structure did not significantly change the response rate ( $F(3, 380) = 1.75, p = 0.157$ ). Changing the schedule length led to a significantly higher mean response rate ( $F(1, 382) = 6.23, p = 0.013$ ) for the 14-day schedule (48.34±33.17%) as compared to the 7-day schedule (38.52±33.44%).

**Conclusions** Changing the available rewards did not lead to a significant difference in the response rate, whereas schedule length did. Our study provides novel insights on how to implement EMA surveys in ongoing cohort studies. This knowledge is essential for conducting high-quality studies using EMA surveys.

# Parents' and stakeholders' views on school-delivered physical activity interventions for children and adolescents with disability: a qualitative study

Dr. Emiliano Mazzoli<sup>1,2</sup>, Ms. Alice Sims<sup>2</sup>, **Dr. Natalie Lander<sup>1,2</sup>**, Dr. Ana Maria Contardo-Ayala<sup>1,2</sup>, Prof. Anna Timperio<sup>1,2</sup>, Associate Professor Nicola D. Ridgers<sup>3</sup>, Prof. David Lubans<sup>4,5,6</sup>, Prof. John Cairney<sup>7</sup>, Dr. Harriet Koorts<sup>1,2</sup>, Prof. Lisa Barnett<sup>1,8</sup>, Dr. Kate Anderson<sup>8,9</sup>, Prof. Jo Salmon<sup>1,2</sup>

<sup>1</sup>Institute for Physical Activity and Nutrition (IPAN), Deakin University, Burwood, Australia, <sup>2</sup>School of Exercise and Nutrition Sciences, Faculty of Health, Deakin University, Burwood, Australia, <sup>3</sup>Alliance for Research in Exercise, Nutrition and Activity, Allied Health and Human Performance, Adelaide, Australia, <sup>4</sup>Centre for Active Living and Learning, College of Human and Social Futures, University of Newcastle, Callaghan, Australia, <sup>5</sup>Hunter Medical Research Institute, New Lambton Heights, Australia, <sup>6</sup>Faculty of Sport and Health Sciences, University of Jyväskylä, Jyväskylä, Finland, <sup>7</sup>School of Human Movement and Nutrition Sciences, Faculty of Health and Behavioural Sciences, The University of Queensland, St Lucia, Australia, <sup>8</sup>School of Health and Social Development, Faculty of Health, Deakin University, Burwood, Australia, <sup>9</sup>Institute for Health Transformation (IHT), Deakin University, Burwood, Australia

Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** N. Other

**Purpose:** School-delivered physical activity interventions need to be adapted to the specific needs of children and adolescents with disability. The views of parents of children and adolescents with disability and stakeholder organisations working in disability may offer important insights on how to make current interventions more inclusive. This study aimed to explore parents' and stakeholders' perceptions on school-delivered physical activity opportunities for children and adolescents with disability, to inform the development of an inclusive whole-of-school physical activity program (i.e., TransformUs All Abilities).

**Methods:** Nine representatives from stakeholder organisations focused on disability, education, and health promotion, and 10 parents of children/adolescents with disability participated in 30-min one-on-one interviews. Stakeholder organisations were identified based on their relevance in the field and representatives were invited to participate via email. Parents were recruited via social media and snowballing. Interview questions were developed based on the framework by Proctor et al. (2011), which refers to *acceptability*, *adoption*, *appropriateness*, *feasibility*, *fidelity*, *implementation cost*, *penetration*, and *sustainability* as crucial aspects to consider for a given service/practice to be successful. Questions to parents focused on their individual-level experience, whereas questions to stakeholders were designed to capture a broader and organisational-level perspective. All interviews were audio-recorded, transcribed verbatim, and analysed using thematic analysis.

**Results:** Of the 19 interviewees, eleven identified as female. Most participants (63%) were aged between 40 and 59 years. Amongst the main factors that may contribute to the intervention success, participants identified ease of use for teacher as important in relation to *acceptability* and children related perceptions/interest in physical activity as critical to *adoption*. Tailoring the resources and equipment to cater for the specific needs of different disability types was the main theme associated with *appropriateness*. A shift in the school-culture towards favouring physical activity opportunities emerged as critical for ensuring the proposed intervention is *feasible* and *sustainable*.

**Conclusion:** Stakeholders and parents suggested that school-delivered physical activity strategies for children and adolescents with disability may be successfully implemented when they are tailored to the specific needs and interests of different students, easy for teachers to implement, and supported by the organisational culture as a whole-of-school practice.

# Detailed descriptions of physical activity patterns among individuals with prediabetes and diabetes: The Lolland-Falster Health Study

**Ms. Sofie Rath Mortensen**<sup>1,2</sup>, Prof. Søren T. Skou<sup>2,3</sup>, Associate Professor Jan Christian Brønd<sup>1</sup>, Associate Professor Mathias Ried-Larsen<sup>1,4</sup>, Dr. Randi Jepsen<sup>5</sup>, Dr. Therese Lockenwitz Petersen<sup>5,6</sup>, Associate Professor Lars Hermann Tang<sup>2,7</sup>, Mr. Lars Bo Jørgensen<sup>2,3,8</sup>, Prof. Anders Grøntved<sup>1</sup>

<sup>1</sup>The Research Unit for Exercise Epidemiology, Centre of Research in Childhood Health, Department of Sports Science and Clinical Biomechanics, University of Southern Denmark, Odense, Denmark, <sup>2</sup>The Research Unit PROgrez, Department of Physiotherapy and Occupational Therapy, Naestved-Slagelse-Ringsted Hospitals, Slagelse, Denmark, <sup>3</sup>Research Unit for Musculoskeletal Function and Physiotherapy, Department of Sports Science and Clinical Biomechanics, University of Southern Denmark, Odense, Denmark, <sup>4</sup>Centre for Physical Activity Research, Rigshospitalet, Copenhagen, Denmark, <sup>5</sup>Lolland-Falster Health Study, Nykøbing F. Hospital, Nykøbing Falster, Denmark, <sup>6</sup>Steno Diabetes Centre Sjælland, Holbæk, Denmark, <sup>7</sup>Department of Regional Health Research, University of Southern Denmark, Odense, Denmark, <sup>8</sup>Department of Physiotherapy and Occupational Therapy, Zealand University Hospital, Roskilde, Denmark

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose** The purpose of this study was to describe daily and weekly physical activity patterns among individuals with prediabetes and diabetes and compare these patterns with individuals with no known diabetes.

**Methods** This cross-sectional study included data from the Danish household-based prospective cohort study; The Lolland-Falster Health Study obtained in 2016-2020. Participants  $\geq 18$  years with accelerometer data and information about diabetes status were included in this study.

The primary outcome was objectively measured physical activity intensities assessed with hip-mounted AX3 accelerometry. Diabetes status was categorized into Diabetes, Prediabetes, and No diabetes by measured HbA1c and self-reported use of antidiabetic medication.

The distribution and comparison of physical activity intensities, adherence to WHO recommendations, timing of activity, and frequency of inactive days/week by diabetes status were estimated with standardization on age and sex. Multiple mixed linear, quantile and poisson regression models were used to estimate and compare physical activity patterns by diabetes status with adjustment of age and sex and subsequent for other major determinants of physical activity.

**Results/findings** Out of 3,158 participants, 181 participants had diabetes, 568 participants had prediabetes, and 2,409 participants did not have diabetes.

Participants with prediabetes and no diabetes had significantly higher daily median MVPA compared to participants with diabetes. Among participants with diabetes, 36.8 % complied with the WHO recommendations of weekly MVPA, while numbers for participants with prediabetes and no diabetes were 40.5 % and 50.4 % respectively.

The percentage of participants with diabetes having more than two consecutive days of inactivity ( $< 5$  minutes/day of MVPA) were 33.2%. Participants with diabetes were significantly less physically active in the afternoon compared to participants with no diabetes (-6.3 min, 95 % CI -10.2; -2.4). Overall, a part of but not the whole difference in physical activity patterns between participants with diabetes, prediabetes and no diabetes were explained by differences in other major determinants.

**Conclusions** This study found that a large proportion of individuals with diabetes and prediabetes were insufficiently physically active and difference in patterns of activity were observed for timing of activity, frequency of inactive days, and overall daily levels of light, moderate and vigorous activity.

# Characterising the Diet, Physical Activity and Sleep Behaviours of UK University Students

**Dr. Ruth James<sup>1</sup>**, Mr. Matthew Savage<sup>1</sup>, Dr. Daniele Magistro<sup>1</sup>, Dr. Kirsty Hunter<sup>1</sup>, Dr. Laura Healy<sup>1</sup>, Dr. James Donaldson<sup>1</sup>, Dr. Philip Hennis<sup>1</sup>

<sup>1</sup>Nottingham Trent University, Nottingham, United Kingdom

Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** J. Young Adults

**Purpose:** University students represent 2.66 million individuals in the UK alone, and around 50% of school leavers now continue to higher education (Bolton, 2022). This rapidly increasing graduate population will carry the self-care habits fostered at university into their mid-life and beyond. Up to date details of the current health behaviours of UK based students are scarce, and therefore the aim of this study was to characterise the diet, physical activity and sleep behaviours of this population.

**Method:** An online self-report survey was completed by 8,296 (66.9% female; 30.7% male) students at a UK university. The questionnaire used previously validated questions to assess levels of moderate to vigorous physical activity (MVPA), sedentary behaviour (SB), diet quality (DQS), alcohol use (AUDIT) and sleep quality (SQS). Descriptive data are reported as mean  $\pm$  1 standard deviation and percentages are as a proportion of those who completed the question.

**Results:** MVPA in 6,611 students was 281 $\pm$ 481 minutes per week; 44.6% of students were not meeting the government target of 150 minutes per week. Mean sedentary behaviour time was 464 $\pm$ 254 minutes per day in 6,283 students; 68.9% of students were spending >6h per day sedentary. DQS was 10 $\pm$ 2 in 4,393 students, measured on a scale of 5 to 15. Of these, 81.9% of students had an 'unhealthy' diet (<12 out of 15). The average AUDIT score was 7 $\pm$ 4 in 6,357 students and 51.5% of students were in the 'increasing risk' or 'higher risk' groups for alcohol use. SQS in 4,397 students was 6 $\pm$ 2 on a scale of 0 to 10; 57.5% experienced terrible, poor or fair sleep quality.

**Conclusion:** A large proportion of students have health behaviours known to be linked to the development of poor long-term health and non-communicable diseases (Ronto et al., 2018; Katzmarzyk et al., 2022). Universities are uniquely positioned to positively influence the development of healthier lifestyle choices as they provide some or all of an individual's education, accommodation, recreation, diet and exercise provision. Therefore, in collaboration with key stakeholders, institutions should look to implement policies and develop initiatives aimed at improving student health behaviours.

# Knowledge, attitude and practices toward health promotion among primary school teachers in Singapore

**Associate Professor Mary F-F Chong<sup>1</sup>**, Ms. Jamie J-M Kok<sup>1,2</sup>, Mr. Julian Azfar<sup>1</sup>

<sup>1</sup>National University of Singapore, Singapore, Singapore, <sup>2</sup>National University Hospital, Singapore, Singapore

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Background** Teachers are seen to be vital stakeholders in promoting health in the school setting, yet little is known about their knowledge, attitude and practices towards health promotion. We aimed to explore these among primary school teachers in Singapore, with a focus on health eating, physical activity (PA) and screen time.

**Methods** A questionnaire was designed, based on concepts of the Social Cognitive Theory and covered demographic information, level of knowledge regarding PA, screen-time and dietary concerns, attitudinal statements, perception of practices and open-ended questions on how else teachers can promote health. This was administered via an anonymous online survey conducted over 3 months from February to April 2022. Participants were recruited through snowballing contacts and via emails found on school websites. Descriptive statistical analysis was conducted, and themes were derived from open-ended questions.

**Results** From 7980 emails sent out, a total of 126 primary school teachers responded and participated in the study (70% female). Participants generally had good knowledge regarding screen-related concerns but were less familiar with recommendations for moderate to vigorous PA for children. While most participants (83%) viewed health promotion as part of their job, about a third of felt neutral or disagreed that they have the right knowledge and skills to educate on health behaviours. Participants of older age and those with more work experience tended to have more positive attitudes and better practices ( $p < 0.05$ ). About half of the participants reported neutral or disagreed that teachers' training had taught them how to teach healthy behaviours to students, and most teachers indicate that they were willing and would benefit from further training to promote health education. However, some alluded to being overwhelmed by workload and consequently gave lower priority to health-related programs in schools, despite knowing their importance.

**Conclusion** Teachers recognised the important roles they play in promoting health among their students, but may often be limited by knowledge, skills and opportunities for training in health promotion, on top of their heavy teaching workload. There is potential for school leadership, policymakers and society to create a suitable environment to support teachers in these endeavours.

# Differences in American youth sport participation during the COVID-19 pandemic by socioeconomic status: A national survey

**Dr. Ashleigh Johnson<sup>1</sup>**, Dr. Gregory Knell<sup>2,3</sup>, Dr. Timothy Walker<sup>4</sup>

<sup>1</sup>San Diego State University, San Diego, USA, <sup>2</sup>The University of Texas Health Science Center at Houston, Dallas, USA, <sup>3</sup>Children's Health Andrews Institute for Orthopaedics and Sports Medicine, Plano, USA, <sup>4</sup>The University of Texas Health Science Center at Houston, Houston, USA

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

## **SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** Opportunities for youth sports participation were notably disrupted during the COVID-19 pandemic. Although organized sports have largely resumed in the United States (US), it is unclear how the youth sports landscape shifted during COVID-19, particularly by socioeconomic status (SES). Low-SES families have fewer organized sport opportunities, due in part to cost. Given the economic impact of COVID-19, sports participation may have disproportionately affected youth from low-SES families compared to those from higher-SES families. Thus, the primary aim of this study was to compare organized sports participation during COVID-19 by SES among a national sample of US athletes ages 11-17.

**Methods:** A cross-sectional, national survey was conducted by a market research company (December 2021-January 2022) among US parents whose child had participated in sports pre-pandemic (March 2019-February 2020). Parents were asked about their child's sports participation in organized sports (yes/no) during the pandemic. Household income was categorized as low (US≤\$49,999), middle (US\$50,000-\$119,999), and high (US≥\$120,000). Weighted multivariable logistic regression was used to examine the relative odds of sports participation during COVID-19 among youth athletes from middle- and high-income households compared to those from low-income households. Covariates included age, gender, race, and number of years playing sports.

**Results:** Among youth included in the analysis (n=500; M<sub>age</sub>=14.0 years; 60.6% male), 71.0% continued playing sports during the pandemic, and 30.9% were classified as being from a low-income household. Youth athletes from a middle-income household [aOR=1.69 (95% CI=1.00-2.85)] and from a high-income household [aOR=2.20 (95% CI=1.09-4.44)] had greater odds of sports participation during the pandemic compared to youth athletes from a low-income household.

**Conclusions:** Among US youth who participated in sports pre-pandemic, athletes from middle- or high-income households (versus low-income) had greater odds of organized sports participation during the pandemic. These findings suggest that existing economic disparities in youth sports participation – and consequently physical activity – may have been exacerbated by COVID-19. As organized sports resume in the US, efforts to promote equitable participation should include low-cost opportunities and strategies that encourage resumption of sports among youth who stopped participating during COVID-19. Additional research examining participation barriers post-pandemic, particularly among low-income youth, may be needed.



# Urban–Rural Differences in Dissemination and Implementation of A Statewide Obesity Prevention Initiative before, during, and after COVID-19

Dr. Sally Davis<sup>1,2</sup>, Dr. Nan Zeng<sup>1,2</sup>, Ms. Victoria Culkin<sup>1,2</sup>, Ms. Amelia Putkaradze<sup>1,2</sup>

<sup>1</sup>University of New Mexico, Albuquerque, USA, <sup>2</sup>Prevention Research Center , Albuquerque, USA

Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** The Child Health Initiative for Lifelong Eating and Exercise (CHILE) Plus is a statewide nutrition education and obesity prevention program among head start (HS) children across New Mexico. This study aimed to investigate whether the COVID-19 pandemic influenced dissemination and implementation of CHILE Plus. Specifically, the study sought to investigate how the COVID-19 pandemic affected children's eating and physical activity behaviors by community type before, during, and after the pandemic.

**Methods:** We looked at (A) "number of enrolled children/class"; (B) changes in children's health behaviors, including "proportion of kids tasting during the nutrition lesson/day" and (C) "average number of minutes of structured physical activity/day". The COVID-19 timelines were broken down into: March 27th 2019- March 27th 2020 (before outbreak), March 28th 2020 - April 5th 2021 (during: between school closing and schools given green-light to start hybrid model), and April 6th 2021 - December 1st 2022 (after: back to school full time and time of abstract drafted). HS centers were categorized by community type as urban or rural. All information was reported on the REDCap. Descriptive statistics were used and presented as mean  $\pm$  standard deviation.

**Results/findings:** A total of 60 HS centers (> 1080 children) implemented CHILE Plus between March 27th 2019 and December 1st 2022. For 39 rural centers, before COVID-19, A was  $13.39 \pm 4.32$ , B was  $0.81 \pm 0.27$ , and C was  $47.76 \pm 20.07$ . During COVID-19, A was  $6.33 \pm 2.46$ , B was  $0.71 \pm 0.33$ , and C was  $42.35 \pm 21.33$ . After COVID-19, A was  $10.67 \pm 4.19$ , B was  $0.78 \pm 0.30$ , and C was  $50.18 \pm 26.3$ . For 21 Urban centers, before COVID-19, A was  $16.67 \pm 2.42$ , B was  $0.85 \pm 0.22$ , and C was  $71.04 \pm 37.97$ . During COVID-19, A was  $9.65 \pm 2.60$ , B was  $0.84 \pm 0.25$ , and C was  $84.16 \pm 26.52$ . After COVID-19, A was  $11.7 \pm 2.75$ , B was  $0.799 \pm 0.1$ , and C was  $74.41 \pm 32.06$ .

**Conclusions:** During COVID-19, enrollment noticeably dropped in both rural and urban Head Starts, and children demonstrated decreased physical activity and eating behaviors. When schools opened post-pandemic, physical activity increased to be above pre-COVID levels. Enrollment and eating behaviors increased post-pandemic but stayed below pre-pandemic baselines. COVID-19 remarkably affects the implementation of CHILE Plus.

# Traditional nutrition education for weight management increases risk factors for disordered eating compared to intuitive eating messages: a randomized controlled trial in emerging adult women

**Dr. Carly Pacanowski<sup>1</sup>**, Ms. Julia Katcher<sup>1</sup>, Ms. Diane Vizthum<sup>1</sup>, Dr. Christine Skubisz<sup>2</sup>

<sup>1</sup>University of Delaware, Newark, USA, <sup>2</sup>Bentley University, Waltham, USA

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** J. Young Adults

Nutrition messages should encourage health-promoting behaviors in emerging adults without increasing disordered eating risk factors like negative affect (NA). Traditional nutrition education (TNE; e.g., calories-in-calories-out, quantitative cutoffs and goals) promotes a different framework than intuitive eating (IE; e.g., hunger/fullness cues, body acceptance). Additionally, higher heart rate variability (HRV), reflects greater emotion regulation, which is inversely related to disordered eating.

**Purpose:** This randomized trial compared a TNE video to an IE video. We hypothesized that the TNE video would elicit increases in NA and worry about eating and weight and decreases in positive affect (PA) and HRV compared to the IE video.

**Methods:** Female emerging adults (ages 18-29) were randomized to one five-minute video. The TNE video was developed based on USA government guidelines, and the IE video on IE principles. Participants completed pre- and post-video measures: Positive and Negative Affect Schedule, visual analog scales for worry about eating and weight, and wore an electrocardiogram while viewing the videos. Independent samples *t*-tests with the dependent variable being change scores were run.

**Results:** The TNE group exhibited significantly greater increases in NA and worry about eating and weight compared to the IE group (NA<sub>TNE</sub>: M = 2.28, SD = 5.49; NA<sub>IE</sub>: M = -0.99, SD = 3.99;  $t(262.487) = 5.822$ ,  $p < .001$ ,  $d = .682$ ; eating<sub>TNE</sub>: M = 0.43, SD = 1.18; eating<sub>IE</sub>: M = -0.65, SD = 1.27;  $t(298) = 7.668$ ,  $p < .001$ ,  $d = .885$ ; weight<sub>TNE</sub>: M = 0.06, SD = 1.33; weight<sub>IE</sub>: M = -0.83, SD = 1.21;  $t(298) = 6.038$ ,  $p < .001$ ,  $d = .697$ ). The IE group had a significantly greater increase in PA (TNE: M = -3.80, SD = 4.86; IE: M = 0.78, SD = 4.80;  $t(293) = -8.15$ ,  $p < .001$ ,  $d = -.949$ ). Change in HRV was in the hypothesized direction.

**Conclusions.** TNE is utilized for communicating nutrition messages about weight control by government agencies; however, the present study found TNE to elicit increases in disordered eating risk factors. Delivery of nutrition messages may benefit from an IE approach so that disordered eating risk is not inadvertently increased.

# Associations between 24-hour movement behaviors and suicidal thoughts/ideation is race-dependent among Brazilian adolescents

**Dr. Diego Augusto Santos Silva<sup>1</sup>**, Dr. Markus Duncan<sup>2</sup>, Dr. Nicholas Kuzik<sup>2</sup>, Dr. Mark Tremblay<sup>2,3</sup>

<sup>1</sup>Sports Center. Federal University of Santa Catarina. , Florianópolis , Brazil, <sup>2</sup>Children's Hospital of Eastern Ontario Research Institute, Ottawa, Canada, <sup>3</sup>Department of Pediatrics, University of Ottawa, Ottawa, Canada

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** The 24-hour movement behaviors are correlates of mental health problems. However, racial disparities in these behaviors are poorly understood. We aimed to analyze the associations between 24-hour movement behaviors and suicidal thoughts among Brazilian adolescents according to race.

**Methods:** This cross-sectional study surveyed 4,081 adolescents aged 15 to 19 years (49.9% females) across all geographic regions of Brazil. Data were collected using a self-administered questionnaire. Within the sample, 31.0% (n=1,264) self-reported as White and 69.0% (n=2,817) as Black. Adolescents who declared one or more times/week suicidal thoughts/ideation were considered as a risk group. Accruing moderate-vigorous physical activity (MVPA) during leisure time,  $\leq 2$  hours/day recreational screen time, and good sleep quality were the exposures investigated. Sociodemographic information, health behaviors and self-reported diseases were covariates in the analyses. We evaluated both additive and multiplicative interactions between race and 24-hour movement behaviors. Binary logistic regression was used to estimate the odds ratio (OR), marginal means effects (ME), and 95% confidence intervals (95%CI).

**Results/findings:** Prevalence of suicidal thoughts was 6.7% (White adolescents: 5.9%; Black adolescents: 7.1%). Black adolescents who met one (OR: 0.34; 95%CI: 0.22-0.52), two (OR: 0.17; 95%CI: 0.11-0.27) or three (OR: 0.13; 95%CI: 0.07-0.26), and White adolescents who met one (OR: 0.35; 95%CI: 0.21-0.57), two (OR: 0.14; 95%CI: 0.08-0.26), or three (OR: 0.11; 95%CI: 0.04-0.31) of the 24-hour movement behavior targets were less likely to have suicidal thoughts/ideation than Black adolescents who did not meet any of the 24-hour movement behavior targets. Black adolescents who did not meet any of the 24-hour movement behavior targets had higher suicidal thoughts/ideation likelihood (ME: 18.0%; 95%CI: 13.0%-24.0%) than White adolescents (ME: 5.0%; 95%CI: 3.9%-10.0%) who did not meet any of the 24-hour movement behavior targets and Black or White adolescents who met at least one of the 24-hour movement behavior targets.

**Conclusions:** In general, we identified an inverse association between meeting individual and combinations of 24-hour movement behavior targets with suicidal thoughts/ideation. Among adolescents who identify as Black and did not meet any targets, these associations were more evident.

# 24-hour accelerometer-measured movement behaviours in Malaysian children and adolescents: a cross-sectional study

**Dr. Sophia M. Brady**<sup>1</sup>, Dr. Ruth Salway<sup>1</sup>, Dr. Jeevitha Mariapun<sup>2</sup>, Dr. Louise Millard<sup>1</sup>, Dr. Amutha Ramadas<sup>2</sup>, Mr. Hussein Rizal<sup>2</sup>, Dr. Andy Skinner<sup>1</sup>, Mr. Chris Stone<sup>1</sup>, Dr. Laura Johnson<sup>3</sup>, Prof. Tin Tin Su<sup>2,4</sup>, Dr. Miranda E.G. Armstrong<sup>1</sup>

<sup>1</sup>University of Bristol, Bristol, United Kingdom, <sup>2</sup>Monash University Malaysia, Kuala Lumpur, Malaysia, <sup>3</sup>NatCen Social Research, London, United Kingdom, <sup>4</sup>South East Asia Community Observatory (SEACO), Kuala Lumpur, Malaysia

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

## **SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose** Sleep, inactive time, and physical activity (PA) are dependent interchangeable behaviours that are compositional in nature. Quantifying movement behaviours as part of a 24-hour continuum can increase understanding of how different movement behaviours interact with each other, their independent and combined effects on health, and can lead to the production of more extensive guidance and recommendations which encompass PA, sleep and inactive time behaviours. While device-based 24-hour PA movement behaviours have been explored in high-income countries, little is known about Malaysian children and adolescents. The aim of this study was to describe 24-hour accelerometer-measured sleep, inactivity and PA in a large sample of Malaysian children and adolescents; by demographic characteristics and external events (Ramadan and COVID-19 restrictions), compared to self-report PA.

**Methods** Children and adolescents (n=626) aged 7-18 recruited between November 2021-August 2022 from households in Segamat, Malaysia wore wrist-worn Axivity AX6 triaxial accelerometers for 24 hours/day over 7 days, and completed the PAQ-C physical activity questionnaire. Accelerometer data were processed using the GGIR R package, using validated cut-points to calculate daily average time and proportions of the day spent in moderate-to-vigorous intensity PA (MVPA), light-intensity PA (LPA), inactive time and sleep. Means and 95% confidence intervals (95% CI) were calculated overall and for demographic subgroups (age, gender, ethnicity, BMI categories, socioeconomic groups).

**Results** Participants spent 8.2 (95% CI= 7.9-8.4) hours/day asleep, 12.4 (95% CI= 12.2-12.7) hours/day inactive, 2.8 (95% CI= 2.7-2.9) hours/day in LPA, and 33.0 (95% CI= 31.0-35.1) minutes/day in MVPA, with only 13% meeting the World Health Organisation MVPA guidelines (average of 60 minutes/day of MVPA per week). We observed higher PA among children vs. adolescents, males vs. females, and Indian vs. Malay ethnic groups.

**Conclusions** Malaysian children and adolescents engaged in relatively low levels of MVPA and had high inactive time compared to studies using similar protocols in children from high-income countries. Further research is required to understand why PA engagement is so low in this population, particularly among girls, adolescents, and those of Malay ethnicity, in order to develop interventions, guidance, and support to increase PA and improve child health.

# Time-trends inequalities in leisure-time physical activity in a Southern Brazilian city from 2004 to 2021

**Dr. Inacio Crochemore-Silva<sup>1</sup>**, Dr. Andrea Wendt<sup>2</sup>, Dr. Alan Knuth<sup>4</sup>, Dr. Bruno Nunes<sup>1</sup>, Dr. Mario Renato Azevedo<sup>1</sup>, Dr. Helen Gonçalves<sup>1</sup>, Dr. Pedro Hallal<sup>3</sup>

<sup>1</sup>Universidade Federal de Pelotas, Pelotas, Brazil, <sup>2</sup>Pontifícia Universidade Católica do Paraná, Curitiba, Brazil,

<sup>3</sup>University of Illinois, Urbana-Champaign, USA, <sup>4</sup>Universidade Federal do Rio Grande, Rio Grande, Brazil

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** To assess time trends inequalities in leisure-time physical activity in Pelotas (Brazil) from 2004 to 2021, according to gender, socioeconomic and ethnicity.

**Methods:** Three surveys were conducted in 2004, 2010 and 2021 in Pelotas, a southern Brazilian City. All multistage sampling processes were comparable, and samples are representative from the urban population. Leisure-time physical activity was assessed using the International Physical Activity questionnaire (IPAQ). Two variables were used, including the WHO recommendations of at least 150 minutes spent in moderate-intensity or 75 minutes in vigorous-intensity activities, and the proportion of individuals reporting any minute of leisure-time physical activity. Inequalities were assessed according to gender (male/ female), ethnicity (self-report skin colour) and wealth (based on a list of household assets and divided in quintiles). Simple (difference) and complex (Slope Index of Inequality) measures of inequalities were used. In addition, intersectionality was addressed based on Jeopardy Index.

**Results:** The final sample included 3,090 adults in the 2004, 2,656 in the 2010 and 5,696 in the 2021 survey. Leisure-time physical activity in Pelotas did not change over time; around 40% of adults reported any leisure-time physical activity and around 25% reported at least 150 minutes/week. Gender inequalities persisted across the years, with women presenting a prevalence of leisure-time physical activity on average 10 percentage points (p.p.) lower than men. In 2004 the wealthiest presented a leisure-time physical activity prevalence 20p.p. higher than the poorest. Despite a reduction observed in 2010, in 2021 the wealth inequalities presented the same magnitude of the initial period assessed. Skin colour inequalities were not observed when analysed isolated, but the most marked inequality pattern was observed comparing the most privileged group represented by men, wealthiest, and white, and the most vulnerable group represented by women, poorest, and black/brown.

**Conclusions:** In addition to time trends analyses of leisure-time physical activity, monitoring inequalities and intersectionality is needed. Women, black/brown and poor are persistently presenting lower levels of leisure-time physical activity. Public policies are required and must be equity oriented.

# Facilitating co-research: lessons learned from reflection forms within three participatory action research projects

**Mrs. Ann Vandendriessche**<sup>1</sup>, Ms. Helga Emke<sup>2</sup>, Mrs. Mai Chin A Paw<sup>2</sup>, Mrs. Benedicte Deforche<sup>1,3</sup>, Mrs. Maïté Verloigne<sup>1</sup>, Mrs. Teatske Altenburg<sup>2</sup>, Mrs. Manou Anselma<sup>2</sup>

<sup>1</sup>Ghent University, Ghent, Belgium, <sup>2</sup>Vrije Universiteit Amsterdam, Amsterdam, Netherlands, <sup>3</sup>Vrije Universiteit Brussel, Brussels, Belgium

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** Researchers acting as facilitators of co-research within participatory action research (PAR) play an important role in establishing a mutual learning environment. Critical self-reflection on the facilitator role can improve the co-research process. However, guidelines for facilitating co-research and for structural reflection on the facilitator role are currently lacking. This study aims to extract lessons for researchers facilitating co-research based on reflection forms used in three PAR projects with children and adolescents.

**Methods:** In three health promotion projects, participatory sessions took place with children or adolescents for three to four school years. After each participatory session, facilitators filled in a reflection form assessing the group process and their role as facilitator. This resulted in 252 reflections forms of which 135 were included in the current analysis. NVivo was used for coding which was partly deductive and partly inductive.

**Results:** A successful session included active and creative participatory methods, a 'plan B' (e.g., for when a method does not really fit, timing wise) and clearly stated the goal at the beginning of the session. Making good agreements, making sure everyone is heard and taking time to have fun appeared to be important. Finally, facilitators needed to encourage co-researchers to take the lead and adapt to the present dynamics in the group.

**Conclusion:** Facilitators learned that a well-prepared session increased efficiency and allowed for more flexibility during the sessions. Furthermore, the facilitator was important in creating and maintaining a safe, functional and positive atmosphere and ensuring ownership and shared-decision making.



# Exploring the design and utility of chatbots for young adults to support healthy eating: A qualitative study.

**Dr. Lee M Ashton**<sup>1,2</sup>, Associate Professor Marc TP Adam<sup>1,2</sup>, Dr. Megan Whatnall<sup>1,2</sup>, Dr. Megan E Rollo<sup>3</sup>, Prof. Tracy L Burrows<sup>1,2</sup>, Miss Vibeke Hansen<sup>1</sup>, Prof. Clare Collins<sup>1,2</sup>

<sup>1</sup>University of Newcastle, Callaghan, Australia, <sup>2</sup>Hunter Medical Research Institute, New Lambton Heights, Australia, <sup>3</sup>Curtin University, Perth, Australia

Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** J. Young Adults

**Background:** There is limited understanding for the potential utility of a chatbot to support healthy eating among young adults. Therefore, the aim was to interview key informants regarding potential utility and design of a chatbot to: 1) increase young adults' return rates and engagement with a purpose-built healthy eating website and, 2) motivate and support young adults to improve diet quality.

**Methods:** Eighteen qualitative, semi-structured interviews were conducted with three stakeholder groups: i) experts in dietary behaviour change in young adults, ii) young adult users of a healthy eating website, and iii) experts in chatbot design. A hybrid approach using deductive and inductive reasoning was applied guided by a behaviour change theoretical framework. A template analysis was conducted using NVivo.

**Results:** Interviews identified three potential roles of a chatbot to support healthy eating in young adults (R1: improving healthy eating knowledge and facilitating discovery, R2: reducing time barriers related to healthy eating, R3: support and social engagement) and eight suggested features or content to support each role (F1: chatbot generated recommendations, F2: triage to website information or external to address current user needs, F3: nudge or behavioural prompts at critical moments, F4: assist users to navigate healthy eating websites, F5: enhance interactivity, F6: offer useful anonymous support, F7: facilitate user connection with content in meaningful ways, F8: outreach adjuncts to website (e.g., emails)). Additional 'general' chatbot features included authenticity, personalisation and effective and well-planned development, while the preferred chatbot style and language included tailoring (e.g., age and gender), with a positive and professional tone. Finally, the preferred chatbot message subjects included training (e.g., *would you like to see a video to make this recipe?*), enablement (e.g., *healthy eating doesn't need to be expensive, we've created a budget meal plan, want to see?*) and education or informative approaches (e.g., *"Did you know bananas are high in potassium which can aid in reducing blood pressure?"*).

**Conclusion:** Findings can guide chatbot designers and nutrition behaviour change researchers on potential chatbot roles, features, style and language and messaging in order to support healthy eating knowledge and behaviours in young adults.

# A comparison on perceived barriers to optimal child sleep among families with low and high income

**Dr. Elizabeth Adams<sup>1</sup>**, Mrs. Amanda Edgar<sup>1</sup>, Ms. Peyton Mosher<sup>1</sup>, Dr. Sarah Burkart<sup>1</sup>, Dr. Michael Beets<sup>1</sup>, Dr. R. Glenn Weaver<sup>1</sup>, Dr. Bridget Armstrong<sup>1</sup>, Dr. Becky Siceloff<sup>1</sup>, Ms. Meghan Bastyr<sup>1</sup>, Mr. Roddrick Dugger<sup>1</sup>, Dr. Ron Prinz<sup>1</sup>

<sup>1</sup>University of South Carolina, Columbia, USA

Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** G. Children and families

**Background:** Children in families with low-income (LI) experience more suboptimal sleep than children in higher income (HI) families. Unique drivers likely contribute to these disparities, along with factors that universally impede healthy sleep patterns, despite income level. This mixed-methods study sought to understand parents' perceptions on child sleep challenges to identify similarities/differences experienced by LI and HI families to inform the development of tailored interventions.

**Methods:** Parents were categorized as LI (n=15; \$30,000±17,845/year) or HI (n=15; \$142,400±61,373/year). All parents had to experience difficulty with their preschooler's sleep. Parents completed a survey with the Child Sleep Wake Scale (CSWS) to measure sleep quality. A semi-structured phone interview explored perceived barriers/facilitators to optimal sleep. Transcripts were coded by two researchers, for LI and HI groups separately, using inductive analyses. Constant-comparison methods generated themes and characterized similarities/differences by income group. Independent t-tests examined differences in CSWS scores.

**Results:** Groups were similar in CSWS sleep quality scores (LI: 3.4±0.7 vs. HI: 3.6±0.6; p=0.28), bedtime delays (LI: 48.7±44.3 vs. HI: 46.9±36.5 min/night; p=0.90), and time to fall asleep (LI: 62.3±52.7 vs. HI: 38±33.2 min/night; p=0.14). LI families reported more night wakings (LI: 2.0±1.1 vs. HI: 1.0±0.7 times/night; p=0.01). Groups were similar in themes related to *diverse bedtime routines* (e.g., presence of stimulating and soothing activities), *specific struggles with child sleep* (e.g., falling asleep), *strategies to reduce night wakings* (e.g., co-sleeping), *environmental contexts* (e.g., creating sleep-promoting environments), and *electronic rules* (e.g., no screens in bed). Groups differed in themes related to *motivations around setting routines* (e.g., HI: intrinsic desire for structure; LI: external sources to promote routine setting), *parent appraisal of child sleep* (e.g., HI: more mixed feelings; LI: mostly negative appraisal), *nap timing and duration*, and *resource access and strategy utilization* (e.g., HI tried more strategies and accessed more online/print resources).

**Discussion:** Parents experienced many similar barriers to child sleep, with a few distinct differences by income group. Future interventions can use these findings to inform components for all families, as well as customized components – such as fostering motivations around routine setting – to address the unique needs of families across income levels.

# mHealth use and needs of women after gestational diabetes: what do women want?

**Dr. Anna Roesler<sup>1</sup>**, Dr. Kaley Butten<sup>1</sup>, Dr. Pennie Taylor<sup>1</sup>, Dr. Elizabeth Holmes-Truscott<sup>2,3</sup>, Dr. Marlien Varnfield<sup>1</sup>

<sup>1</sup>The Australian eHealth Research Centre, The Commonwealth Scientific and Industrial Research Organisation, Brisbane, Australia, <sup>2</sup>The Australian Centre for Behavioural Research in Diabetes, Melbourne, Australia, <sup>3</sup>Deakin University, Geelong, Australia

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Gestational Diabetes Mellitus (GDM) is one of the most common medical complications of pregnancy. Women affected are at increased risk of future diabetes. Diet and lifestyle modifications remain the cornerstone of therapy to reduce future diabetes risk, and mHealth (e.g., health apps) can facilitate these modifications. However, there is limited information on health app usage and desired app features following GDM across Australia. This study aims to understand the health-aims of women after GDM, as well as drivers towards use of a health app and its functions.

**Methods:** An explorative cross-sectional survey was developed and tested with six women prior GDM. Study-specific questions measured demographic and clinical characteristics, health-aims, health-app use and motivation for an app and desired functions. The online survey was disseminated via social media (Nov 2022 – Jan 2023) to women who have experienced GDM within Australia in the last five years. Descriptive analyses were conducted.

**Findings:** Of the 1155 valid survey completers (aged 35±4.8 years), 98% reported having health aims post pregnancy (e.g. eat healthy (86%), look after mental wellbeing (80%), maintain a healthy weight (79%), exercise regularly (79%)), and 18% used a health-app to support health-aim achievement. In total, 112 health-apps were identified as used to support post pregnancy health-aim achievement (most common: MyFitnessPal, 22%). GDM specific: 1 app reported), and these apps were typically self-selected (61%). The most useful functions reported by current users included tracking capabilities for diet, exercise, glucose and weight, while non-users indicated help and information functions. Two thirds (67%) of app non-users reported motivation to use a health-app for chronic disease (e.g. diabetes) prevention if the app was recommended by their health provider, while 18% said that nothing would motivate health-app use. Overall, respondents would like more information on: future prevention of GDM (48%), weight loss plans (45%) and healthy eating plans (44%).

**Conclusions:** An app may be a well-received option to facilitate healthy behaviours after GDM. However, endorsement of mHealth by health providers is important to women. Further, there is opportunity for health-app refinement to better meet the needs and preferences of women with prior GDM.

# Adapting TransformUs – a whole-of-school physical activity program for Secondary schools: A participatory approach

**Dr. Ana Maria Contardo-Ayala<sup>1</sup>, Dr. Natalie Lander<sup>1</sup>**, Dr. Emiliano Mazzoli<sup>1</sup>, Associate Professor Nicola D. Ridgers<sup>1,2</sup>, Prof. Anna Timperio<sup>1</sup>, Ms. Nicole Biggs<sup>1</sup>, Prof. Jo Salmon<sup>1</sup>

<sup>1</sup>Institute for Physical Activity and Nutrition (IPAN), School of Exercise and Nutrition Sciences, Deakin University, Burwood, Australia, <sup>2</sup>Alliance for Research in Exercise, Nutrition and Activity (ARENA), Allied Health and Human Performance, University of South Australia, Adelaide, Australia

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose** School-based movement behaviour initiatives have been largely ineffective in increasing physical activity in secondary school students. Strategies that utilise a whole-school approach and are co-designed/adapted by teachers and students could be effective. This study aimed to inform the adaptation of TransformUs (a whole-school program originally designed for primary schools) to suit the needs and characteristics of secondary schools, using a participatory approach.

**Methods** Three Victorian secondary schools were involved in separate face-to-face participatory workshops (2.5 hours each). The workshops were informed by a systematic review, interviews with academics and stakeholders, and the Department of Education's "Active-schools framework". Students from Years 7–12, teachers representing different year levels/subjects, and school principals participated in the workshops. A design sprint process ensured collaboration during the workshops, and included: a) *understanding* TransformUs strategies and other effective strategies identified in literature; b) *defining* specific adaptation goals; c) *identifying* barriers specific to each school and developing possible solutions; d) *agreeing* on the most suitable solutions generated by the group; e) *prototyping* the identified strategies by including comprehensive details on how to deliver them; and f) *validating* strategies using teachers' feedback on their use. Each school was provided with up to AUD 40,000 to implement the strategies.

**Results** One participating school (S) was located in a regional area (S1: 10 students; 3 teachers) and one each in a high (S2: 10 students; 3 teachers; school principal) and low (S3: 9 students; 7 teachers) socioeconomic area. The following strategies were selected and adapted by each school during the workshop based on their specific needs: S1= active breaks, organised lunch-time sports and activities, height-adjustable desks and teacher professional development (TPD); S2: active breaks, active lessons, organised lunch-time sports and activities, height-adjustable desks, line markings and TDP; S3: active breaks, active lessons, teacher resource packs/whiteboards, classroom wall decals, height-adjustable desks, and TDP.

**Conclusions** There were some similarities and differences in the types of strategies each school selected/adapted to suit the context of their school community. Participatory approaches are warranted to ensure alignment with school-specific needs. Future research should determine if this participatory approach leads to change in movement behaviours.

# Are chatbots effective for improving physical activity, diet and sleep? A systematic review and meta-analysis.

**Dr. Ben Singh<sup>1</sup>**, Prof. Timothy Olds<sup>1</sup>, Dr. Jacinta Brinsley<sup>1</sup>, Dr. Dot Dumuid<sup>1</sup>, Dr. Rosa Virgara<sup>1</sup>, Dr. Lisa Matricciani<sup>1</sup>, Dr. Amanda Watson<sup>1</sup>, Ms. Kimberley Szeto<sup>1</sup>, Mrs. Emily Eglitis<sup>1</sup>, Mr. Aaron Miatke<sup>1</sup>, Mrs. Catherine Simpson<sup>1</sup>, Prof. Corneel Vandelanotte<sup>2</sup>, Prof. Carol Maher<sup>1</sup>

<sup>1</sup>University of South Australia, Adelaide, Australia, <sup>2</sup>Central Queensland University, Rockhampton, Australia

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** To: i) describe the weight management strategies used by a sample of Australian adults; ii) examine whether use of weight management strategies was associated with weight change over 12 months; and iii) examine the psycho-sociodemographic characteristics of those who used each strategy.

**Methods:** Data were from a 12-month cohort study, involving a community-based sample of Australian adults (n=368, mean age=40.1, SD=5.8). Demographic characteristics were self-reported at baseline. Participants were encouraged to weigh themselves, preferably daily but at least weekly using Fitbit Aria body weight scales (Aria 2 or Aria Air scales, Fitbit Inc., San Francisco, CA). Data were remotely gathered using custom-developed "FitnessLink" software. The use of weight management strategies were obtained using a self-report survey at eight timepoints during the 12-month period. The relationship between weight management strategies, change in weight over the 12-month period and psycho-sociodemographic characteristics was assessed using linear mixed effect models and univariate multinomial logistic regression.

**Results:** Most participants (81%) reported using as least one weight management strategy over the 12 months. The most common weight management strategies were being physically active or exercising (reported by 77%), restricting calories (63%), fasting (41%), counting calories (28%), using supplements (24%) and using diet pills (6%). Exercising or being physically active for weight control was the only strategy significantly associated with weight change (between group difference relative to those not reporting the strategy: -1.2 kg,  $p<0.01$ ). Participants who reported accepting their bodyweight were less likely to report the use of weight management strategies (OR=0.38,  $p<0.01$ ). Compared with females, males were less likely to count calories (OR=0.49,  $p<0.01$ ).

**Conclusions:** Overall, the use of weight management strategies was common in a sample of Australian adults. Public health weight management approaches should include strategies that are associated with effective weight management, and also address the perceptions that individuals have about their bodyweight.

# Effects of integrating physical literacy into active school recesses intervention on physical fitness and academic performance in Chinese School children: A Cluster Randomized Controlled Trial

**Miss Dangling Zhang**<sup>1</sup>, Ms. Lijuan Shi<sup>2</sup>, Ms. Xiaoling Zhu<sup>3</sup>, Mr. Sitong Chen<sup>4</sup>, Prof. Yang Liu<sup>1,5</sup>

<sup>1</sup>School of Physical Education, Shanghai University of Sport, Shanghai, China, <sup>2</sup>Shanghai Teacher Institute, Shanghai, China, <sup>3</sup>Education Institute of Yangpu District Shanghai, Shanghai, China, <sup>4</sup>Institute for Health and Sport, Victoria University, Melbourne, Australia, <sup>5</sup>Shanghai Research Center for Physical Fitness and Health of Children and Adolescents, Shanghai University of Sport, Shanghai, China

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** The aim of this study was to examine the effects of school-based intervention integrating physical literacy (PL) into active school recesses (ASR) on physical fitness (PF) and academic performance (AP) in Chinese children.

**Methods:** A total of 357 children (mean age:  $7.8 \pm 0.7$  years; boys: 50.4%) recruited from two schools and these two schools were randomly assigned as intervention group (IG) and control group (CG), respectively. IG consisted of 155 children (mean age:  $7.9 \pm 0.7$  years, boys: 51.0%), and 202 children (mean age:  $7.8 \pm 0.7$  years; boys: 50%) were in CG. Children in IG received a 10-week PL integrated intervention conducted during ASR. In CG, children remained engaging in regular school activity within 10 weeks. Generalized estimating equation was used to compare the effects of IG and CG on PF and AP.

**Results:** Regarding to PF, there was a significant group  $\times$  time interaction on 20-m shuttle run ( $\beta = -3.89$ , 95% CI [-5.08; -2.71],  $p < 0.001$ ) and handgrip ( $\beta = -0.70$ , 95% CI [-1.20; -0.20],  $p = 0.006$ ). Intervention group had a greater increase than the CG ( $p < 0.001$ ) with 20-m shuttle run and handgrip. In addition, the post-test performance of children in the IG was significantly greater than those in the CG (20-m shuttle run:  $p < 0.001$ , handgrip:  $p = 0.002$ ). In AP, there was a significant group-by-time interaction on Chinese level ( $\beta = -1.21$ , 95% CI [-1.91; -0.56],  $p = 0.001$ ) and math level ( $\beta = 16.71$ , 95% CI [15.14; 18.143],  $p < 0.001$ ). Significant positive difference in post-test was only observed in mathematics level between IG and CG ( $p = 0.012$ ).

**Conclusions:** This study suggests that intervention integrated PL into ASR could bring positive impacts on PF indicators and AP in Chinese children. Replicated studies with larger sample size and in different contexts are required for scale-up of the intervention.

**Keywords:** physical literacy, academic achievement, physical fitness, active break



# Associations between socioeconomic status and screen time among children and adolescents in China: a cross-sectional study

**Dr. Youzhi Ke<sup>1</sup>**, Dr. Sitong Chen<sup>2</sup>, Dr. Jintao Hong<sup>3</sup>, Dr. Yahan Liang<sup>1</sup>, Prof. Yang Liu<sup>1,4</sup>

<sup>1</sup>Shanghai University of Sport, Shanghai, China, <sup>2</sup> Victoria University, Victoria, Australia, <sup>3</sup>Shanghai Research Institute of Sports Science, Shanghai, China, <sup>4</sup>Shanghai Research Center for Physical Fitness and Health of Children and Adolescents, Shanghai, China

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** I. Socio-economic inequalities

**Background:** Socioeconomic status (SES) is an important determinant of screen time (ST) in children and adolescents, however, the association between SES and ST is not fully understood in China. This study aimed to investigate the association between SES and ST (operationalized as meeting the ST guidelines; no more than 2 hours per day) in Chinese children and adolescents.

**Methods:** Cross-sectional data of 2,955 Chinese children and adolescents aged 8 to 17 (53.4% girls) were used. SES was measured using indicators of parental education and perceived family wealth. ST was assessed with detailed items from the Health Behaviour School-aged Children survey questionnaires. Descriptive statistics and a Chi-square test were used to report the sample characteristics and analyse ST differences across different sociodemographic groups. A binary logistic regression was then applied to analyse the association of SES indicators with ST in children and adolescents.

**Results:** Overall, 25.3% of children and adolescents met the ST guidelines. Children and adolescents with higher parental education levels were 1.84 [95% CI 1.31–2.57; father] and 1.42 [95% CI 1.02–1.98; mother] times more likely to meet the ST guidelines than those with lower parental education levels. Associations between SES and ST varied across sex and grade groups. Moreover, the associations of SES with ST on weekdays and weekends were different.

**Conclusions:** This study demonstrated the association between SES and ST in children and adolescents, highlighting the importance of targeting children and adolescents with low SES levels as an intervention priority. Based on our findings, specific interventions can be tailored to effectively reduce ST. Future studies are encouraged to use longitudinal or interventional designs to further determine the association between SES and ST.

**Keywords:** Social inequalities, health promotion, screen time, child, adolescent

# Using the Transtheoretical Domains Framework to Understand Barriers and Facilitators Influencing Physical Activity Behavior in Rural Communities

**Ms. Kirsten Ward<sup>1</sup>**, Mr. Cameron Aird<sup>1</sup>, Dr. Guy Faulkner<sup>2</sup>, Dr. Mary Jung<sup>3</sup>, Ms. Gloria Fox<sup>4</sup>, Dr. Anne Pousette<sup>5,6</sup>, Dr. Chelsea Pelletier<sup>1</sup>

<sup>1</sup>Department of Health Sciences, University of Northern British Columbia, Prince George, Canada, <sup>2</sup>School of Kinesiology, University of British Columbia, Vancouver, Canada, <sup>3</sup>School of Health and Exercise Sciences, University of British Columbia Okanagan, Kelowna, Canada, <sup>4</sup>Population and Public Health, Northern Health, Prince George, Canada, <sup>5</sup>Wellness in Northern British Columbia, Prince George, Canada, <sup>6</sup>Faculty of Medicine, University of British Columbia, Prince George, Canada

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** People living in rural communities face unique barriers and fewer opportunities for participation in physical activity than those in urban centers. The existing literature has no consensus on the definition of rural. This project aims to identify and understand the barriers and facilitators of physical activity in rural communities of British Columbia (BC), Canada and map these factors to behavior change theory to guide creation of interventions.

**Methods:** We interviewed participants from rural locations in the northern and interior regions of BC. Rural communities were defined as per the Rural Practice Subsidiary Agreement, endorsed by the provincial government and Doctors of BC, based on factors including community size and distance from major medical centers and related services. Interview questions prompted discussion about participant beliefs and lived experiences of physical activity, focusing on barriers and facilitators. Deductive analysis was used, identifying barriers and facilitators to physical activity, and mapping them to the Theoretical Domains Framework. Inductive thematic analysis was completed within domains that had more complex and nuanced coding, resulting in subthemes.

**Results:** Participants included 46 individuals from northern (n = 26) and interior (n = 20) communities, aged 22 to 77 years with 78% (n = 36) identifying as women. A total of 28 different communities were represented by participants (population size 10 - 13,400). Participants identified barriers and facilitators to physical activity most frequently associated with the domains of Social Influences (focus on interpersonal processes), Environmental Context and Resources (circumstances of the individual's environment/situation), and Beliefs About Consequences (beliefs about reality or outcomes of a behavior). Subthemes of these domains related to the availability of friends or family with whom to be physically active together; weather-related factors; infrastructure for physical activity; and beliefs about aging and fear of injuries.

**Conclusion:** To support a strengths-based approach to physical activity promotion, a focus on highlighting and supporting facilitators such as peer interaction, education, and pertinent strategies for weather conditions could be beneficial at a community level. Additionally, reviewing and updating infrastructure and improving availability of resources, such as funding, could be completed at a higher government or health promotion level.

# Is Television Viewing Related to Attitudinal Beliefs Towards Violence, Academic Performance, Agility and Movement Skill, and Health Behaviors in Adolescents?

**Dr. Alejandro Jiménez-Loaisa<sup>1</sup>**, Dr. David González-Cutre<sup>2</sup>, Dr. Eva León-Zarceño<sup>3</sup>, Dr. Javier Valenciano-Valcárcel<sup>1</sup>, Dr. Vicente J. Beltrán-carrillo<sup>2</sup>

<sup>1</sup>Department of Didactics of Physical Education, Artistic and Music. Faculty of Education. University of Castilla-La Mancha. , Toledo, Spain, <sup>2</sup>Department of Sport Sciences. Sports Research Centre. Miguel Hernández University of Elche., Elche, Spain, <sup>3</sup>Department of Behavioral Sciences and Health. Miguel Hernández University of Elche., Elche, Spain

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** J. Young Adults

**Purpose:** Prior research has found that television viewing is associated with several harmful health behaviors (e.g., physical inactivity, poor dietary intake) during adolescence, but little is known about how it is associated with other factors equally important for proper adolescent development and well-being. This correlational study examined the associations between television viewing behavior and attitudinal beliefs towards violence, academic performance, agility and movement skill, and health behaviors in adolescents.

**Methods:** A total of 307 adolescents (159 boys and 148 girls;  $M_{age} = 13.95$  years,  $SD = 1.28$ ) from a secondary Spanish school completed several measures to assess their attitudinal beliefs towards violence in educational centres (CAHV-25 questionnaire), agility and movement skill (CAMSA test), physical activity (PAQ-A questionnaire), adherence to a healthy Mediterranean diet (KIDMED questionnaire), and consumption of tobacco, alcohol, and other drugs (HBSC questionnaire). The mean of their marks in the school subjects was also used as an indicator of academic performance. Pearson's correlations and linear regression analyses were calculated to test the associations among these variables.

**Results:** Correlation analyses showed that television viewing was positively associated with attitudinal beliefs towards violence ( $r = .15$ ,  $p = .006$ ) and agility and movement skill ( $r = .14$ ,  $p = .009$ ) in adolescents. Television viewing was also negatively associated with academic performance ( $r = -.12$ ,  $p = .022$ ) and with adherence to a healthy diet ( $r = -.24$ ,  $p < .001$ ). Linear regression analyses showed that adolescents with higher agility and movement skill watched more television ( $\beta = .18$ ,  $p = .005$ ), whereas adolescents with higher academic performance ( $\beta = -.13$ ,  $p = .040$ ) and a higher adherence to a healthy diet ( $\beta = -.21$ ,  $p = .001$ ) watched less television.

**Conclusions:** Television viewing may have a considerable impact on adolescents' social behaviors, health, and education. However, more research is needed to try to clarify the mediators behind the positive association between television viewing and agility and movement skill. Future school-based interventions that try to encourage responsible TV consumption in the adolescent population are desirable.

# Inequities in diverse greenspace types by race/ethnicity and income across the United States

Dr. Ellen Stowe<sup>1</sup>, **Dr. Andrew Kaczynski<sup>1</sup>**, Dr. Morgan Hughey<sup>2</sup>, Dr. Courtney Monroe<sup>1</sup>, Dr. Dwayne Porter<sup>1</sup>  
<sup>1</sup>University of South Carolina, Columbia, USA, <sup>2</sup>College of Charleston, Charleston, USA

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Neighborhood greenspace is tied to health and well-being but may not be equitably present in neighborhoods that vary in sociodemographic attributes, thereby contributing to environmental injustices and health disparities. The purpose of this study was to examine variations in coverage for numerous types of greenspace across the United States by race/ethnicity and income.

**Methods:** For census block groups in the contiguous United States ( $n=187,809$ ), data from the National Land Cover database and Esri USA Parks were used to calculate percent block group coverage for 11 measures of greenspace: five related to landcover (forest, shrubland, herbaceous, wetlands, total landcover greenspace), one tree canopy, and five parks (national, state, county, local, total). Data about race/ethnicity (percent non-Hispanic white) and median household income were collected from American Community Survey five-year (2012-2016) estimates for all block groups. Spatial autocorrelation tests were conducted and spatial error models using a queen spatial weights matrix were used to examine the association between race/ethnicity and income and the 11 greenspace measures (controlling for median housing age and US Census region).

**Results:** Nine of the 11 greenspace types had a significant, positive association with race/ethnicity, in that as the percentage of non-Hispanic white residents in a block group increased by 1%, so too did the proportion of greenspace: forest ( $B=0.04, SE=0.002$ ), shrubland ( $B=0.004, SE=0.001$ ), herbaceous ( $B=0.01, SE=0.001$ ), wetlands ( $B=0.01, SE=0.001$ ), total landcover ( $B=0.07, SE=0.002$ ), tree canopy ( $B=0.05, SE=0.001$ ), national parks ( $B=0.01, SE=0.001$ ), state parks ( $B=0.004, SE=0.001$ ), total parks ( $B=0.01, SE=0.001$ ). Likewise, seven of the 11 greenspace measures had a significant, positive association with median household income, in that as block group income increased by \$10,000, so too did the amount of greenspace: forest ( $B=0.29, SE=0.01$ ), shrubland ( $B=0.06, SE=0.01$ ), herbaceous ( $B=0.04, SE=0.005$ ), total landcover ( $B=0.38, SE=0.02$ ), tree canopy ( $B=0.43, SE=0.01$ ), county parks ( $B=0.01, SE=0.001$ ), local parks ( $B=0.09, SE=0.005$ ). Choropleth maps will be used to illustrate racial/ethnic and socioeconomic disparities.

**Conclusions:** Most types of greenspace were not equitably present in block groups across the United States. Government officials, city and park planners, and public health practitioners should identify local and regional disparities and develop policy and environmental solutions to ensure environmental justice and community health.

# Activity classification accuracy of the thigh-worn SENS Motion accelerometry system in laboratory and free-living conditions

**Mr. Claas Lendt<sup>1</sup>**, Ms. Angeli Gawlik<sup>1</sup>, Dr. Bianca Biallas<sup>1</sup>, Prof. Ingo Froboese<sup>1</sup>

<sup>1</sup>German Sport University Cologne, Cologne, Germany

Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose** Thigh-worn accelerometry may be used in various research fields to assess different dimensions of physical behavior. Accurate methods to classify physical activity types are warranted to support the emerging field of time-use epidemiology and behavior change interventions. The novel SENS Motion system combines a small-scale thigh-worn accelerometer and proprietary algorithms to classify selected physical activity types. This study aims to evaluate the accuracy of the SENS Motion system in laboratory and free-living conditions.

**Methods** 20 healthy adults (55% female; 31±9 years; 23.3±2.3 kg/m<sup>2</sup>) completed a standardized activity protocol as well as 60 minutes of unrestricted free-living activities. The SENS Motion sensor was attached to the skin of the right lateral thigh. Participants completed standardized activities with varying intensities in the laboratory. Activities included walking, running, cycling, sitting, standing and lying down. Further, participants spent free-living activities outside of the laboratory while being video-recorded with a chest-mounted camera. Videos were segmented and labeled according to the activities performed. Balanced accuracy, sensitivity, precision and specificity were calculated for each activity type in laboratory and free-living conditions.

## Results

Balanced accuracy during standardized activities in the laboratory ranged from 96.7% (cycling) to 99.9% (standing) with all additional performance metrics >94% across activities. In free-living conditions, balanced accuracy ranged from 76.4% (walking) to 95.8% (sedentary). Free-living sedentary activities (sitting, lying down) were classified with precision, sensitivity and specificity >94%. Cycling was classified with high precision and specificity (94.2% and 99.1%, respectively) while sensitivity was 57.6%.

**Conclusions** Classification accuracy varies between laboratory and free-living conditions as well as between activity types. Free-living cycling may be challenging to classify due to frequent, short periods of non-pedaling. The SENS Motion system may be used to accurately classify sedentary behavior in free-living conditions in healthy adults. Performance in classifying activities in other populations such as patient groups or children may differ and needs further investigation.

# Combining Intervention Mapping, Participatory Action Research and Systems Thinking to promote energy balance-related behaviours together with and for adolescents

**Ms Helga Emke<sup>1,2</sup>**, Dr. Teatske Altenburg<sup>2</sup>, Assistant Professor Coosje Dijkstra<sup>1</sup>, Prof. Stef Kremers<sup>3</sup>, Prof. Mai Chinapaw<sup>2</sup>

<sup>1</sup>Vrije Universiteit, Amsterdam, Netherlands, <sup>2</sup>Amsterdam UMC location Vrije Universiteit, Amsterdam, Netherlands, <sup>3</sup>Maastricht University Medical Centre, Maastricht, Netherlands

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose** To improve the effectiveness of interventions tackling the complex problems of obesity in adolescents, collaboration with adolescents themselves and addressing the complex systems is promising. This paper describes how Participatory Action Research (PAR) and systems dynamics are combined to develop, implement and evaluate actions to stimulate healthy Energy Balance Related Behaviours (EBRBs) in adolescents in a disadvantaged neighbourhood in Amsterdam, the Netherlands.

**Methods** The six steps of the structured intervention (IM) protocol was used to guide the process of co-creating actions, while including the perspective of adolescents in each step with PAR. Systems dynamics was included through the creation of Causal Loop Diagrams (CLDs) to obtain insight in the broader system and the use of the Intervention Level Framework to develop systemic actions. This study is conducted with PAR groups consisting of 6-8 adolescent (10-14 years) co-researchers and a facilitator per group, meeting every week for 3 or 4 years.

**Results** Our innovative approach consisted of six steps, that were conducted by the PAR groups: 1) Build CLDs for each EBRBs through peer-research and identify overarching mechanisms, 2) Determine leverage points using the Intervention Level Framework (ILF), 3) Develop actions ideas through role-playing exercises, 4 & 5) Develop actions in detail including an implementation plan & implement the actions, 6) Evaluate the actions by the co-researchers and facilitators. PAR ensured that the actions fitted the needs of adolescents, while systems dynamics promoted a change in the system at different levels. The IM protocol ensured that the actions were theory-based. The main challenge was to integrate systems dynamics in our practice in cooperating with adolescent co-researchers.

**Conclusions** We experienced that combining IM, PAR and systems strengthened the process of action development, implementation and evaluation. The knowledge and experience with both PAR and systems dynamics of the facilitator was crucial to actively collaborate with adolescents throughout the process, specifically to integrate systems dynamics. This study can serve as an example to other studies developing actions using IM, PAR and systems dynamics.



# The development of a conceptual model for collective patterns and income inequalities of adult's leisure-time physical activity

**Miss Sophie Jones<sup>1</sup>**, Prof. Ruth Hunter<sup>1</sup>, Dr. Leandro Garcia<sup>1</sup>

<sup>1</sup>Queen's University Belfast, Belfast, United Kingdom

Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** Levels of physical activity are highly unequal across the population. However, despite being widely researched, there is minimal understanding of the dynamic processes involved in driving and sustaining these unequal patterns. Therefore, we sought to develop a conceptual model illustrating the dynamic interactions between an individual's personal attributes and physical and social environments, which influence their decision to practice leisure-time physical activity (LTPA). The conceptual model will consequently be used to inform the development of an agent-based model to understand how dynamic interactions between different mechanisms and conditions drive collective patterns and income inequalities in LTPA.

**Methods:** The conceptual model was developed through four main processes (1) an initial draft was developed using the knowledge of the research team, (2) an intermediary draft was developed as a result of two realist-informed reviews, (3) an expert consultation with academics in relevant areas, and (4) finalisation of the conceptual model. The consultation was conducted via an online survey to validate and verify assumptions made in the intermediary draft. Experts were asked to assess the conceptual model, including an overall agreement rate and open questions about relationships and mechanisms they would include or exclude.

**Results/findings:** The conceptual model has intention as the most proximal construct to practice LTPA, conditioned by aspects of the individual's perceived, physical, and social environment, many of which are driven by individual and/or area-level income. The conceptual model is supported by several theories, 11 reviews and 38 empirical studies. In addition, 40 experts assessed an intermediary draft of the conceptual model, with an agreement rate of 80%.

**Conclusions:** The present conceptual model adopts a dynamic perspective whereby income inequalities exist as an emergent feature of a complex system resulting from interactions within the system. The model developed is well supported by evidence and is the first to focus solely on income inequalities in adults' LTPA. Moving forward, this conceptual model will inform an agent-based model aimed at enabling a broader understanding of what shapes and sustains inequalities across different income groups, which will be of benefit from an inequality perspective and for population health.

# Developing an agent-based model for collective patterns and income inequalities of adult's leisure-time physical activity

**Miss Sophie Jones<sup>1</sup>**, Prof. Ruth Hunter<sup>1</sup>, Dr. Leandro Garcia<sup>1</sup>

<sup>1</sup>Queen's University Belfast, Belfast, United Kingdom

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** Traditional linear and reductionist interventions have thus far provided minimal or no progress in reducing inequalities in physical activity levels. Furthermore, it is unclear in which contexts and conditions different types of physical activity promotion strategies may be beneficial. Approaches that adopt systems thinking, such as agent-based modelling, could help us overcome this limitation by providing a deeper understanding of the dynamic processes which occur to shape the patterns we observe. Therefore, we developed an agent-based model to understand how dynamic interactions between mechanisms and conditions drive and sustain collective patterns and income inequalities of leisure-time physical activity (LTPA) in adults.

**Methods:** The agent-based model was developed through four main stages (1) conceptual model development, (2) operationalisation of the agent-based model, (3) parameterisation and calibration and (4) consistency and sensitivity analysis. The agent-based model was designed as an abstract representation of two cities, different by income-based geographical segregation, and is governed by a conceptual model whereby individuals decide to practice LTPA each week. Within the model, there are two types of agents: people and LTPA spaces. Each week, an individual decides to practice LTPA based on their intention, conditioned to their perceived, physical, and social environment.

**Results/findings:** The analysis of the agent-based model will take place in May 2023. We plan to run a series of "what if" scenarios in the agent-based model to understand how different mechanisms and conditions may interact with individuals with varying incomes across different neighbourhoods and city types, shaping inequalities in physical activity. We will also run an uncertainty analysis to investigate what data to prioritise to inform future models.

**Conclusions:** The agent-based model designed is suitable for exploring collective patterns and income inequalities in adults' LTPA. Central to the model are the dynamic interactions between an individual, income levels, and the physical and social environments in which they live. This agent-based model will enable us to develop a different way of thinking about inequalities in LTPA, which will be beneficial for improving population levels of physical activity.

# Supporting socioeconomically vulnerable families to cook a balanced meal: Effect evaluation of the intervention “Dinner is served at 1-2-3 euros”

**Ms. Marjolijn Vos**<sup>1</sup>, Prof. Benedicte Deforche<sup>1,2</sup>, Prof. Anneleen Van Kerckhove<sup>1</sup>, Dr. Nathalie Michels<sup>1</sup>, Prof. Wendy Van Lippevelde<sup>1</sup>

<sup>1</sup>Ghent University, Ghent, Belgium, <sup>2</sup>Vrije Universiteit Brussel, Ixelles, Belgium

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

## **SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose** There is a social health gradient, meaning that people with a lower socioeconomic status (SES) have less healthy lifestyles and more health problems than people with a higher SES. However health promoting interventions often solely rely on individual resources (e.g. psychological) whereas, to tackle social and health inequalities, it would be more effective and equitable to use more structural interventions that make changes in the environment. In Belgium, an existing intervention, called “Dinner is served at 1-2-3 euros”, seems promising in enhancing lower SES families’ meal habits and diets. The intervention is a collaboration between social organizations and a large Belgian retailer, providing subscribed families two-weekly recipe booklets with balanced meals, and offering a fixed price of one, two or three euros per person per meal. The goal of this study is to investigate the effect of this intervention on people’s food choices via purchase data retrieved from loyalty cards.

**Methods** The study has a longitudinal pre-post design, and is based on secondary purchase data from 2018 until 2022. The intervention group (i.e., participants of the intervention) will be compared to a control group (i.e., not subscribed in the intervention), by using general customer data. Consent to use the individual’s purchase data is asked. The dependent variable is food purchases, with as primary outcome measure: the products used in the recipe booklets, and as secondary outcome measures: the money spent in various food categories (e.g., vegetables and fruits, high processed foods, etc.) versus the total food shopping cart. A multilevel growth model will be used to look at each individual’s different purchase moments, with data before and during the intervention. The model represents three levels: 1) point of time/purchase, 2) customer, 3) store/location.

**Results** Data-analysis will be conducted in the following months, so that (preliminary) results will be available to present at the ISBNPA annual meeting.

**Conclusion** We expect to gain insight into the effectiveness of the intervention by looking at the bought food products from the recipes, as well as to find out if the intervention has an effect on (un)healthy food purchases.

# Supporting socioeconomically vulnerable families to cook a balanced meal: Process evaluation of the intervention “Dinner is served at 1-2-3 euros”

**Ms. Marijlijn Vos**<sup>1</sup>, Prof. Benedicte Deforche<sup>1,2</sup>, Prof. Anneleen Van Kerckhove<sup>1</sup>, Prof. Wendy Van Lippevelde<sup>1</sup>

<sup>1</sup>Ghent University, Ghent, Belgium, <sup>2</sup>Vrij Universiteit Brussel, Ixelles, Belgium

Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM

## **SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose** Health inequalities between families with a different socioeconomic status (SES) have been growing. Moreover, individuals with a lower SES seem to be less likely to show health-related behaviors, like healthy food consumption. To tackle these inequalities and to reach individuals from all backgrounds, health promoting interventions should not only target individual determinants (e.g., knowledge), but be more structural (i.e., make changes in the environment). In Belgium a promising, existing intervention to enhance lower SES families' meal habits and diets, is called “Dinner is served at 1-2-3 euros”. The intervention is a collaboration between social organizations and a Belgian retailer, providing subscribed families two-weekly recipe booklets with balanced meals, and offering a fixed price of one, two or three euros per person per meal. With this qualitative study, we aim to gain insight into the experiences of participants and of social organizations (i.e., the intermediaries that lead participants to the intervention), and explore the key mechanisms of success and points of improvement.

**Methods** Participants of the program will be interviewed in one-on-one interviews and representatives of social organizations will be interviewed in focus groups, using a semi-structured interview guide. The interview guides are based on the key process-evaluation elements of Saunders and colleagues (2005), as well as on a thorough analysis of the intervention itself by means of the Intervention Mapping protocol. Interviews will be audio-recorded and transcribed verbatim. Thematic analysis will be used as qualitative analytic method. Data collection and analysis will be done by the first author as well as research assistants, hereby reaching researcher triangulation.

**Results** Data-analysis will be conducted in the following months, so that (preliminary) results will be available to present at the ISBNPA annual meeting.

**Conclusion** We expect to gain insight into the reach of the intervention, the recruitment, the context, the delivered dose and the received dose, as well as understand barriers and success factors of the intervention. With this study we hope to inform health promoters, policy makers and marketers about possible strategies to reach lower SES families.

# The Influence of Neighborhood Characteristics on Individual Weight loss in a Clinical Trial

**Dr. Nana Yaa Marfo<sup>1</sup>**, Dr. Emil Coman<sup>2</sup>, Dr. Tricia Leahey<sup>3</sup>, Dr. Kristen Cooksey Stowers<sup>3</sup>, Dr. Stephanie Milan<sup>3</sup>, Dr. Amy Gorin<sup>3</sup>

<sup>1</sup>University of Massachusetts Chan Medical School, Worcester, USA, <sup>2</sup>University of Connecticut School of Medicine, Hartford, USA, <sup>3</sup>University of Connecticut, Storrs, USA

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** Myriads of obesity-focused studies have documented the relationship between adult weight status and characteristics of the neighborhood environment (e.g., walkability and poverty rates); however, causality between these correlates has proven difficult to test or infer. Behavioral weight loss trials provide an ethical, efficient, quasi-experimental setting for the exploration of causality via the direct effects of neighborhood characteristics on individual weight loss outcomes. The purpose of this study was to assess the extent to which four characteristics of the neighborhood environment predicted participant weight loss above and beyond individual characteristics in the 16-week, weight loss-induction phase of an adult weight loss maintenance trial. We hypothesized that (1) greater neighborhood walkability and park access would predict more weight loss, while (2) lower neighborhood socioeconomic position (SEP) and less access to healthy food would predict less weight loss.

**Methods:** The study sample (n=747) consisted of predominantly White (79.57%) and female (83.06%) residents of Connecticut, USA. Average age and BMI were  $50.64 \pm 12.02$  years and  $34.70 \pm 5.62$  kg/m<sup>2</sup> respectively. Participants' addresses were anonymized, geocoded, and linked to their respective census tracts (n=265) using *PolicyMap* software. Neighborhoods were defined as census tracts for this study. Neighborhood variables (i.e., walkability, low access to supermarkets and grocery stores, and average SEP) were downloaded from *PolicyMap* at the census tract level. Park access data were downloaded from the National Neighborhood Data Archive (NaNDA): Parks by Census Tract data set. Spatial path analyses were performed to assess the extent to which each census tract-level neighborhood characteristic uniquely predicted individual level weight loss outcomes.

**Results/Findings:** On average, residents from census tracts with lower SEP and less healthy food access demonstrated less weight loss relative to their counterparts ( $B = -0.491$ ,  $SE = 0.200$ ,  $p = .014$ ;  $B = -0.666$ ,  $SE = 0.337$ ,  $p = .048$ ). Neither census tract-level walkability nor park access had additional effects on individual weight loss. These findings suggest that factors beyond the individual level impact the effectiveness of behavioral weight loss interventions, and that the complexity with which they affect health must be addressed to make these treatments more equitable.

# Urban walkability perceived by children and youth: Participatory methods and scale development in the WALKI-MUC project

**Mr. Daniel Alexander Scheller<sup>1</sup>**, Dr. Joachim Bachner<sup>1</sup>

<sup>1</sup>Associate Professorship of Didactics in Sport and Health, Department of Sport and Health Sciences, Technical University of Munich, Munich, Germany

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** Youth's perceptions of a city or neighbourhood's walkability are important for determining the physical activity (PA) friendliness of their environment. Traditional objective measures of walkability fail to incorporate children and youth's subjective perceptions of places that they perceive as supportive for play and exercise. Internationally, the most promising subjective measure is the Neighborhood Environment Walkability Scale for Youth (NEWS-Y). Yet, the NEWS-Y is not available for German-speaking adolescents. In the WALKI-MUC project, a combination of participatory research methods is used to identify places that are perceived as PA-friendly by children and adolescents. Based on the findings, a German version of the NEWS-Y (NEWS-Y-G) for subjective walkability measurement is developed.

**Methods:** Ninety-three children and adolescents aged six to 17 years from six neighbourhoods of Munich, Germany, with different objectively-measured walkability took part in photovoice, walking interviews and mapping exercises to capture their perceptions on self-chosen PA-friendly places. Participants were divided into small groups within their respective neighbourhoods. One individual participated in a series of activities, including an introductory workshop with photo training, a photo mission combined with a one-on-one walking interview with the researcher, and a focus group discussion about characteristics of photographed PA-friendly places, all held on separate days. To encourage active participation, a novel approach to photovoice called "photo lottery" was utilised. Walking interviews were transcribed verbatim and coded deductively with the Tripartite Framework for Place Attachment including its dimensions Place, Person and Process.

**Results/findings:** Surrounding nature played a crucial role for visiting PA-friendly places whereas individual motives to be physically active seemed less important. Affects, emotions and memories associated with a place drove the frequency of visits differing by age and gender. Identified built and natural characteristics of PA places were used to adapt the original NEWS-Y after having translated the scale into German by using a back-translation technique.

**Conclusion:** The WALKI-MUC project combines qualitative and quantitative methods for subjective walkability measurement and scale development, providing a new participatory approach for researchers and urban planners. The NEWS-Y-G offers a German instrument for subjective walkability measurement, which will be piloted in a representative sample of adolescents in Munich.



# Accelerometer-measured physical activity and indicators of cardiometabolic risk among rural adolescents: a cross-sectional study from Bangladesh

**Mr. Mohammad Redwanul Islam**<sup>1</sup>, Associate Professor Christine Delisle Nyström<sup>2</sup>, Associate Professor Maria Kippler<sup>3</sup>, Prof. Eero Kajantie<sup>4,5</sup>, Dr. Anisur Rahman<sup>6</sup>, Associate Professor Syed Moshfiqur Rahman<sup>1,6</sup>, Prof. Marie Lof<sup>2,7</sup>, Prof. Eva-Charlotte Ekström<sup>1</sup>

<sup>1</sup>Department of Women's and Children's Health, Uppsala University, Uppsala, Sweden, <sup>2</sup>Department of Biosciences and Nutrition, Karolinska Institutet, Stockholm, Sweden, <sup>3</sup>Unit of Metals and Health, Institute of Environmental Medicine, Karolinska Institutet, Stockholm, Sweden, <sup>4</sup>Finnish Institute for Health and Welfare, Helsinki and Oulu, Finland, <sup>5</sup>PEDEGO Research Unit, MRC Oulu, Oulu University Hospital and University of Oulu, Oulu, Finland, <sup>6</sup>Maternal and Child Health Division, International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b), Dhaka, Bangladesh, <sup>7</sup>Department of Health, Medicine and Caring Sciences, Linköping University, Linköping, Sweden

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

## **SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose** Physical activity (PA) behaviors and cardiometabolic risk profile tend to track from adolescence into adulthood. We sought to explore the relationship of accelerometer-assessed sedentary time (ST) and PA with conventional indicators of cardiometabolic risk at mid-adolescence in a rural birth cohort from Bangladesh.

**Methods** This cross-sectional study utilized data from the 15-year follow-up of Maternal and Infant Nutrition Interventions in Matlab (MINIMat) cohort, collected with wrist-worn (non-dominant) ActiGraph wGT3x-BT device in 5-second epochs (frequency 90 hertz). ST and time engaged in intensity-specific PA were estimated, applying Chandler cut-points. Total PA was based on daily vector magnitude counts per minute. Adolescents accumulating five days (including at least one weekend day) with  $\geq 600$  minutes/day of awake wear time were retained in the analysis ( $n = 1872$ , 52.6% girls). Waist circumference (WC), systolic blood pressure (SBP), fasting plasma triglyceride (TG), total cholesterol, low- and high-density lipoproteins (LDL and HDL), insulin and glucose levels were measured. We calculated insulin resistance using Homeostasis Model Assessment equation (HOMA-IR). Three right-skewed variables were natural log transformed: WC, TG and HOMA-IR. Overall and gender-specific linear regression and isotemporal substitution models were fitted.

**Results** The adolescents spent 64.3 minutes/day (inter-quartile range: 49.9–80.9) in moderate-to-vigorous physical activity (MVPA). ST demonstrated weak, positive associations; while total PA displayed weak, negative associations with WC and HOMA-IR after controlling for gender, household wealth, maternal education and wear time. A 10-minute-per-day higher vigorous-intensity PA (VPA) was associated with: 4.9% (95% confidence interval (CI): 2.9%–6.8%;  $P < 0.001$ ) lower WC, 3.2 mm of Hg (95% CI: 1.5–4.8;  $P < 0.001$ ) lower SBP, 10.4% (95% CI: 2.9%–17.3%;  $P = 0.008$ ) lower TG, 24.4% (95% CI: 11.3%–34.9%;  $P < 0.001$ ) lower HOMA-IR, and 0.1 mmol/L (95% CI: 0.06–0.15) higher HDL. MVPA showed similar associations of notably smaller magnitude. Except for WC, the associations were more pronounced among the boys. Substituting ST with VPA of equal duration was associated with lower WC, SBP, TG and HOMA-IR.

**Conclusion** PA – especially VPA – was associated with lower levels of cardiometabolic risk indicators. VPA represents a target for preventive strategies tailored to adolescents in a resource-limited setting.

# Gender differences in the physical activity of French adults: What links with physical activity guidelines ?

**Mr. Jérôme Bouchan**<sup>1,2</sup>, Prof. Jean-Michel Oppert<sup>2,3</sup>, Dr. Hélène Charreire<sup>4</sup>, Dr. Alice Bellicha<sup>2</sup>, Dr. Valérie Deschamps<sup>1</sup>, Dr. Benoît Salanave<sup>1</sup>, Dr. Charlotte Verdot<sup>1</sup>

<sup>1</sup>Non-Communicable Disease and Trauma Department, Santé publique France, Saint-Maurice, France,

<sup>2</sup>Nutritional Epidemiology Research Team (EREN), University of Sorbonne Paris Nord and University of Paris Cité, National Institute of Health and Medical Research (INSERM), National Research Institute for Agriculture, Food and Environment (INRAE), National Conservatory of Arts and Crafts (CNAM), Center of Research in Epidemiology and Statistics, Bobigny, France, <sup>3</sup>Nutrition Department, Pitié-Salpêtrière Hospital (AP-HP), Sorbonne University, Human Nutrition Research Center Ile-de-France (CRNH IdF), Paris, France, <sup>4</sup>Montpellier Interdisciplinary Center on Sustainable Agri-foods System (MoISA), University of Montpellier, Montpellier, France

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose** Recent physical activity (PA) survey data in France (Esteban survey, 2014-2016) have shown that 29% of adult men and up to 47% of adult women were physically inactive (ie not meeting current PA recommendations). Previous analyses only assessed total PA. With the aim to refine public health strategies, the aim of our study was to analyze PA domain and type and to assess the contribution of each PA domain to reaching PA recommendation according to gender.

**Methods** The French cross-sectional population-based survey Esteban (2014-2016) collected PA data on a representative sample of the French adult population (n=2682, age 47.0, % women 51.2) with a multi-stage sampling design. PA assessed by the Recent Physical Activity Questionnaire (RPAQ). Analyses focused on domains (leisure, work etc...) and types of PA (walking, gardening etc...) in relation to overall PA levels and several sociodemographic and health variables.

**Results** Weekly duration of moderate-to-vigorous intensity PA was significantly higher among men than women. Men compared to women engaged in more leisure-time PA (53.2% of total PA vs. 35.8%) and work PA (28.0% vs. 20.7%). While women worked more in sedentary jobs and almost a third of their PA is of low intensity (mainly due to household activities). Transport PA (active mobility) to work was extremely low (accounting for 1.2% and 0.7% of weekly PA for men and women respectively). Among leisure PA, walking ranked first and was reported by 82.6% of men and 91.6% of women. Those subjects reaching the public health PA recommendations were those who engaged in leisure-time PA more frequently and for longer periods of time, but also those who engaged in several different types of leisure PA (around 4 activities practiced by those who reached the recommendations versus 2.5 activities).

**Conclusions** Higher total PA as previously reported in French men compared to women appear related to higher leisure-time and work PA. Meeting current PA recommendation was associated with increased frequency, duration and number of PA performed during leisure-time.

# Practical learnings from applying photovoice with Aboriginal and Torres Strait Islander peoples in remote communities.

**Ms. Emma Chappell**<sup>1,2</sup>, Prof. Yvonne Cadet-James<sup>1,3</sup>, Associate Professor Julie Brimblecombe<sup>1,2,4</sup>, Associate Professor Marita Hefler<sup>1,2</sup>, Ms. Caroline Deen<sup>3</sup>, Ms. Ellie Chan<sup>5</sup>, Dr. Megan Ferguson<sup>1,2,4</sup>

<sup>1</sup>University of Queensland, Brisbane, Australia, <sup>2</sup>Menzies School of Health Research, Darwin, Australia,

<sup>3</sup>Apunipima Cape York Health Council, Cairns, Australia, <sup>4</sup>Monash University, Clayton, Australia, <sup>5</sup>Central Australian Aboriginal Congress, Alice Springs, Australia

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose** To assess the application of photovoice as a participatory action research method with Australian Aboriginal and Torres Strait Islander peoples in exploring solutions to improve food security. This study explored the suitability and adaptability: i) of photovoice's goals to promote critical group dialogue on community-identified strengths, concerns and to reach policy makers, and ii) how the process applies to best practice in working with Aboriginal and Torres Strait Islander peoples.

**Methods** Aboriginal-Controlled Community Health Organisations set the priority of food security and identified the target population of pregnant women and carers of Aboriginal and/or Torres Strait Islander children aged under five. Community Advisory Groups informed photovoice recruitment and implementation. In each of four remote Aboriginal communities we aimed to recruit 4-10 participants. Three photovoice workshops (with additional time for participant support) were planned to be conducted over four weeks in each community, preceded by 1-2 weeks of recruitment. Workshops were intended to be group workshops and involve participants in theme generation. Formative evaluation in two communities sought participant preference for group versus individual workshops. The inclusion of data in further workshops with community leaders was evaluated.

**Results/findings** 25 participants participated in the first workshops, an average of six per community. In response to participant preferences, most workshops were run with individuals rather than groups. Formative evaluation suggested this related to a variety of reasons specific to this context including the sensitivity of subject matter. A new protocol for theme generation was devised, which was researcher-led and participant-checked, giving consideration to burden on participants and the fact that participants had not observed each others' stories and photos until workshop three. Post-workshop data analysis included input from two Aboriginal researchers. Overall there were community-identified strengths and concerns and some attempt at critical dialogue through viewing others' photos individually. Photovoice data did contribute to discussions by community leaders around future advocacy decisions.

**Conclusions** Photovoice is adaptable to participant needs and preferences with Aboriginal and Torres Strait Islander peoples. This study found acceptable ways to adapt the method by being informed by Aboriginal and Torres Strait Islander guidance throughout the process.

# Are digital health behavioural interventions to prevent or manage obesity in adolescents contributing to inequalities? An assessment tool for systematic appraisal of interventions

**Dr. Stephanie Partridge<sup>1</sup>**, Ms. Allyson Todd<sup>1</sup>, Ms. Sisi Jia<sup>1</sup>, Ms. Rebecca Raeside<sup>1</sup>

<sup>1</sup>Engagement and Co-design Research Hub, School of Health Sciences, Faculty of Medicine and Health, The University of Sydney, Sydney, Australia

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** J. Young Adults

**Purpose:** Digital health interventions have shown moderate effectiveness in helping adolescents manage their weight and adopt healthy habits. However, it is crucial to ensure that all adolescents can access and benefit from these services, regardless of their demographic backgrounds. Inequities in digital health reflect societal inequities. The populations most at risk of being excluded from digital health interventions include racial and ethnic minority groups, people with lower socioeconomic status and underserved rural communities. This review aims to assess the digital health equity of adolescent obesity interventions and identify any barriers to access and equity that may exist.

**Methods:** We will conduct a systematic review of 10 electronic databases, including cluster/randomized controlled trials (cRCT/RCT) of digital health interventions with participants aged 10-19 years without significant acute or chronic diseases. The intervention should target one or more lifestyle risk behaviours (physical activity, diet, sedentary behaviour or sleep). The study outcome will measure changes in body weight, measured by Body Mass Index (BMI) or BMI z-score. The primary outcome of this review is to assess digital health equity based on digital determinants of health across four levels of influence. This review is registered with PROSPERO (CRD42022372040) and is being conducted and reported following PRISMA statement guidelines.

**Results:** We have developed a framework guided by previous research for reviewing digital determinants of health across individual, interpersonal, community and societal levels to assess digital health equity. The included studies are evaluated for individual, interpersonal, community, and societal factors, such as access to technology, digital self-efficacy, implicit technology bias, technology norms, engagement of community partners, technology policies, accessibility, social norms, and algorithmic biases. The systematic review of digital health interventions is ongoing, and the assessment results will be presented as applied to the included studies.

**Conclusions:** Consolidating evidence across digital health intervention studies will inform decision-makers and support the development of equitable technologies/interventions to prevent and manage obesity in adolescent populations. The digital health equity framework has the potential to be applied across other areas of digital health behavioural interventions.

# Examining social disparities in youth participation on sports teams and self-reported exposure to food marketing in sports settings in two policy environments in Canada

**Ms. Elise Pauzé<sup>1</sup>**, Associate Professor Marie-Hélène Roy-Gagnon<sup>1</sup>, Associate Professor Catherine Mah<sup>2</sup>, Lana Vanderlee<sup>3</sup>, Ms. Christine White<sup>4</sup>, Dr. David Hammond<sup>4</sup>, Dr. Monique Potvin Kent<sup>1</sup>

<sup>1</sup>University of Ottawa, Ottawa, Canada, <sup>2</sup>Dalhousie University, Halifax, Canada, <sup>3</sup>University Laval, Quebec, Canada, <sup>4</sup>University of Waterloo, Waterloo, Canada

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** This study examined the socio-demographic correlates of sports participation among youth and their exposure to food marketing in sports settings in two policy environments in Canada. In the province of Quebec, sponsorship advertising related to the activities of children under 13 is permitted but must be discrete while no such restrictions exist in rest of Canada (ROC). This research sheds light on social disparities in children's health determinants and the effectiveness of Quebec's statutory advertising restrictions.

**Methods:** Data were collected by the International Food Policy Study using a cross-sectional online survey completed by 3,682 youth aged 10 to 17 years in Canada in 2019. Data were weighted by age, sex, and region. Multiple logistic regressions were performed to examine the socio-demographic correlates of children's participation on a sports team and their self-reported exposure to names or logos of food companies or restaurants on their sporting equipment or signs displayed at their sporting events.

**Results:** 31% and 40% of youth aged 10-17 reported playing on a sports team in Quebec and ROC, respectively. Among children aged 10-12 who played on a sports team, 32% in Quebec and 46% in ROC reported being exposed to food marketing while playing sports. Among those aged 13-17, 36% and 42% reported being exposed to such marketing in Quebec and ROC, respectively. The odds of playing on a sports teams were greater among children aged 10-12 compared to those aged 13-17 (AOR= 1.176; 95CI: 1.013-1.562), among children living in ROC compared to Quebec (AOR= 1.537; 95CI:1.303-1.813), among males compared to females (AOR= 1.355; 95CI:1.176-1.562), and among children who perceive their family income to be enough to meet their needs compared to barely or not enough (AOR= 1.651; 95CI:1.357-2.008). The odds of self-reporting exposure to food marketing while playing sports were greater in ROC than Quebec (AOR= 1.481; 95CI: 1.119-1.959), and among males compared to females (AOR= 1.452; 95CI: 1.154-1.827).

**Conclusion:** Social disparities in sports participation and advertising exposure may be contributing to health inequities in Canada. Quebec's statutory advertising restrictions are not sufficiently protecting children under 13 from food advertising exposure in sports settings.



# Routine dietary restraint is associated with higher body weight in Chinese adults

**Ms. Yagi Wang<sup>1</sup>**, Assistant Professor Mandy Man Ho<sup>1</sup>, Associate Professor Patsy Pui Hing Chau<sup>1</sup>, Associate Professor Susan M. Schembre<sup>2</sup>, Associate Professor Daniel Yee Tak Fong<sup>1</sup>

<sup>1</sup>School of Nursing, University of Hong Kong, Hong Kong, China, <sup>2</sup>Georgetown Lombardi Comprehensive Cancer Center, Georgetown University, Washington, DC, USA

Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose** Weight loss programs require participants to use dietary restraints to restrict their energy intake to promote weight loss. There are two dimensions of dietary restraint: routine and compensatory. However, the relationships between routine and compensatory restraints and body weight are unexplored. This study aimed to assess the relationship between routine and compensatory restraints and emotional and external eating and body weight in Chinese adults.

**Methods** This is a cross-sectional online survey. Routine and compensatory restraints and emotional and external eating were assessed using a validated 13-item Chinese version of the Weight-related Eating Questionnaire. The higher score indicates a higher level of eating behavior. Body mass index (BMI) was calculated using self-reported height and weight. Pearson's correlation was conducted to assess the relationship between routine and compensatory restraints, emotional and external eating, and BMI.

**Results** A total of 949 Chinese adults completed the online survey (mean age=33 years, SD=14, mean BMI=22.0 kg/m<sup>2</sup>, SD=3.8, 26.4% males). Mean routine restraint score was higher in the overweight/obese group (mean  $\pm$  SD=2.13 $\pm$ 0.76,  $p<0.001$ ) than in the normal-weight (2.08 $\pm$ 0.89) and underweight (1.72 $\pm$ 0.94) groups. However, the normal-weight group scored higher in compensatory restraint (2.88 $\pm$ 1.03,  $p=0.021$ ) than the overweight/obese (2.75 $\pm$ 0.93) and underweight (2.62 $\pm$ 1.04) groups. The routine and compensatory restraint scores did not differ between the participants aged below and above 40 years old, although young adults (<40 years old) had higher emotional and external eating scores than adults aged over 40 years old. Routine restraint ( $r=0.090$ ,  $p=0.005$ ) and emotional eating ( $r=0.131$ ,  $p<0.001$ ) were positively correlated to BMI. However, compensatory restraint ( $r=-0.10$ ,  $p=0.763$ ) and external eating were not related to BMI ( $r=0.049$ ,  $p=0.133$ ). Emotional eating was related to higher levels of external eating ( $r=0.497$ ,  $p<0.001$ ) and routine ( $r=0.251$ ,  $p<0.001$ ), and compensatory restraints ( $r=0.239$ ,  $p<0.001$ ). Similarly, external eating was related to higher levels of routine ( $r=0.151$ ,  $p=0.001$ ) and compensatory ( $r=0.190$ ,  $p<0.001$ ) restraints.

**Conclusion** Routine and compensatory restraints are related to BMI in different ways. Reducing the levels of routine restraint may be helpful for weight loss. Longitudinal studies are needed to test the causality of the relationships between routine and compensatory restraints and emotional and external eating and BMI



# The development of course content for a dietary life skills course targeting students – co-creation with future users

**Assistant Professor Ida Ulrikke Valand**<sup>1</sup>, Prof. Nina C. Øverby<sup>1</sup>, Associate Professor Charlotte Kiland<sup>2</sup>, Associate Professor Tormod Bjørkkjær<sup>1</sup>, Assistant Professor Camilla Bjørnes<sup>1</sup>, Assistant Professor Julie Nordli<sup>1</sup>, Assistant Professor Line Pettersen<sup>1,3</sup>, Prof. Frøydis N. Vik<sup>1</sup>, Prof. Elisabet R. Hillesund<sup>1</sup>

<sup>1</sup>Department of Nutrition and Public Health, Faculty of Health and Sport Sciences, University of Agder, Kristiansand, Norway, <sup>2</sup>Department of Political Science and Management, Faculty of Social Sciences, University of Agder, Kristiansand, Norway, <sup>3</sup>Department of Upbringing and Culture, Bjerkreim Municipality, Bjerkreim, Norway

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** J. Young Adults

**Purpose:** An important role for universities is to educate and empower students in becoming healthy and literate citizens of the 21<sup>st</sup> century society. Previous studies show that students acknowledge the value of dietary knowledge and skills. The Skills for Life project aims to develop and evaluate a course targeting diet literacy in university students. This abstract describes the development and content of the theory- and evidence-based course.

**Methods:** The development of course content was originally guided by 13 focus group discussions (FGDs) with 57 university students, and literature reviews. FGDs were recorded, transcribed verbatim and thematically analysed. Preliminary course content was discussed in three new FGs involving 12 of the above students. Selected learning activities was tested and evaluated by undergraduate students in Nutrition. Preliminary course content was adapted based on feedback from the students.

**Results:** The co-created dietary life skills course comprise 10 lessons with the following topics:

- 1) Lifecourse nutrition and why diet matters
- 2) How to eat healthily
- 3) How to store food to avoid food waste
- 4) How to stock your kitchen
- 5) Preconception diet
- 6) Food labels and how to interpret them
- 7) How to make the most of the student loan
- 8) Sustainable food and “food rescuing”
- 9) What is true about food and health?
- 10) Cooking competition and mindful eating

The students will get access to a web page comprising a short video lecture and selected literature, learning activities and recipes for each lesson. They will also attend lessons at the teaching kitchen on Campus each week (120-150 minutes) for 10 weeks to engage in discussions and group work including meal planning, food preparation and cooking. The course will be piloted and evaluated among approximately 30 first-year students at the University of Agder, Norway during the autumn semester of 2023.

**Conclusion:** The Skills for Life course content was developed with extensive input from university students and includes ten lessons that will be piloted autumn 2023. We hypothesise that the course will promote health, wellbeing, social connectedness, sustainable diet, and other life skills among university students.

# Development and launch of up-to-date ergonomic recommendations for abdominopelvic surgeons to rehabilitate and prevent work-related musculoskeletal pain

**Mrs. Helle Joon Christiansen**<sup>1</sup>, Prof. Pernille Tine Jensen<sup>1</sup>, Prof. Ole Mogensen<sup>1</sup>, Associate Professor Tina Dalager<sup>1,2</sup>

<sup>1</sup>Department of Clinical Medicine, Aarhus University and Aarhus University Hospital, Aarhus N, Denmark,

<sup>2</sup>Department of Sports Science and Clinical Biomechanics, University of Southern Denmark, Odense, Denmark

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose** Almost 9 out of 10 surgeons report musculoskeletal pain, and evidence shows that pain negatively affects their workability and leisure. Poor ergonomic practice in the operating room (OR) is a possible cause of musculoskeletal pain. However, the effects of ergonomic interventions in the OR on surgeons' musculoskeletal health are poorly elucidated as many surgeons report they are unaware of ergonomic recommendations (ER). In a systematic literature review, we narratively synthesized the evidence on the effects of OR ergonomics on musculoskeletal health among abdominopelvic surgeons, with the aim to successfully launch up-to-date ER.

**Methods** The systematic literature search inclusion criteria were: ergonomic interventions applied in the OR on abdominopelvic surgeons and a musculoskeletal health outcome. To successfully launch the evidence-based ER, we will apply a modified version of participatory ergonomics. Surgeons' and other stakeholders' (nurses, management) input will guide the development of ER in three steps: 1) discuss review findings and practical implications, 2) rank ER by appeal and feasibility, and 3) field-test the recommendations. Surgeons' awareness will be evaluated following a three-month launch period.

**Results/findings** The systematic literature search yielded 3903 records and resulted in 29 reports. The preliminary ER were developed based on study quality and effect size: 1) take short intraoperative breaks of 20-300 sec. every 20-40 min., preferably with an active component such as stretching; and 2) participate in modality-specific ergonomic training. Two to three surgeons/other stakeholders will be recruited to assist in the modified participatory ergonomics process.

**Conclusions** We expect the ER will be accessible in short videos, posters, e-mails, and presentations, and that the launch of ER will create awareness of better ergonomics within the OR. The ER will act as usual care in a randomized controlled trial investigating the effect of Individualized Physical Exercise Training (IPET) plus ER on musculoskeletal pain, compared to ER only. IPET is an app-delivered, 60 min./week training program that is tailored to work exposure, physical capacity, musculoskeletal pain and general health. Reducing surgeons' pain will secure their work longevity.

# The socioeconomic trajectories of early adulthood and associations with cardiometabolic health at age 24 years

**Dr. Eleanor Winpenny**<sup>1</sup>, Prof. Laura Howe<sup>2</sup>, Prof. Kate Tilling<sup>2</sup>

<sup>1</sup>MRC Epidemiology Unit, University of Cambridge, Cambridge, United Kingdom, <sup>2</sup>MRC Integrative Epidemiology Unit, University of Bristol, Bristol, United Kingdom

Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** J. Young Adults

**Purpose** Cardiovascular health develops throughout adult life, with socioeconomic factors such as educational attainment strongly associated with cardiovascular outcomes. However, little is known about the immediate health impacts of socioeconomic exposures during early adulthood. In this study we describe the socioeconomic trajectories of early adulthood (age 16-24y) in a contemporary population, and assess associations of these trajectories with measures of cardiometabolic health at age 24y.

**Methods** ALSPAC cohort participants with data on education and employment between ages 16y to 24y (n=7,568) were included. Longitudinal latent class analysis identified classes following different socioeconomic trajectories across ages 16–24y, based on participation in education and employment, education level attained and occupational class. A metabolic health score (MetZscore) was derived based on measures of waist circumference, blood pressure, serum triglycerides, serum high-density lipoprotein cholesterol, and fasting plasma glucose at age 24y (n=3189). We modelled differences in MetZscore across the socioeconomic trajectory classes, adjusting for sex, childhood socioeconomic position, adolescent health behaviours and adolescent health.

**Results** We identified four classes of early adulthood socioeconomic trajectory: (1) Higher Education (41% of the population), (2) Continued Education (9%), (3) Part-Time Employment (21%), and (4) Early Employment (29%). The Higher Education class entered employment following completion of higher education, while the Continued Education class were still in full-time education at age 24y. The Early Employment class left education and entered employment around age 18y, while the Part-Time Employment class were distinguished by part-time employment throughout early adulthood.

The standardized MetZscore was lowest in the Continued Education class, indicating that this was the healthiest population class. No statistically significant difference was seen in MetZscore between this class and the Higher Education class. However, the Part-Time Employment class and Early Employment class showed lower metabolic health, compared to the Continued Education class (difference in intercept 0.189,  $p=0.027$  and 0.215,  $p=0.003$  respectively), after adjusting for parental and childhood covariates.

**Conclusion** Identification of socioeconomic trajectories provides a person-centred method for assessment of socioeconomic exposures across the period of early adulthood. These trajectories contribute to inequalities in cardiovascular health, which can already be identified at age 24y.

# Anything goes? Facilitators and barriers to participatory video methods: Experiences from a community-based participatory research project with women in difficult life situations

**Miss Raluca Sommer**<sup>1</sup>, Dr. Alexandra Sauter<sup>2</sup>, Miss Stephanie Linder<sup>1</sup>, Mrs. Annika Herbert-Maul<sup>1</sup>, Prof. Heiko Ziemainz<sup>1</sup>, Assistant Professor Karim Abu-Omar<sup>1</sup>

<sup>1</sup>Friedrich-Alexander-Universität, Erlangen, Germany, <sup>2</sup>University of Regensburg, Regensburg, Germany

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

## **Purpose:**

There has been an increasing interest in empowering individuals and communities to engage in research that can lead to social change (High et al., 2012). Visual research methods, such as participatory video - a “collaborative approach in which people create a video about themselves to open spaces for learning, enable change and transformation” (Milne et al., 2012, pp.36) - is the focus of this study. NU-BIG<sup>[1]</sup> involves women in difficult life situations<sup>[2]</sup> (n=6) in co-creating and co-producing a participatory video to reflect the long-term effects of a physical activity promotion program (BIG<sup>[3]</sup>) for this target group. Our research sheds light on how the group’s capacity building can be strengthened by this method.

**Methods:** We conducted a qualitative study using a semi-standardized monitoring protocol for capacity building (Sauter et al., 2020); semi-structured interviews (n=12); field notes (n=4); and a reflexive focus group interview (n=1).

**Results:** For the women, the video was a powerful means to express how BIG influenced their lives. They requested a slow and gradual process, media input, and permanent support from scientists. A workshop by a media professional developed their self-confidence, critical awareness, improved their general media literacy, even if not all capacity building dimensions could be strengthened, such as leadership. However, the process could only take place in their language and on their terms, which called for a unique role of researchers as evaluators. They underwent a continuous evolution of their identity and “positionality” in research, while the women determined their role. The process was demanding, requiring a flexible facilitation of meetings (e.g., format, seating arrangements) and a permanent ability to adapt to spontaneous situations and women’s demands.

**Conclusions:** Most women have a sense of own marginalization and the method used succeeds in creating space for an empowering process. This comes with challenges for both researchers and participating women. Conceptualizing a participatory video with this specific target group sets in motion dynamic learning and knowledge exchange, but also triggers their insecurities and inhibits active participation. Visual research methods such as participatory videos should be given more importance, particularly in community-based projects with vulnerable population groups.

# Levels in different domains of physical activity before and during the COVID-19 pandemic in the city of São Paulo, Brazil: a cohort study.

**Dr. Rildo de Souza Wanderley Júnior<sup>1</sup>**, Ms. Margarethe Thaisi Garro Knebel<sup>2</sup>, Ms. Bianca Mitie Onita<sup>2</sup>, Miss Elaynne Silva de Oliveira<sup>2</sup>, Prof. Alex Antonio Florindo<sup>1</sup>

<sup>1</sup>School of Arts, Sciences and Humanities-University of Sao Paulo, São Paulo, Brazil, <sup>2</sup>School of Public Health-University of Sao Paulo, São Paulo, Brazil

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

## **SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** The aim was to analyze physical activity (PA) levels in different domains before and during the COVID-19 pandemic in citizens of the city of São Paulo-SP, Brazil.

**Methods:** It was a cohort ISA-Physical Activity and Environment conducted with a sample of 1,434 subjects interviewed in the city of São Paulo-SP in 2014-2015 (baseline: face-to-face) and 2020-2021 (2<sup>nd</sup> wave: telephone). Levels of physical activity ( $\geq 150$  minutes per week) in the domains of leisure-time, active transportation, work, and domestic were measured using the IPAQ long version before and during COVID-19 and stratified by sex; age group; race; marital status; education level; and adoption to lockdown (total isolation in the house; and leave normally or just to do obligatory services). Statistical analyzes were prevalence and 95% confidence intervals (CI), McNemar and Chi-square tests.

**Results:** PA levels had a significant increase in baseline and 2<sup>nd</sup> wave in the domain of leisure time (22.7; CI95%: 20.6-25.0 x 30.4; CI95%: 28.1-32.8;  $p=0.01$ ), work (48.2; CI95%: 44.6-51.8 x 57.5; CI95%: 53.9-61.0;  $p=0.01$ ), and domestic (52.2; CI95%: 66.2-71.0 x 68.7; CI95%: 66.2-71.0;  $p=0.01$ ), but not in active transportation (22.2; CI95%: 20.2-24.4 x 24.3; CI95%: 22.2-26.6;  $p=0.15$ ). The prevalence of leisure time PA was higher in male, <18yo at baseline, 18-39yo at second wave, single at baseline, and high education level. The prevalence in work PA was higher in male, 40-59yo at baseline, low education level, race brown at the second wave, and live with a partner at the second wave. The prevalence of domestic PA was higher in females, 40-59yo, race black at baseline, and live with a partner. The largest proportion physically active in leisure time (31.4; CI95%: 29.0-34.0;  $p<0.01$ ), work (58.0; CI95%: 54.4-61.6;  $p=0.02$ ), and domestic (69.7; CI95%: 67.1-72.1;  $p<0.01$ ) were those who didn't adopt to lockdown during the period of the COVID-19 pandemic.

**Conclusions:** There was a significant increase in PA levels in leisure time, work, and domestic domains in the two periods, however the adoption of lockdown by COVID-19 were associated inversely with leisure-time, work, and domestic PA. Active transportation should consider walking and cycling as isolated behaviors in new analyses.

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# Community-engaged citizen science to improve sport and physical activity participation among girls in Peru

**Dr. Maja Pedersen**<sup>1</sup>, Ms. Thalia Simich<sup>2</sup>, Ms. Macarena Scarafia<sup>2</sup>, Mr. Daniel Barrera<sup>3</sup>, Dr. Maria Pia Urgelles<sup>3</sup>, Ms. Ann Banchoff<sup>4</sup>, Ms. Isela Blanco-Velazquez<sup>4</sup>, Ms. Ines Campero<sup>4</sup>, Dr. Abby C. King<sup>1,4</sup>

<sup>1</sup>Stanford Prevention Research Center, Department of Medicine, Stanford University, Stanford, California, USA, <sup>2</sup>Fundación Deporte en Igualdad, Lima, Peru, <sup>3</sup>Universidad Peruana de Ciencias Aplicadas, Lima, Peru,

<sup>4</sup>Department of Epidemiology and Population Health, Stanford University School of Medicine, Stanford University, Stanford, California, USA

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** Increasing participation in physical activity (PA) by girls is critical to the layered goals of long-term health and social outcomes, and ultimately progress toward gender equity. One powerful, inclusive, and globally recognized approach to this end is through the field of sport. The purpose of this study was to improve understanding of social and environmental barriers to and facilitators of PA and sport participation by adolescent girls in Cusco, Peru.

**Methods:** This project was positioned within the UN framework of gender equality through sport and applied the ecological model highlighting social and environmental influences on health behavior. A partnership between Stanford University (USA), the Institute for Sports Equality (Peru) and the The Peruvian University of Applied Sciences (Peru) was developed to engage school-based sites in community participation and research-to-action science. We applied a community-engaged citizen science approach in implementing an evidence-based, participatory mobile health intervention. We asked participants to respond to a themed prompt via an iterative, smartphone-based, multimethod data collection process (the *Our Voice* method). The prompt was: “*What makes it easy or difficult for you and other girls and women to participate in sports or PA in Cusco?*”

**Results/Findings:** Fourteen girls (ages 8-17) participated; we received school site, parental, and individual approvals for all activities. There were 44 data collection timepoints, 57 photos taken with accompanying rankings (positive or negative) and narrative descriptions. High participation rates (78%) occurred across five participant interpretive meetings. Themes identified by participants included (1) discrimination; (2) inclusiveness; (3) maintenance; (4) access; (5) multi-use facilities; and (6) security. Feasibility measures indicated high levels of support and enthusiasm from participants and stakeholders including parents, school and city officials, and national representatives of Peru’s federal Institute for Sports for implementing the findings to enact change.

**Conclusions:** This study is aligned with global health initiatives for action (UN, WHO), and was conducted by an interdisciplinary partnership including two Peruvian organizations with deep-seated community and institutional ties. The long-term goals of this research are to advance knowledge and action for improving girls’ sport participation and the increased confidence, agency, and empowerment that it can engender.



# An inventory of instruments for measuring community member participation in health promotion research: Preliminary results from a scoping review

Dr. Maike Till<sup>1</sup>, Miss Raluca Sommer<sup>1</sup>, Dr. Alexandra Sauter<sup>2</sup>, **Dr. Peter Gelius<sup>1</sup>**

<sup>1</sup>Friedrich-Alexander-Universität Erlangen-Nürnberg, Erlangen, Germany, <sup>2</sup>University of Regensburg, Regensburg, Germany

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose** Community participation is a key principle in health promotion, and it is essential to evaluate it to fully appreciate the benefits of participatory projects for improving community health. However, measuring the extent, type and quality of citizens' engagement in a comparable fashion is often challenging. This study aims to provide an overview of existing instruments to measure participation, to categorize and describe available instruments, and to identify research gaps and recommendations.

**Measures** Twelve scientific databases were searched from inception to June 2021 to identify English or German scientific journal articles. Search terms represented assessment, measurement, concepts of participation, engagement, involvement, and terms related to action research, community-based research, and collaboration science. Results were analyzed in line with PRISMA-ScR guidelines for scoping reviews.

**Results** Our search yielded 20,682 hits across all databases. After removing duplicates, two researchers independently screened 12,267 articles based on title/abstract, and 26 articles were selected for full-text screening. 14 were included for the qualitative synthesis, of which seven related to the development of tools, three to checking psychometric properties and four had a mixed focus of both. Regarding the concept of participation, most tools explicitly refer to participation in terms of engagement. Others focus on strength, success, and/or synergies within partnerships, and still others on group dynamics within community-based participatory research (CBPR) projects or other key dimensions of researchers-community partnerships. One study measured participation in terms of adherence of partnerships to the nine CBPR principles. In a next research step, articles focusing on development will be further assessed regarding their origin, quality and development appraisal.

**Conclusions** Preliminary results suggest there is some variety among instruments to assess participation in CBPR. Most tools are based on different principles for CBPR and aim at predicting the success of community-academic partnerships for health promotion. Our scoping review offers a resource to assist the evaluation of such partnerships and to gain a comprehensive understanding on how community members engage in health promotion research.

# Daily and Weekly Exercise Regularity May Enhance Beneficial Effects of Exercise in Active Young Adults

**Mr. Thomas Keiser<sup>1</sup>**, Dr. Elissa Hoopes<sup>1</sup>, Mr. Ben Brewer<sup>1</sup>, Dr. Susan Malone<sup>2</sup>, Dr. Melissa Witman<sup>1</sup>, Dr. Freda Patterson<sup>1</sup>

<sup>1</sup>College of Health Sciences, University of Delaware, Newark, USA, <sup>2</sup>Rory Meyers School of Nursing, New York University, New York, USA

Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM

**SIG - Primary Choice:** J. Young Adults

**Purpose:** The growing field of chronomedicine suggests that the time of day when a therapeutic is administered can enhance or diminish effects. The time-of-day effects of aerobic exercise on cardiometabolic health have yet to be elucidated. To begin to address this gap, the current study explored the extent to which different metrics of time-of-day exercise regularity moderated the association between weekly MVPA and the cardiometabolic health variables of body mass index (BMI), systolic blood pressure (SBP), and diastolic blood pressure (DBP).

**Methods:** Healthy adults completed 14-days of waist accelerometry. Exercise timing was operationalized as the start time of the longest exercise bout each day. Exercise regularity was then quantified according to two patterns: (1) 'daily' regularity (i.e., standard deviation (SD) of exercise timing across 14 days), and (2) 'weekend' regularity (i.e., engaging in >50% of exercise bouts during the same time-of-day [morning, late morning, afternoon, or evening] on Saturdays+Sundays)(binary). Clinical assessments of BMI, resting SBP, and DBP were taken following the 14-day monitoring period. Multivariable regression models that adjusted for age and sex were used to test the research questions.

**Results:** Participants (N=45) aged  $M=28.7\pm6.8y$ , were 64.4% female, with min/MVPA/week of  $M=438.0\pm231.78$ , BMI of  $M=24.4\pm3.3kg/m^2$ , and resting systolic and diastolic blood pressure of  $114.5\pm12.0mmHg$  and  $71.8\pm7.7mmHg$ , respectively. Daily exercise regularity was  $3.56h\pm1.53$ , while 66.7% exhibited weekend regularity. Multivariable models show that greater daily regularity moderated the relationship between weekly MVPA and BMI such that at the mean weekly MVPA, each 1-hour increase in SD of daily regularity increased BMI by an estimated  $0.572 kg/m^2$  ( $F_{(5,39)}=1.22$ ;  $RSE=3.21$ ;  $R^2=0.02$ ; interaction term  $p<0.05$ ). Weekend regularity was also found to moderate the associations between weekly MVPA and resting blood pressure. Specifically, among regular (versus irregular) weekend exercisers, each additional minute of MVPA decreased SBP by  $0.06mmHg$  ( $F_{(5,39)}=6.59$ ;  $RSE=9.39$ ;  $R^2=0.39$ ; interaction term  $p<0.01$ ), and DBP by  $0.03mmHg$  ( $F_{(5,39)}=5.19$ ;  $RSE=6.31$ ;  $R^2=0.32$ ; interaction term,  $p<0.05$ ).

**Conclusions:** In this highly active sample, a more regular daily and weekly exercise schedule was associated with better markers of cardiometabolic health. These data help inform hypotheses about the possible independent role of exercise timing on health.

# Factors influencing digital health intervention uptake and engagement in Singapore: findings from a Patient and Public Involvement study

**Dr. Jacqueline Louise Mair**<sup>1,2</sup>, Dr. Sarah Martine Edney<sup>2</sup>, Ms. Jumana Hashim<sup>2</sup>, Ms. Linh Thai<sup>2</sup>, Associate Professor Falk Müller-Riemenschneider<sup>1,2,6,7</sup>, Prof. E Shyong Tai<sup>1,2,6</sup>, Dr. Alicia Salamanca-Sanabria<sup>1</sup>, Dr. Jillian Ryan<sup>8</sup>, Prof. Tobias Kowatsch<sup>1,3,4,5</sup>

<sup>1</sup>Future Health Technologies, Singapore-ETH Centre, Singapore, Singapore, <sup>2</sup>Saw Swee Hock School of Public Health, National University of Singapore, Singapore, Singapore, <sup>3</sup>Institute for Implementation Science in Health Care, University of Zurich, Zurich, Switzerland, <sup>4</sup>School of Medicine, University of St. Gallen, St Gallen, Switzerland, <sup>5</sup>Centre for Digital Health Interventions, ETH Zurich, Zurich, Switzerland, <sup>6</sup>Yong Loo Lin School of Medicine, National University of Singapore and National University Health System, Singapore, Singapore, <sup>7</sup>Digital Health Centre, Berlin Institute of Health, Charité – Universitätsmedizin Berlin, Berlin, Germany, <sup>8</sup>The Commonwealth Scientific and Industrial Research Organisation, Adelaide, Australia

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** Digital health interventions (DHIs) hold promise as scalable and cost-effective preventive healthcare solutions. However, those with the poorest health who stand to gain the most from DHIs are also among the least likely to access and engage with them. The aim of this qualitative study is to better understand factors influencing DHI uptake and engagement in the wider population, including those from underserved communities, in Singapore.

**Methods:** Adapting the Patient and Public Involvement (PPI) methodology to Singapore's context, lay facilitators approached adult patrons at seven public eateries (Hawker Centres) in residential areas for an informal discussion. The topic guide was iteratively developed based on literature and systematic debriefing after qualitative encounters, and explored the daily motivations and barriers towards DHI uptake and sustained use. An optional demographic survey was administered at the end of each encounter. Field notes were collated within four pre-defined user group categories: (1) current DHI users; (2) previous DHI users but no longer using; (3) those familiar with DHIs but never used, and (4) those who had never heard of DHIs. Data analysis is currently ongoing. We take a hybrid analysis approach whereby relevant themes are identified through inductive thematic analysis and sub-themes are then deductively mapped to behaviour change theory.

**Results/findings:** Lay facilitators interacted with 118 individuals between November 2022-February 2023. Overall, findings revealed that some people have no interest in using a DHI and will never be convinced to do so. Some could be convinced to use and continue to engage with a DHI, but several barriers need to be addressed, e.g., tedious registration processes, cost, technical instability and inaccuracy, language limitations, insufficient reward programmes, and poor digital literacy. Access to healthier food in the local environment is needed before DHIs for dietary behaviours can even be considered. Community engagement and training were suggested as methods to overcome perceived barriers towards DHI use.

**Conclusion:** Our findings will inform the design and implementation of DHIs to support healthy lifestyles and strategies to increase uptake and engagement with DHI in target populations, including those from underserved communities.

# Regional Variability in Prevalence of Food Insecurity and Diet Quality among US Children

**Dr. Jayna Dave<sup>1</sup>**, Dr. Tzuan Chen<sup>2</sup>, Ms. Alexandra Castro<sup>1</sup>, Ms. Mamie White<sup>1</sup>, Dr. Debbie Thompson<sup>1</sup>  
<sup>1</sup>USDA/ARS Children's Nutrition Research Center, Baylor College of Medicine, Houston, USA, <sup>2</sup>HEALTH Research Institute, University of Houston, Houston, USA

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** With an increase in the number of low-income individuals and families from rural areas being food insecure in the US, there is a greater need for understanding the association between food security status (FSS) and dietary intake, including differences due to living in rural vs. urban residence, among these at-risk populations. Thus, the purpose of this study was to assess the regional variability (urban vs. rural) in prevalence of food insecurity, federal nutrition assistance program (FNAP) participation, and diet quality among US children.

**Methods:** This study employed National Health and Nutrition Examination Survey (NHANES) data 2013-2016 with three age groups (2-5, 6-11, and 12-17 years old). The models were performed using SAS SURVEYREG/SURVEYFREQ procedure to account for the complex, stratified, multistage probability cluster sampling design. Multiple linear/logistic regression models were used to evaluate the association between the FSS and FNAP participation and the diet quality measures including Healthy Eating Index (HEI-2015) and its 13 subcomponents. In addition, the moderations effect of urban/rural residence were examined. Covariates included age, sex, race/ethnicity, and family monthly poverty index. Statistical significance was set at  $p < 0.05$ .

**Results/findings:** Total sample consisted of 6,403 children; mean age- 7.5 years; 51% male; 33% Hispanic, and 64% normal weight. Child and household food insecurity was reported by 13% and 30% of the sample, respectively; 90% participated in SNAP and 88% in school lunch program. Relative to 6–11-year-old children living in rural areas, children living in urban areas were significantly more likely to report household food insecurity (29.15% vs. 19.10%). Overall, HEI-2015 score was 48.2. The associations between child/household FSS and the receipt of FNAP as well as between child/household FSS and diet quality (HEI and 13 subcomponents) did not differ by urban/rural residence status regardless of children's age groups.

**Conclusions:** Diet quality of children, regardless of age or urban/rural residence, needs improvement. Children, especially those experiencing food insecurity in urban areas, are an important target group for future dietary interventions aiming to improve diet quality. Strategies for food security and diet quality improvement may include increased benefits for health food purchases within FNAP.

# Grip strength and incidence of Type 2 diabetes: A Mendelian Randomization

**Miss Zhu Liduzi Jiesisibieke**, Dr. Catherine Mary Schooling<sup>1</sup>

<sup>1</sup>1. School of Public Health, Li Ka Shing Faculty of Medicine, The University of Hong Kong, Hong Kong, China

**Poster Session #2, June 16, 2023, 10:50 AM - 12:00 PM**

**Background:** Grip strength, as an indicator of skeletal muscle strength, is easy to measure and works well as a target of intervention. However, current evidence concerning grip strength and risk of type 2 diabetes (T2D) is mostly based on observational studies, which are open to confounding and selection bias. We conducted a Mendelian randomization study, i.e., using genetic proxies of grip strength, to obtain unconfounded estimates.

**Methods:** Genome wide significant ( $p\text{-value} < 5 \times 10^{-8}$ ), independent ( $r^2 < 0.001$ ) genetic variants predicting right (N=461,089) and left (N=461,026) hand grip strength were extracted from UK Biobank. We applied these genetic predictors to the largest available genome-wide association studies of T2DM from the DIAGRAM consortium (Ncases=62,892; Ncontrols=596,424) and from FinnGen (Ncases=33,043; Ncontrols=28,4971). We used inverse variance weighting with multiplicative random-effects as the main analysis, and MR-Egger and weighted median as sensitivity analysis to test for horizontal pleiotropy. We meta-analyzed estimates from the two T2D GWAS.

**Results:** In total, 122 and 112 independent genome-wide genetic variants were obtained for right- and left-hand grip strength respectively. Right-hand grip strength (odds ratio [OR] 0.76, 95% CI 0.63 to 0.9 and left-hand grip strength (OR 0.64, 95% CI 0.53 to 0.78) were associated with lower odds of T2D. There was no evidence of horizontal pleiotropy from sensitivity analysis

**Conclusion:** Developing grip strength could be an intervention target to reduce the risk of developing T2D, ideally as marker of generally improved body composition.

# Dropouts in mHealth interventions: How to manage missing values when evaluating the effectiveness of digital health tools?

**Mr. Vinayak Anand Kumar<sup>1</sup>**, Ms. Luisa Korte<sup>2</sup>, Mr. Claas Oltmann<sup>2</sup>, Prof. Margrit Schreier<sup>1</sup>, Prof. Sonia Lippke<sup>1</sup>

<sup>1</sup>Constructor University, Bremen, Germany, <sup>2</sup>apprevent GmbH, Bremen, Germany

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** The purpose of the study was to compare approaches and provide recommendations for managing dropouts in the evaluation of mHealth interventions targeting physical activity (PA) and sedentary behaviour (SB) in patients. Participant' drop out between measurement time points is an issue that most studies face. Using work carried out to manage dropouts in a digital health tool, this study addresses the research question "what is the relative accuracy and precision of imputation strategies when evaluating effectiveness of digital health tools"?

**Methods:** A digital health tool was evaluated in a pilot study using a Randomised Controlled Trial (RCT), with 20 participants each in the intervention and control arms. The pilot study acted as a pre-cursor to a larger clinical trial, which collected outcome measures at baseline, 3-month and 6-month follow up, using validated measures of PA and SB. The evaluation used a mixed effects model to estimate the effect of the intervention and time on outcome measures. For the purposes of this presentation, synthetic data was constructed for the RCT based on observations in the pilot study, and missingness was simulated. The following approaches were evaluated, with respect to the bias and variance of model parameters:

- Listwise deletion
- Last observation carried forward (LOCF)
- Multiple imputation using Jump to Reference (MI-J2R)
- Multiple imputation using chained equations (MICE)

**Results/findings:** Preliminary results of the study indicated that listwise deletion had a positive bias; overestimating the impact of the intervention. Whilst LOCF had a negative bias and underestimated the variance of model parameters. Both MI-J2R and MICE provide relatively accurate parameter and variance estimates of the intervention effect, with the former providing more conservative estimates of the treatment effect.

**Conclusions:** MICE is a preferred method for managing missingness when accurate imputation models can be developed. However, when researchers want to take a more conservative approach for estimating the intervention effect and/ or when an accurate imputation model cannot be developed, MI-J2R is recommended. This study also provides a framework and code for developing synthetic data, carrying out simulation studies, and building reproducible statistical analysis pipelines in R.



# Are Physical Therapists Promoting Physical Activity for their Patients with Neurological Disorders?

**Dr. Winston Kennedy<sup>1</sup>**, Dr. April Bowling<sup>1</sup>

<sup>1</sup>Merrimack College, North Andover, USA

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** Physical therapists (PTs) work with people with neurological disorders (ND) to promote function, activity participation, and quality of life. PTs are also positioned to provide physical activity (PA) promotion, however, there has been little investigation into the PA promotion practices of PTs for their patients with ND. The purpose of this study is to investigate the frequency of PA promotion of PTs licensed in the United States who treat patients with ND, the factors associated with PA promotion for PTs who primarily treat patients with ND, and the types of PA promotion used.

**Methods:** This study utilized a survey which included the Determinants of Implementation Behavior Questionnaire (DIBQ) to explore which items or factors were associated with the frequency of PA promotion, and items to describe what kind of PA promotion is typically used. The survey was delivered to a geographically stratified sample recruited nationally using professional organizations and social media. Over 8 weeks 109 participants were recruited to complete the survey. Descriptive statistics were used to analyze the frequency of PA promotion and equality of proportions was used to compare PA frequency between PTs who reported a case load of over 50% and those who did not.

**Results:** Out of 76 participants who reported working with patients with ND diagnosis in any capacity, 34 (45%) reported always promoting PA. Of the 38 participants reporting a caseload of over 50% ND, 17 (45%) reported always promoting PA. There were 7 DIBQ statements representing separate behavioral domains that had a significant correlation with frequency of PA promotion. The majority of the sample reported providing education about PA with their patients (99%). Exploring perceived barriers to PA with patients was the next highest reported type of PA promotion (86%).

**Conclusion:** This study aimed to investigate the PA promotion practices of PTs licensed in the US who treat patients with ND. We found that PTs who work with patients with ND are not consistently promoting PA for their patients. Future research should investigate to how to better educate and support PTs in engaging in PA promotion, particularly for populations with ND.

# Point of sale food and beverage marketing to kids in food stores and restaurants: evidence from eleven cities in Canada.

**Dr. Leia Minaker**

<sup>1</sup>University Of Waterloo, Waterloo, Canada

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Background and objectives:** The World Health Organization called for global action to reduce the impact of marketing unhealthy foods and beverages to children over a decade ago. Several countries, such as Mexico, Ireland, and Chile, have implemented laws that restrict food and beverage broadcast marketing to children (M2K). To date, national M2K policies and monitoring predominantly focuses on broadcast media: television, radio, and social media. There are currently major gaps in policy and research on point-of-sale M2K in food retailers and restaurants. This research describes results from three separate studies (collecting data from 11 city-regions) of point-of-sale M2K in Canada.

**Methods:** The Canadian Marketing Assessment Tool for Stores (CMAT-S) assesses point-of-sale M2K in food retail establishments (e.g., supermarkets and corner stores) while the CMAT-R assesses point-of-sale M2K in restaurants. Both tools pay particular attention marketing techniques directed at children. Tools were developed based on literature syntheses and expert consultations. Inter-rater reliability was high for both tools. In 2021 and 2022, data were collected from 2,140 restaurants and 813 food stores in urban and rural regions across Canada (including in two of Canada's northern Territories). Descriptive statistics were used to describe key point-of-sale M2K indicators across cities and by area-level deprivation. Key indicators included exterior and interior marketing, as well as placement and price promotions of indicator foods. Photos of exterior and interior ads, island displays, drink and ice cream fridges, and drive-thrus were coded according to advertising strategies employed.

**Results:** Despite some regional variation, prevalence of point-of-sale M2K was very high (e.g., 65% of stores and 60% of restaurants had exterior marketing) although different types of restaurants and stores employed different M2K techniques (for example, convenience stores had more M2K than supermarkets; fast food outlets had more M2K than sit-down restaurants). There were few differences in M2K by neighbourhood income, although most indicators were slightly higher in higher-income neighbourhoods relative to lower-income neighbourhoods.

**Conclusions:** These tools can be adapted for use in other countries to demonstrate the need for M2K policies to consider and monitor point-of-sale food and beverage M2K in addition to broadcast marketing.

# One Kilometre at a time; a mixed-method evaluation of a school-based physical activity program, Kilometre Club

**Miss Teisha Schirmer**<sup>1</sup>, Dr. Andrew Bailey<sup>1</sup>, Mrs. Nicola Kerr<sup>1</sup>, Miss Alison Walton<sup>1</sup>, Dr. Linda Ferrington<sup>3</sup>, Mr. Michael Cecilio<sup>2</sup>

<sup>1</sup>Mid North Coast Local Health District, Coffs Harbour, Australia, <sup>2</sup>Northern New South Wales Local Health District, Lismore, Australia, <sup>3</sup>Rural Clinical Campus, University of New South Wales, Port Macquarie, Australia

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Background** Despite the known benefits of physical activity, there is minimal research focusing on the implementations factors of long-lasting and existing school-based physical activity programs. In 2014 one Australian school initiated a physical activity program called the Kilometre Club (KM Club). KM Club is now run by multiple schools and aims to provide children with the opportunity to run, walk or jog on an outside course. This evaluation aimed to examine families, teachers and principals' perceptions of the benefits, implementation enablers and barriers of KM Club, as well as the effects on student's physical activity levels during the school day.

**Methods** This study utilized a mixed-method design. 26 families, four teachers, and two principals from four regional New South Wales primary schools completed semi-structured interviews to understand their perceptions of KM Club. 21 students completed emotional state-scales to understand their emotions when participating in KM Club. 141 students from three schools participated in step-count measures using accelerometers. Qualitative data was analysed using an interpretive approach to thematic analysis. Linear mixed models were used to investigate the effect of KM Club on daily step counts.

**Results** Families, teachers and principals reported benefits such as improved social connectedness, wellbeing, home and classroom behaviours, participation in sport and fitness levels. Implementation enablers consisted of champion engagement, incentives, versatile facilities and integration with other school activities. Implementation barriers included the weather and environment, program timing and health issues. Most students reported that participating in KM Club made them feel proud, confident and fantastic. Students' daily steps increased significantly in the two schools that ran KM Club four or more days per week.

**Conclusion** Flexible and adaptable factors appear to be essential to the successful implementation of KM Club in primary schools. Children's health, wellbeing, and education outcomes were perceived to be positively impacted by KM Club. There was also an increase in children's physical activity levels in schools who ran the program four or more days a week. The findings from this study may help to inform future design, implementation and scale-up of school-based health promotion programs, potentially improving children's health and wellbeing outcomes.

# Perceived Neighbourhood Environment Attributes and Physical Activity in Ghana

**Ms. Vida Korleki Nyawornota<sup>1</sup>**, Dr. Fidelia Dake<sup>1</sup>, Dr. Abu Mumuni<sup>1</sup>, Prof. Stephen Owusu Kwankye<sup>1</sup>, Prof. Samuel Codjoe<sup>1</sup>, Prof. Reginald Ocansey<sup>1</sup>

<sup>1</sup>University of Ghana, Accra, Ghana

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** G. Children and families

**Background:** Participation in regular and sufficient physical activity (PA) is a major approach for reducing the increasing rate of non-communicable diseases (NCDs) globally. The perceived neighbourhood environment according to empirical evidence, is a key contributor to engaging in regular physical activity. A supportive neighbourhood environment (NE) that fosters physical activity may contribute to high levels of physical activity of a population. There has been consistent evidence of a correlation between the characteristics of neighbourhood environment and physical activity, but most existing studies focuses on developed countries. Few studies have examined the association of the neighbourhood environment attributes with physical activity in low- and middle-income countries like Ghana.

**Objectives:** This study examines the association between the attributes of the perceived neighbourhood environment and physical activity in Ghana.

**Methods:** The International Physical Activity Questionnaire (IPAQ) and the Neighbourhood Environment Walkability Scale (NEWS) -Africa instrument, were used in a cross-sectional study to gather data on neighbourhood environment attributes and physical activity. Data from 1075 youth and adults aged 17 years and above, selected from diverse communities (by socioeconomic status (SES), and residential density in the Upper East, Bone and Greater Accra regions of Ghana were included in the study.

**Results:** About 53 percent of the respondents were female, while 47 percent were males. Three out of four people engaged in low PA. Residential areas with very densely packed small houses recorded high proportions of respondents with low physical activity level (81.9%). Results of multinomial regression analysis showed that five neighbourhood environment attributes: main types of housing in respondents' immediate neighbourhood (p-value < 0.001), proximity to service facilities/places (p-value < 0.001), access to service facilities/places (p-value < 0.001), road/walking path (p-value < 0.01), place for walking/cycling/playing p-value < 0.01), and crime safety (p-value < 0.01) recorded significant association with overall PA.

**Conclusion:** Neighbourhood environments that are walkability friendly and of low residential density encourage participation in high physical activity in Ghana.

# Acute effects of the physical and social environment on anxiety and perceived stress and their impact on walking levels in people with epilepsy – qualitative walk-along interviews

**Miss Julie Delobelle**<sup>1,2</sup>, Prof. Evelien Carrette<sup>1</sup>, Prof. Kristl Vonck<sup>1</sup>, Dr. Jelle Van Cauwenberg<sup>1,2</sup>, Prof. Delfien Van Dyck<sup>1</sup>

<sup>1</sup>Ghent University, Ghent, Belgium, <sup>2</sup>Research Foundation Flanders, Brussels, Belgium

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Background:** Many people with epilepsy (PWE) do not meet the physical activity (PA) guidelines. However, PA has antiepileptic and anxiolytic effects, which is of utmost importance for PWE, since stress and anxiety are very common triggers of seizures. Walking is an accessible and feasible way to be active. Previous studies already showed that the physical and social environment positively influences walking levels in the general population. Therefore, this study will gain in-depth qualitative information regarding which physical and social environmental characteristics influence anxiety and perceived stress and, consequently, impact PA among PWE.

**Methods:** Walk-along interviews, i.e. qualitative in-depth interviews during a walk in the participants' residential environment will be conducted, until saturation of information is reached. While walking, participants will be asked to identify and discuss physical and social attributes that (positively or negatively) affect their stress and acute anxiety levels and how this may affect their walking levels. The walk will proceed from the participant's home to a specific destination (e.g. a square or park). Participants can choose the route to walk to the destination. This route will be the participant's preferred route and this can be anticipated to be a route with a minimal presence of stimuli that can provoke anxiety and stress. The way back home will be chosen by the researcher, in order to expose the participants to potential environmental stressors and triggers of stress or anxiety that are normally avoided. Additionally, a go-pro camera will be attached to the participant's chest, to video and audio-record the interview. The audiotapes will be transcribed verbatim and processed afterwards with NVivo-12.1 software. To explore the validity and credibility of the results, member checking will be used.

**Results:** Data collection for this study will take place between March 2023 and May 2023. Qualitative analyses will be conducted and results will be presented at the conference.

**Discussion:** This study will provide in-depth information on which environmental attributes are perceived as safe or attractive and stimulate walking; and which attributes evoke feelings of acute anxiety and stress and discourage walking. These findings may contribute to interventions to promote walking in PWE.

# Disentangling the Association Between Adverse Childhood Experiences, Neighborhood Environment, and Obesity

**Dr. Krista Schroeder**<sup>1</sup>, Dr. Levent Dumenci<sup>1</sup>, Dr. David Sarwer<sup>1</sup>, Dr. Jennie Noll<sup>2</sup>, Dr. Kevin Henry<sup>1</sup>, Dr. Shakira Suglia<sup>3</sup>, Dr. Christine Forke<sup>4</sup>, Dr. David Wheeler<sup>5</sup>

<sup>1</sup>Temple University, Philadelphia, USA, <sup>2</sup>Penn State University, University Park, USA, <sup>3</sup>Emory University, Atlanta, USA, <sup>4</sup>Children's Hospital of Philadelphia, Philadelphia, USA, <sup>5</sup>Virginia Commonwealth University, Richmond, USA

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Background:** Growing evidence documents adverse childhood experiences' (ACEs) association with adult obesity. ACEs can increase obesity risk via sequelae of chronic or severe stress or by hindering healthy behaviors. For example, ACEs have been associated with lower rates of physical activity and alterations in hunger hormones that can impact dietary intake. Multi-level research examining the influence of neighborhood environment on the ACEs-obesity association is lacking. Neighborhood factors (e.g., limited access to healthy food, limited greenspace) may contribute to both ACEs and obesity via indirect and overlapping pathways. It is difficult to disentangle neighborhood's impact on the ACEs-obesity association because many co-occur within the broader context of neighborhood poverty and racial segregation; sophisticated approaches such as geospatial analysis and novel methods for quantifying neighborhood risk are necessary.

**Purpose:** This study evaluated methods for creating a Neighborhood ACEs Index (NAI), as a first step in disentangling ACEs-obesity-neighborhood associations. A NAI is a spatial index that captures the association between neighborhood environment characteristics (e.g., healthy food access, greenspace) and individual-level ACEs exposure. A NAI can be applied in analyses to examine how neighborhood influences the ACEs-obesity association. In addition, a NAI can be used to identify neighborhood-level targets for obesity interventions and policies, because NAI creation results in weights that quantify the extent to which each neighborhood characteristic is associated with ACEs within that sample.

**Methods:** Methods entailed cross-sectional secondary analysis connecting individual-level ACEs and obesity data from the Philadelphia ACE Survey (N=1,677 Philadelphia adults) with 25 spatial datasets capturing neighborhood characteristics. Four methods were tested for index creation (three methods of principal components analysis, and a novel spatial index development approach [Bayesian index regression]). Resulting indexes were compared using Akaike Information Criteria. Linear regression analyses examined associations between ACEs, the NAI, and body mass index (BMI).

**Results:** Bayesian index regression was the best method for index creation. The NAI was associated with higher BMI, both independently and after controlling for ACEs exposure. The NAI attenuated the association between BMI and ACEs.

**Conclusions:** Future research can employ a NAI to disentangle ACEs-obesity-neighborhood associations and inform place-based approaches to interrupting ACEs-obesity associations.



# The Association Between Adverse Childhood Experiences, Neighborhood Greenspace, and Body Mass Index

**Dr. Krista Schroeder**<sup>1</sup>, Dr. Christine Forke<sup>2,3</sup>, Dr. Jennie Noll<sup>4</sup>, Dr. David Wheeler<sup>5</sup>, Dr. Kevin Henry<sup>1</sup>, Dr. David Sarwer<sup>1</sup>

<sup>1</sup>Temple University, Philadelphia, USA, <sup>2</sup>Children's Hospital of Philadelphia, Philadelphia, USA, <sup>3</sup>University of Pennsylvania, Philadelphia, USA, <sup>4</sup>Penn State University, University Park, USA, <sup>5</sup>Virginia Commonwealth University, Richmond, USA

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** An association between adverse childhood experiences (ACEs) and elevated body mass index (BMI) has been found in previous investigations. ACEs' effects on BMI have been primarily considered via individual-level physiological and behavioral frameworks. Neighborhood factors, such as greenspace, are also associated with BMI and may merit consideration in studies examining ACEs-BMI associations. Greenspace's inverse association with BMI is hypothesized to occur through several possible pathways, including increased physical activity and improved mental well-being. Given that ACEs are associated with higher BMI and greenspace with lower BMI, it is plausible that greenspace's beneficial effects could potentially modify the negative effects of ACEs. This exploratory study examined associations of BMI with ACEs and neighborhood greenspace and tested whether greenspace moderated ACEs-BMI associations.

**Methods:** Methods entailed secondary analysis of cross-sectional data. ACEs and BMI were captured from 2012/2013 Philadelphia ACE Survey and 2012 Southeastern Household Health Survey data; greenspace percentage in participants' (n=1,679 adults) home neighborhoods was calculated using National Land Cover Database data. Multi-level, multivariable linear regression 1) examined associations between BMI, ACEs, (0 ACEs [reference], 1-3 ACEs, 4+ ACEs), and neighborhood greenspace levels (high [reference], medium, low) and 2) tested whether greenspace moderated the ACEs-BMI association (assessed via additive interaction) before and after controlling for social determinants of health-related covariates.

**Results:** Experiencing 4+ ACEs ( $\beta=1.21$ ; 95%CI: 0.26, 2.15;  $p=0.01$ ), low neighborhood greenspace ( $\beta=1.51$ ; 95%CI: 0.67, 2.35;  $p<0.01$ ), and medium neighborhood greenspace ( $\beta=1.37$ ; 95%CI: 0.52, 2.21;  $p<0.01$ ) were associated with BMI in unadjusted models. Only low neighborhood greenspace was associated with BMI ( $\beta=0.95$ ; 95%CI: 0.14, 1.75;  $p=0.02$ ) in covariate-adjusted models. The ACEs-greenspace interaction was not significant in unadjusted ( $p=0.89-0.99$ ) or covariate-adjusted ( $p=0.46-0.79$ ) models.

**Conclusions:** After accounting for key social determinants of health, low neighborhood greenspace, but not ACEs, was independently associated with BMI. Currently, most efforts to understand and address documented ACEs-obesity associations have focused at lower levels of the socio-ecological model. Future research should examine why the previously observed association between ACEs and BMI was disconfirmed in this study, after accounting for social determinants of health-related potential confounders and greenspace.

# The effectiveness of school-based physical activity interventions on girls' MVPA, sedentary behaviour and physical activity guideline adherence

**Ms. Nicole McCarthy<sup>1,2</sup>**, Dr. Alix Hall<sup>1,2</sup>, Dr. Nicole Nathan<sup>1,2</sup>, Dr. Rebecca Hodder<sup>1,2</sup>

<sup>1</sup>University of Newcastle, Newcastle, Australia, <sup>2</sup>Hunter New England Population Health, Newcastle, Australia

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** G. Children and families

**Background:** Physical activity is extremely important for all children and there is emerging evidence that physical activity levels decline as children age and that physical activity levels are lower for girls than for boys. Many school-based physical activity programs have been implemented targeting children's physical activity levels with varying effects. However, there are few systematic reviews that focus on girls' physical activity. To address this evidence gap, we conducted a synthesis of studies included in the most recent comprehensive Cochrane review of school-based physical activity interventions, to determine the effect of these intervention on girls' physical activity levels.

**Methods:** Studies from the original review were considered eligible for inclusion if they: employed a randomised controlled trial design, focused on the general population of school students, and included a measure of physical activity (such as MVPA, sedentary time or the proportion of children meeting the guidelines) measured via accelerometers or pedometers across the whole day or school day. Only studies reporting the results separately for girls were eligible for inclusion in this secondary analysis. Where possible Random-effects meta-analyses were undertaken to estimate a pooled effect size for the primary outcomes.

**Results:** Twenty eligible studies were included. Meta-analysis for minutes of MVPA across the whole or school day based on 14 studies, including 11,551 participants indicated results made little to no difference to girls' MVPA [*mean difference: 0.81 minutes/day (95% CI: -0.30, 1.91, p=0.151; I<sup>2</sup>=50%; Low certainty evidence*]. Eight studies measured girls' whole-day sedentary behaviour. The meta-analysis found that school-based physical activity interventions probably decreases girls' sedentary behaviour slightly [*mean difference: -6.73 minutes/day (95% CI: -11.61, -1.85); moderate certainty evidence*] Only one study measured the proportion of students meeting guidelines resulting in little to no difference [0.65 (0.23 to 1.85) very low certainty of evidence].

**Conclusions:** School-based physical activity interventions seem to have an impact on movement but not intensity of movement. Future research should focus on increasing intensity, especially in girls.

# Relationships between body fat and objectively assessed physical activity in underweight, overweight and nonobese children: the BC–IT study

**Prof. Makama Andries Monyeki**

<sup>1</sup>Physical Activity, Sport and Recreation Research Focus Area, Faculty of Health Sciences, North-West University, Potchefstroom, South Africa

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** G. Children and families

**Background:** Obesity and physical inactivity are significant health problems in developing countries. This study aimed to determine the relationships fat and objectively assessed physical activity in underweight, overweight and nonobese South African primary school children.

**Methods:** A cross-sectional study with 299 children (125 boys & 174 girls) aged 6- to 8-years who are part of a larger Body Composition using Isotope Technique Study (BC–IT study) living in the Potchefstroom areas, North West province, of South Africa. Weight and height were measured using standard procedures. The deuterium oxide (D<sub>2</sub>O) dilution determined body fatness. Fatness was classified using McCarthy centiles set at 2nd, 85th and 95th in conjunction with high fatness cut-off points (25% in boys & 30% in girls). ActiGraph accelerometer (Model GT3X-BT) was used to determine PA for a minimum of 10 hours/day for seven consecutive days. PA data was then categories into sedentary PA (<99 counts per minutes), light PA (≥ 100 counts per minutes), moderate PA (≥2296 counts per minute), vigorous PA (≥ 4012 counts per minutes) and moderate to vigorous PA (MVPA). Data were analyzed using SPSS with p-values for significant set at  $p \leq 0.05$ .

**Results:** Out of 299, 10% of the children were underweight, 63% normal weight; 15% overweight and 12% obese. Girls were more overweight and obese whilst boys were presented with high prevalence on underweight. Average daily minutes for MVPA for underweight was  $91.74 \pm 26.70$ ; normal  $77.71 \pm 22.66$ ; overweight  $72.2 \pm 24.38$ ; obese  $56.99 \pm 17.15$ . Average weekly minutes for MVPA for underweight was  $475.90 \pm 144.10$ ; normal  $433.47 \pm 16.77$ ; overweight  $410.2 \pm 145.49$ ; obese  $326.61 \pm 105.53$ . In the normal weight group, FFM was positive and significantly vigorous activity ( $r=0.28$ ,  $p=0.05$ ) and MVPA ( $r=0.31$ ,  $p=0.05$ ). Whilst in the overweight group, FFM ( $r=0.63$ ,  $p=0.05$ ), FM% ( $r=0.70$ ,  $p=0.01$ ) and FMI ( $r=0.65$ ,  $p=0.05$ ) were positive and significantly associated moderate PA. Also, MVPA was positive and significantly associated with FFM ( $r=0.58$ ,  $p=0.05$ ), FM% ( $r=0.67$ ,  $p=0.05$ ) and FMI ( $r=0.61$ ,  $p=0.05$ ).

**Conclusion:** The prevalence of underweight, overweight and obesity exists. Both overweight and obesity significantly affected participation in physical activity. Given the health implication of this results, strategic intervention is urgently recommended.

# The 2022 ParticipACTION Report Card on Physical Activity for Children and Youth: Focus on the COVID-19 pandemic impact and equity-deserving groups

**Dr. Nicholas Kuzik<sup>1</sup>**, Dr. Christine Cameron<sup>2</sup>, Dr. Valerie Carson<sup>3</sup>, Dr. Jean-Philippe Chaput<sup>1</sup>, Dr. Rachel Colley<sup>4</sup>, Dr. Joe Doiron, Dr. Guy Faulkner<sup>5</sup>, Dr. Ian Janssen<sup>6</sup>, Dr. Travis Saunders<sup>7</sup>, Dr. John C Spence<sup>3</sup>, Dr. Patricia Tucker<sup>8</sup>, Dr. Leigh M Vanderloo<sup>8,9</sup>, Dr. Mark S Tremblay<sup>1</sup>

<sup>1</sup>Healthy Active Living and Obesity Research Group, Children's Hospital of Eastern Ontario, Ottawa, Canada,

<sup>2</sup>Canadian Fitness and Lifestyle Research Institute, Ottawa, Canada, <sup>3</sup>Faculty of Kinesiology, Sport, and Recreation, University of Alberta, Edmonton, Canada, <sup>4</sup>Health Analysis Division, Statistics Canada, Ottawa, Canada, <sup>5</sup>School of Kinesiology, University of British Columbia, Vancouver, Canada, <sup>6</sup>School of Kinesiology and Health Studies, Queen's University, Kingston, Canada, <sup>7</sup>Department of Applied Human Sciences, University of Prince Edward Island, Charlottetown, Canada, <sup>8</sup>School of Occupational Therapy, University of Western Ontario, London, Canada, <sup>9</sup>ParticipACTION, Toronto, Canada

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** To summarize the COVID-19-related findings from the 2022 ParticipACTION Report Card on Physical Activity for Children and Youth. Further, to highlight findings for equity-deserving groups (i.e., those identifying as: having a disability, Indigenous, 2SLGBTQ+, newcomers to Canada, racialized, or girls) and populations of interest (i.e., early years children), with results for both synthesized as equity-deserving groups.

**Methods:** The best available COVID-19-related data on physical activity and related behaviours, characteristics, and opportunities were synthesized across 14 different indicators in four categories. The 2022 Report Card Research Committee assigned letter grades (i.e., A-F) based on expert consensus of the synthesized evidence. While not graded, efforts were also made to summarize key findings for equity-deserving groups and content experts/community members were recruited to write sections of the Report Card detailing the importance of physical activity for all equity-deserving groups of children and youth.

**Results/findings:** Grades were assigned for: Daily Behaviours (Overall Physical Activity: D; Active Play: D-; Active Transportation: C-; Organized Sport: C+; Physical Education: Incomplete [INC]; Sedentary Behaviours: F; Sleep: B; 24-Hour Movement Behaviours: F), Individual Characteristics (Physical Literacy: INC; Physical Fitness: INC), Spaces & Places (Household: C, School: B-, Community & Environment: B), and Strategies & Investments (Government: B-). Compared to the 2020 Report Card, the COVID-19-specific grades increased for Active Play and Active Transportation; and decreased for Overall Physical Activity, Sedentary Behaviours, Organized Sport, and Community & Environment. Across the indicators, there was often limited data to synthesize for equity-deserving groups. Specifically, the mean percentage of indicators with no results for the equity-deserving groups was 77.6% (range: no results in 14/14 indicators [100%], no results in 5/14 indicators [35.7%]).

**Conclusions:** During the COVID-19 pandemic, the grade for Overall Physical Activity decreased from a D+ (2020) to a D, coinciding with decreases in grades reflecting fewer opportunities for sport and community/facility-based activities as well as higher levels of sedentary behaviours. Fortunately, improvements in Active Transportation and Active Play during COVID-19 prevented a worse shift in children's health behaviours. Efforts are needed to improve physical activity for children and youth during and post-pandemic, with a greater emphasis on equity-deserving groups.

# Gender and age influences on novel 24-h accelerometer-derived metrics in middle-aged Australian Adults.

**Associate Professor Joanne McVeigh**<sup>1,2</sup>, Miss Bingyan Pang<sup>1</sup>, Prof. Leon Straker<sup>1,2</sup>

<sup>1</sup>Curtin School of Allied Health, Perth, Australia, <sup>2</sup>enABLE Institute, Curtin University, Perth, Australia

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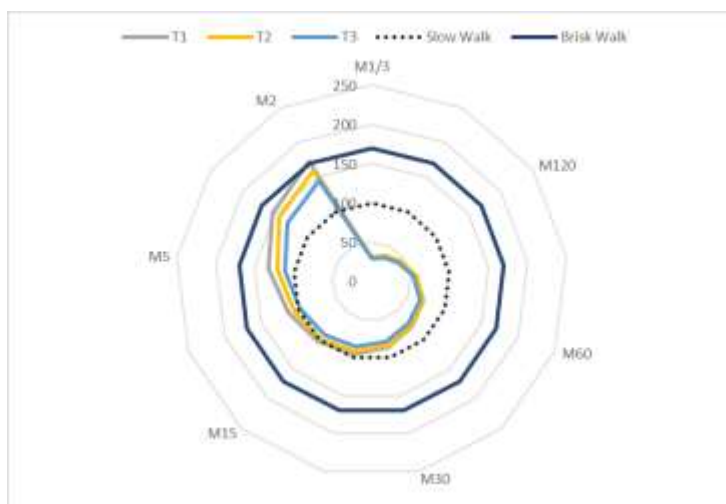
**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** Novel population-independent accelerometer metrics have been proposed: average acceleration (AvAcc: indicative of volume of activity); intensity gradient (IG) for the distribution of intensity across the 24-h profile and; data-driven metrics that capture the acceleration above which a person's most active minutes are accumulated, (MX variables). This study examined gender and age influences on these metrics using raw triaxial wrist-worn accelerometer data (Actigraph wGT3X-BT) from 997 middle-aged Australian adults (42.6% male) from the Raine Study in Perth, Western Australia (mean age: 56.7; SD:5.7 years).

**Methods:** Data (processed using "GGIR" package in R), expressed as acceleration in equivalent gravitational units (1 *mg* = 0.001 *g*), were used to estimate AvAcc, IG and acceleration for the most active 2 (M2), 5 (M5), 15 (M15), 30 (M30), 60 (M60), and 120 (M120) minutes of the day and M1/3 (most active 8 hours). Accelerometer metrics were also compared across tertiles of age (Tertile 1: Mean age (y) 50.7 SD: 2.9, n=339; Tertile 2: Mean age 56.7 SD: 1.3, n=317; Tertile 3: Mean age 62.8 SD:5.7, n=341).

**Results:** AvAcc was 25.6 *mg* (SD: 8.3) and varied by gender (men: 24.9 (SD: 8.7); women: 26.0 (SD: 7.9); 95%CI (-2.10 to - 0.02)). AvAcc was negatively correlated with age ( $r = -0.075$ ,  $p = 0.018$ ). The mean IG (-3.28 (SD: 0.45)) did not vary by gender or age. There were significant differences in all MX metrics for each tertile of age ( $p < 0.05$ ). Relative differences in the MX metrics between age tertiles decreased with the duration of the most active period (see Figure). The mean M2 value demonstrated that acceleration in the youngest tertile was 16% higher than the oldest tertile, while the mean M1/3 value was higher by 5%.

**Conclusion:** The influences of gender and age varied with the novel metric used. This understanding will help elucidate activity-health mechanisms when applied to subsequent studies investigating relationships with health outcomes.



Radar plot illustrating mean MX metrics for (clockwise) the most active 8 h of the day (M1/3DAY), 120 min (M120), 60 min (M60), 30 min (M30), 15 min (M15), 5 min (M5) and 2 min (M2) for three age groups.



# The association between physical activity and mothers' sleep quality on gestational weight gain and infant birth outcomes: a longitudinal cohort study

**Ms. Mugdha Deshpande<sup>1,2</sup>**, Dr. Neha Kajale<sup>1,2</sup>, Prof. Tarun Katapally<sup>3</sup>, Dr. Jasmin Bhawra<sup>4</sup>, Dr. Anuradha Khadilkar<sup>1,2</sup>

<sup>1</sup>Hirabai Cowasji Jehangir Medical Research Institute, Pune, India, <sup>2</sup>Department of Health Sciences, Savitribai Phule Pune University, Pune, India, <sup>3</sup>Western University, London, Canada, <sup>4</sup>Toronto Metropolitan University, Toronto, Canada

Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM

**SIG - Primary Choice:** N. Other

**Purpose:** Physical activity (PA) influences maternal health during pregnancy, thereby having implications for infant health outcomes. Sleep is a bio-behavioural process crucial for overall health and well-being, especially during pregnancy. However, there is little evidence of how both PA and sleep influence maternal and infant health. This study aimed to assess the relationship between PA and sleep quality (SQ) of pregnant mothers (across 3 trimesters) in the western state of Maharashtra, India and to study their association with gestational weight gain (GWG-maternal health key indicator) and infant outcomes.

**Methods:** Using a longitudinal prospective cohort study design, data from 182 pregnant women (134 rural; 48 urban) of MAI cohort (Mother and Infant cohort) were collected between August 2020 and January 2023. PA (intensity and type) and SQ (score <5 denotes good sleep and >5 denotes worse sleep) data were collected using validated questionnaires. Data on maternal GWG and infant anthropometry such as Birth weight(BW), recumbent length, head and mid-upper arm circumference(HC and MUAC) were collected. The association between sleep and PA across trimesters were tested using an independent sample t-test, ANOVA, and Spearman's rank correlation ( $p$  value<0.05) using SPSS(V.26) software.

**Results:** Significant differences in maternal age, GWG, and infant BW for rural (23.4±3.7years; 9.9±3.7kg; 2.6±0.4kg) and urban mothers (31.0±4.7years; 12.1±4.3kg; 2.8±0.5kg) respectively were observed. Negative associations were observed between vigorous PA and GWG ( $\rho = -0.226$ ,  $p = 0.05$ ). Urban mothers who worked were more likely to deliver longer infants ( $\rho = 0.314$ ,  $p = 0.05$ ) with a greater HC ( $\rho = 0.340$ ,  $p = 0.05$ ). In contrast, rural mothers who engaged more in occupational activity delivered infants with lower BW ( $\rho = 0.175$ ,  $p = 0.05$ ). Sleep latency and poor sleep efficiency among mothers were inversely related with GWG ( $\rho = -0.185$ ,  $p = 0.05$ ;  $\rho = -0.309$ ,  $p = 0.05$ ), and infant birth length ( $\rho = -0.369$ ,  $p = 0.05$ ) and MUAC( $\rho = -0.296$ ,  $p = 0.05$ ). Poor SQ was also inversely correlated with infant length, and HC( $\rho = -0.297$ ,  $p = 0.05$ ).

**Conclusion:** Findings suggest that while PA influences maternal-infant health positively, vigorous PA was associated with lower GWG and infant BW. Inadequate sleep was also associated with inadequate GWG and poorer infant health outcomes.



# Examining factors associated with perceived barriers to physical activity between rural and urban Canadian youth

**Dr. Taru Manyanga<sup>1,2</sup>**, Ms. Nicole White<sup>1</sup>, Ms. Larine Sluggett<sup>1</sup>, Dr. David Anekwe<sup>1,2</sup>, Dr. Chelsea Pelletier<sup>1</sup>  
<sup>1</sup>University of Northern British Columbia, Prince George, Canada, <sup>2</sup>University of British Columbia, Vancouver, Canada

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** We used nationally representative data to explore associations among location of residence (rural/urban) and perceived barriers to Physical Activity (PA) among Canadian youth.

**Methods:** We analyzed the 2017 Canadian Community Health Survey, Barriers to Physical Activity Rapid Response data for 12-17-year-old-youth, with a final weighted sample of N=1,412,050 (unweighted n=1395). Nine items from the survey assessing perceived barriers to PA were combined into three barrier domains: resources, motivational, and socioenvironmental. The likelihood of reporting any barrier, or each barrier domain to PA based on rural-urban location was examined using survey-weighted binary logistic regression following a model fitting approach. Sociodemographic factors were modelled as covariates and tested in interaction with location. For each barrier domain, we derived the best-fitting model with fewest terms.

**Results:** There were no location-specific effects related to reporting any barrier or for motivation-related PA barriers. We found a sex\*location interaction predicting the likelihood of reporting resource-related barriers. Rural boys were less likely to report resource-related barriers compared to urban boys (OR=0.42 [0.20, 0.88]); this rural/urban disparity was not observed for girls (OR=1.30 [0.74, 2.27]). We found no sex difference in the odds of reporting resource-related barriers (OR=1.19 [0.73, 1.95]) among urban youth, while rural girls were more likely to report resource-related barriers compared to boys (OR=3.72 [1.66, 8.30]). Regarding socioenvironmental barriers, we observed a significant BMI\*location interaction. There were no rural/urban differences in the likelihood of reporting barriers (OR=1.04 [0.70, 1.56]) for youth with BMI in the “normal” range. However, having a BMI outside the normal range was associated with higher likelihood of reporting barriers among rural compared to urban youth (OR=2.38 [1.32, 4.30]) and to rural youth with normal BMI (OR=2.44 [1.41, 4.23]). BMI was unrelated to reporting socioenvironmental barriers for urban youth (OR=1.07 [0.67, 1.71]).

**Conclusion:** Perceived PA barriers are not universal among Canadian youth. Overall, rural youth with BMI outside the normal range were more likely to report socioenvironmental barriers compared to rural youth with normal BMI and all urban youth. Our findings demonstrate the importance of testing interactions in contextual models.

# Systematic review of 24-hour movement behaviours among children and youth living in Asian countries (2-17 years)

**Ms. Megan Clemens<sup>1</sup>**, Ms. Reyana Jayawardena<sup>2</sup>, Ms. Maia Collins<sup>1</sup>, Ms. Mariam Farooq<sup>1</sup>, Ms. Yeong-Bae Kim<sup>3</sup>, Mr. Heejun Lim<sup>1</sup>, Mr. Brendan Murphy<sup>1</sup>, Ms. An-Chi Shih<sup>1</sup>, Ms. Danica Vangsgaard<sup>1</sup>, Ms. Kathryn Wytenburg<sup>1</sup>, Dr. Mark Tremblay<sup>4</sup>, Dr. Eun-Young Lee<sup>1</sup>

<sup>1</sup>School of Kinesiology and Health Studies, Queen's University, Kingston, Canada, <sup>2</sup>Faculty of Health Sciences, Queen's University, Kingston, Canada, <sup>3</sup>Faculty of Kinesiology, Sport, and Recreation, University of Alberta, Edmonton, Canada, <sup>4</sup>Children's Hospital of Eastern Ontario Research Institute, Ottawa, Canada

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Achieving appropriate levels of 24-hour movement behaviours (MBs; i.e., physical activity [PA], sedentary behaviour [SB], and sleep) is important for healthy childhood development. However, achievement of favourable levels is low among children living in Asian countries and the relationship with social determinants of health (SDoH) is poorly understood. This systematic review examined levels and SDoH correlates of MBs among those aged 2-17 years in Asian countries.

**Methods:** Five electronic databases were searched between May and August 2021 for peer-reviewed articles in English, Japanese, and Mandarin Chinese. Covidence software was used by two independent reviewers for screening and data extraction. Retrieved evidence was synthesized using Excel, including SDoH analysis. Top-up searches will be done in February 2023.

**Results:** A total of 346 studies (1,138,233 participants from 45 countries) were included. Of these, 187 studies examined PA (n=140), SB (n=21), or sleep (n=26), exclusively, 122 studies examined two MBs, and 37 studies examined all three MBs. A preliminary analysis of 165 studies found that the mean duration for total and moderate to vigorous intensity PA (n=97) were 1.50 h/d and 1.06 h/d, respectively. The mean duration for SB (n=53) and sleep (n=49) were 6.11 h/d and 8.47 h/d, respectively. The average adherence to the 24-hour Movement Guidelines for PA and SB were 36.3% and 53.4%, respectively, among those aged 5–17 years. There was insufficient evidence on recommendation adherence in early childhood. Only three studies reported adherence to all three MBs, finding that 7.9% met all recommendations while 22.7% met none. Important SDoH were age (PA/sleep: negative; SB: mixed), gender (PA: negative for girls; SB/sleep: mixed), rurality (PA/sleep: positive; SB: negative), and household income (all three MBs: mixed).

**Conclusions:** Adherence to the 24-Hour Movement Guidelines for PA and SB were low among children in 45 Asian countries. Important SDoH correlates were identified, clarifying the relationship between some SDoH and MBs. Health promotion interventions in Asia should better support children and youth to adhere to 24-Hour Movement Guidelines.

# Objectively Measured Physical Activity and Sleep During Summer versus School Days among Children with Autism Spectrum Disorder

**Dr. Keith Brazendale<sup>1</sup>**, Dr. Jeanette Garcia<sup>1</sup>, Dr. Susan Quelly<sup>1</sup>, Dr. Shawn Lawrence<sup>1</sup>, Dr. Shilpa Gurnurkar<sup>2</sup>, Dr. Ethan Hunt<sup>3</sup>

<sup>1</sup>University of Central Florida, Orlando, USA, <sup>2</sup>Nemours Children's Hospital, Orlando, USA, <sup>3</sup>University of Texas Health Science Center, Austin, USA

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** G. Children and families

**Background:** Children with Autism Spectrum Disorder (ASD) are 42% more likely to be overweight or obese than neurotypical youth. Studies have identified summer as a 'critical window' for children, showing significant weight-gain during summer compared to school months. The 'Structured Days Hypothesis' suggests this may be due to the less-structured nature of summer, where weight-related behaviors – such as physical activity and sleep – can be negatively impacted. There is a lack of evidence exploring this hypothesis, particularly in children at greater risk of being overweight/obese, such as children with ASD. The purpose of this study is to explore differences in children with ASDs' physical activity and sleep during summer versus school months.

**Methods:** Children (N=16) with ASD were recruited to participate in this within-subjects observational study. Participants were asked to wear accelerometers on their non-dominant wrist for 24hr/d for 14 days to capture activity (sedentary, light, moderate, vigorous) and sleep (duration and timing) during a school month, and again, during a summer month. Mixed-effect models were employed considering clustering at the child level (multiple observation days) and controlling for wear-time.

**Results:** Six children (67% male, median age 6 years old, 66% Overweight/Obese, 50% Hispanic White) provided valid summer and school accelerometer data. Reasons for a lack of valid data included discomfort with wearing accelerometers (N=4), participants unavailable during summer months (N=2), and participants only providing one valid timepoint of data (school *or* summer) (N=4). Participants spent an additional +30.2 minutes per day in moderate-to-vigorous physical activity (95% CI: +19.3.1, +41.0) during school compared to summer days. Participants spent more time in light physical activity during summer compared to school days (+49.7, 95%CI: +11.0, +88.3). No statistically significant differences were observed for sedentary time or sleep duration and timing.

**Conclusions:** Preliminary evidence suggests differences in physical activity may exist during summer versus school months in children with ASD, however, the small sample size necessitates further research with larger, more diverse samples to draw meaningful conclusions. Future studies adopting objective measures of activity and sleep in children with ASD should consider additional measures (e.g., qualitative, surveys etc.) to increase study validity.

# Perspectives on yoga principles to promote holistic well-being among community health educators

**Miss Mary Frazier<sup>1</sup>**, Dr. Samantha Harden<sup>1</sup>

<sup>1</sup>Virginia Tech, Blacksburg, USA

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose** To examine holistic well-being in community health educators (CHE) and their perspectives and current practices of yoga to inform translation of yoga principles to prevent and manage disease and burnout.

**Methods** A convenience sample of CHE in the Department of Agriculture's Virginia Cooperative Extension in the United States (n=18) filled out an electronic survey consisting of the Flourishing Index, a psychometrically validated metric for holistic well-being, as well as several questions about perceptions and current practices of yoga principles (i.e., movement, breathwork, and meditation). Data was analyzed for descriptive purposes. A 2-day virtual retreat was offered to determine reach (attendance) and satisfaction of yoga-related programming.

**Findings** Survey results demonstrated an overall level of flourishing of 7.5 (10=highest level). All CHE were interested in learning yoga principles (22% extremely [4/18], 22% very [4/18], 28% moderately [5/18], 28% slightly [5/18], 0% not at all [0/18]). The most prominent purposes reported for a personal yoga practice were relaxation (72%, 13/18), overall wellness (67%, 12/18), mental health (67%, 12/18), physical health (61%, 11/18), and self-care (61%, 11/18). CHE reported that individuals in their communities would be interested in participating in a CHE-delivered yoga program (6% extremely [1/18], 61% very [11/18], 17% moderately [3/18], 17% slightly [3/18], 0% not at all [0/18], 6% omitted [1/18]). Most CHE (67%, 12/18) did not have a personal yoga practice: 11% practice yoga postures 20-60 minutes/week (2/18), 24% practice breath exercises 20-30 minutes/week (4/18), and 33% practice meditation 10-60 minutes/week (6/18). Seventy-three CHE attended the 2-day retreat and reported satisfaction and positive perceptions of the programming (e.g., one CHE noted that it was the first time in their career that they felt like they were valued).

**Conclusions** CHE flourishing data provides a novel baseline as a target for improved well-being. In alignment with the literature on the health benefits associated with yoga, CHE perceive personal yoga practices for improved relaxation, overall wellness, mental health, physical health, and self-care. Translation of yoga principles has strong potential to prevent disease and burnout in CHE and the communities they serve.

# Family Farm to Healthy Kids: Engaging Early Learners in Fresh Food Education

**Ms. Diane Smith**

<sup>1</sup>Washington State University, Burlington, USA

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Early learning of food groups can be foundational in increasing familiarity with different foods and acceptance of healthy food choices. This poster will present a fresh food education delivery strategy and research evaluation describing behavior change associated with an early learning food education program that included taste samplings of local produce.

**Methods:** In the 2021-2022 school year, thirteen early learning center sites participated in the Family Farm to Healthy Kids (FF2HK) project. Seasonal produce was procured from a local farm cooperative, delivered to culinary school for students to prepare tasting samples, then the prepared samples and accompanying recipe fact sheet were delivered to the early learning sites for distribution at circle time. Food education prompts were provided to the classroom teachers and a recipe fact sheet was sent home to parents. Survey tools were created to gather feedback from three target audiences served by this project: culinary students, parents, and preschool youth. Surveys were audience specific and incorporated Knowledge, Attitude and Practice (KAP) questions.

**Results/findings:** In the early learning audience, 50% of the harvest samples offered were new foods (not tried or familiar to the preschooler), with 40% of the preschoolers responded in the positive that they liked the new food, and 85% said they would try the food again. Of the culinary students, 38% reported the featured produce items were new to them (increased familiarity) and 17% purchased the harvest of the month produce item from the local store (adopt new behavior). Parents of preschoolers reported purchasing at least one of the featured produce items and 66% reported that they changed how they stored produce after reading “how to store” section of the recipe fact sheet.

**Conclusions:** Establishing food preferences early in life can influence adult eating patterns. The FF2HK project introduced fruit and vegetable through taste samples in conjunction with in-classroom food education. The program evaluation suggests that increased acceptance of new foods and behavior change in the purchase of healthy foods can be achieved through food education which includes taste samples of local produce and supplemental parent materials to extend the learning to the home environment.

# Immediate and one-year self-reported changes in food purchases after the implementation of Warning Labels in Mexico

Dr. Alejandra Contreras-Manzano<sup>1</sup>, **Dr. Alejandra Jáuregui<sup>1</sup>**, Mrs. Claudia Nieto<sup>1</sup>, Miss Katia Larissa Quevedo<sup>1</sup>, Dr. Jorge Vargas<sup>1</sup>, Dr. James F. Trasher<sup>2</sup>, Prof. Simón Barquera<sup>1</sup>, Dr. David Hammond<sup>3</sup>

<sup>1</sup>Instituto Nacional de Salud Pública, Cuernavaca, Mexico, <sup>2</sup>University of South Carolina, South Carolina, USA,

<sup>3</sup>University of Waterloo, Waterloo, Canada

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Front-of-pack warning labels were introduced in Mexico in 2020 as a public health strategy to inform consumers and promote healthier food choices. We aimed to describe the self-reported immediate (1-2 months) and one-year changes in the consumption of critical food groups after implementing warning labels. We also investigated the demographic factors associated with using warning labels.

**Methods:** We analyzed data from the 2020 and 2021 International Food Policy study among Mexican adults ( $\geq 18$  years,  $n=2,108$ ) and youth (14-17 years,  $n=1,790$ ). Participants were asked if the warning labels had changed their purchasing decisions regarding specific food groups critical for the development of nutrition-related chronic diseases and commonly labeled with warning labels (cola drinks, soda, diet soda or pop, sweetened fruit drinks, candy or chocolate bars, snacks, desserts, and sugary cereals), and beverages without warning labels (100% fruit or vegetable juice). Response options were 'buy less', 'no change', and 'buy more'. Multilevel and linear regression models were fitted to analyze differences in self-reported changes in purchasing behavior by demographic characteristics, nutrition knowledge, BMI category, and food shopping role.

**Results:** Overall, 38.7% (IC95%: 37.1, 40.3) of youth and 47.9% (IC95%: 47.1, 48.7) of adults reported buying fewer food products because of the warning labels; no differences per study year were observed. Food groups with the highest self-reported reductions in purchases among adults and youth were soda (54% and 50%), sweetened fruit drinks (52% and 41%), candy or chocolate bars (49% and 38%), and sugary cereals. The food group with the lowest self-reported reductions in purchases was 100% fruit or vegetable juice (adults: 28; youth: 20%). Higher self-reported use of warning labels was associated with being responsible for food shopping at the household, being older than 49 years, self-identifying as indigenous, and with higher self-reported nutrition knowledge.

**Conclusions:** Self-reported reductions in the purchases of key food groups for the development of nutrition-related chronic diseases were observed a few months after warning labels were implemented in Mexico and maintained after one year of implementation.



# Prevalence of the metabolic syndrome in adolescents: A comparison between the IDF and NCEP/ATP III criteria

**Prof. Makama Andries Monyeki**, Dr. Caroline M Sedumedi, Prof. Sarah J Moss

<sup>1</sup>Physical activity, Sport and Recreation Research Focus area, Faculty of Health Sciences, North-West University, Potchefstroom, 2520, Potchefstroom, South Africa

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** G. Children and families

**Background:** The prevalence of metabolic syndrome (MetS) varies widely across the world in different studies. This is due to a lack of universally accepted definitions of the syndrome which makes it difficult to compare prevalence between different studies. Regardless of this, the prevalence of MetS still remains high. The current study compares the prevalence of the MetS according to the International Diabetes Federation (IDF) and the National Cholesterol Education Programme/Adult Trial Panel III (NCEP/ATP III) criteria among adolescents aged 15 years from the North West Province, South Africa.

**Methods:** This study follows a cross sectional design. Measures performed include anthropometry and markers of MetS. Prevalence of MetS in the sample population is 2.3% according to the IDF criteria and 5.6% according to the NCEP/ATP III criteria respectively. **Results:** Prevalence of MetS is twice as high when the NCEP/ATP III cut-off points were applied, compared to the IDF criteria. The difference between the two classifications is statistically significant ( $p < 0.05$ ) with a fair level of agreement ( $\kappa = 0.331$ ).

**Conclusion:** Variations in the prevalence of MetS are evident with the NCEP/ATP III criteria giving a prevalence that is twice as high compared to the IDF criteria. Standardized cut-off points for MetS in South African adolescents are needed to derive accurate identification and ensure comparable prevalence of the MetS in this population. Effective interventions strategies can only be developed and tested based on standardized cut-off points.

# The use of contracts as a form of private regulation to implement and manage healthy vending: best practice recommendations for effective and sustainable interventions

**Ms. Jane Dancey<sup>1</sup>**, Associate Professor Julie Brimblecombe<sup>1</sup>, Dr. Belinda Reeve<sup>2</sup>, Dr. Alexandra Jones<sup>3,4</sup>  
<sup>1</sup>Monash University, Melbourne, Australia, <sup>2</sup>University of Sydney, Sydney, Australia, <sup>3</sup>The George Institute, Sydney, Australia, <sup>4</sup>University of New South Wales, Sydney, Australia

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** Private regulation, such as contracts, can be an effective lever to implement and sustain healthy food retail environments. However, guidance for the effective use of contracts, in food retail settings is lacking. We applied a public health regulatory framework to publicly available guidance documents for the use of contracts to implement healthy food vending to create a best-practice framework to guide practitioners.

**Methods:** Document analysis involved i) snowball sampling to identify eligible publicly available guidance documents; ii) application of a public health regulatory framework to extract data on regulatory form, substance and governance; and iii) synthesis of data to form best practice recommendations on implementation and governance. Eligible documents were those that were aimed at implementing healthier vending; published from 2000 onwards; accessible online; and included recommendations beyond nutrition standards alone, including a reference to at least one regulatory governance process (administration, implementation, monitoring, enforcement or review).

**Results:** Twelve of 92 documents identified were eligible and all were from the United States (US). Only one guidance document addressed all elements of the best-practice regulatory framework, although all noted that products need comply with nutrition standards. Other aspects of regulatory substance (i.e., pricing, promotion, placement, labelling and contract length) were less well considered as were elements of regulatory governance (regulatory rules, administration, implementation, monitoring, enforcement and review). Using the three domains and nine components and recommendations of the public health regulatory framework as a guide, we extracted information from the healthy vending guidance documents and synthesised these into a best-practice framework for application of contracts in healthy vending.

**Conclusions:** Application of an established public health regulatory framework to our data resulted in the development of a best practice framework to guide the use of contracts to create healthy food vending initiatives. Our best practice framework considers elements of regulatory form, substance and governance and may assist public health and health promotion practitioners to strengthen future initiatives using contracts to create healthy vending. We encourage further research regarding the applicability of our best practice framework to other food retail settings.

# Physical activity, residential greenness and cardiac autonomic function

**Miss Maija Korpisaari**<sup>1,2,3</sup>, Miss Soile Puhakka<sup>1,2,3</sup>, Dr. Vahid Farrahi<sup>2,5</sup>, Dr. Maisa Niemelä<sup>1,4,5</sup>, Prof. Mikko Tulppo<sup>4,6</sup>, Prof. Tiina Ikäheimo<sup>2,7</sup>, Prof. Raija Korpelainen<sup>1,2,4</sup>, Dr. Tiina Lankila<sup>1,3</sup>

<sup>1</sup>Department of Sports and Exercise Medicine, Oulu Deaconess Institute Foundation sr, Oulu, Finland,

<sup>2</sup>Research Unit of Population Health, Faculty of Medicine, University of Oulu, Oulu, Finland, <sup>3</sup>Geography

Research Unit, Faculty of Science, University of Oulu, Oulu, Finland, <sup>4</sup>Medical Research Center, Oulu

University Hospital and University of Oulu, Oulu, Finland, <sup>5</sup>Research Unit of Health Sciences and Technology,

Oulu, Finland, <sup>6</sup>Research Unit of Biomedicine and Internal medicine, Faculty of Medicine, University of Oulu,

Oulu, Finland, <sup>7</sup>Department of Community Medicine, University of Tromsø, the Arctic University of Norway, Tromsø, Norway

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** N. Other

**Purpose** Interaction with nature is positively associated with amount of physical activity (PA) and parasympathetic regulation measured with heart rate variability (HRV). Residential greenness has been associated with the amount of light PA (LPA) and a relationship between PA and cardiovascular health has been suggested. Moderate to vigorous PA (MVPA) has been reported to reduce the risk for cardiovascular diseases. The aim of this study was to evaluate the associations between PA at different intensities, residential greenness and HRV in a large population-based sample of Finnish adults.

**Methods** The study population consisted of Northern Finland Birth Cohort 1966 (originally  $n = 10,321$ ) who participated in follow-up data collection in 2012 at 46 years old with two-week PA recording with Polar Active accelerometer. The participants underwent assessments of vagally mediated HRV (root mean square of successive differences in R-R interval (rMSSD)). The final study population included those whose residential greenness was measured using Normalized Difference Vegetation Index (NDVI) based on satellite imaging ( $n=5433$ ). Independent-samples T-test was used to analyze the significance of the difference of means between grouping variables. The association between LPA, MVPA and HRV were analyzed using Generalized Additive Modeling (GAM). Multivariable GAM were adjusted with BMI, alcohol consumption, education, sleep duration, cardiorespiratory fitness, sedentary activity and NDVI.

**Results** Men had more PA in all intensity levels in green (NDVI >0.5) than non-green (NDVI <0.5) residential areas, of which LPA ( $p<0.001$ ), moderate PA ( $p<0.001$ ), total PA ( $p<0.001$ ) were statistically significant. Women in green residential areas had higher amount of LPA ( $p<0.001$ ) and total PA ( $p<0.05$ ). GAM adjusted for NDVI and other confounders showed positive linear associations between LPA, MVPA and HRV.

**Conclusions** Higher LPA and MVPA were significantly associated with higher HRV irrespective of residential greenness. Greenness was positively associated with PA in all intensity levels in men, whereas in women a positive association was found for LPA and total PA. Positive relationship of both PA with HRV, and greenness with PA was found. Residential greenness for promoting PA and heart health in adults should be considered in city planning.

# Implementation of the Promoting Activity, Independence and Stability in Early Dementia (PrAISED) intervention in clinical practice: a mixed methods study

**Dr. Emma Adams**<sup>1</sup>, Mrs. Clare Burgon<sup>1</sup>, Mrs. Juliette Lock<sup>1</sup>, Mrs. Helen Smith<sup>2</sup>, Prof. Sarah Goldberg<sup>1</sup>, Prof. John Gladman<sup>1,3</sup>, Prof. Tahir Masud<sup>3</sup>, Prof. Rowan Harwood<sup>1,3</sup>

<sup>1</sup>University of Nottingham, Nottingham, United Kingdom, <sup>2</sup>Nottinghamshire Healthcare NHS Foundation Trust, Nottingham, United Kingdom, <sup>3</sup>Nottingham University Hospitals NHS Trust, Nottingham, United Kingdom

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose** The Promoting Activity, Independence and Stability in Early Dementia (PrAISED) intervention is a 12-month, home-based, individually tailored rehabilitation programme, delivered by therapists and rehabilitation support workers, with a focus on strength, balance, physical activity and activities of daily living. We evaluated the PrAISED intervention using a multi-site randomised controlled trial. The aim of this study was to explore how the PrAISED intervention could be implemented as a clinical service.

**Methods** Patients were referred to a shortened (6 month) version of the PrAISED Intervention in one National Health Service Trust in England. Patient characteristics and the number and duration of visits were recorded by intervention delivery staff. Quantitative data were explored using descriptive statistics. Semi-structured interviews were conducted online with 7 members of staff involved in the service (2 managers, 5 delivery staff) to explore implementation. The Consolidated Framework for Implementation Research was used to inform interview guides and to conduct a codebook thematic analysis.

**Results** Between April and November 2022, 11 patients (54.5% male; mean age 78; 90.9% white British) were referred to, and participated in, the service. Patients received on average 20.9 visits (mean duration 82.1 mins). Adaptations were made to intervention processes including the eligibility criteria, referral processes, patient clinical assessments, visit schedules and visit content, whilst maintaining the principles for the delivery of PrAISED. Interviews highlighted challenges with establishing operational processes, difficulties with referrals, changes to the types of activities delivered, staff and patient enjoyment of the intervention, and perceived benefits for patients with improvements in confidence, motivation, balance and strength.

**Conclusions** It was possible to implement PrAISED as a clinical service, though adaptations were needed and referrals to the service were lower than expected. More time may be needed to establish processes and engage relevant personnel across organisations before commencing service delivery. Referral pathways need further investigation to increase the number and diversity of patients referred to the service. The PrAISED principles were used to deliver the intervention despite its shorter duration and the change in focus of some activities. PrAISED was enjoyed by staff and patients and may fill a gap in support post-dementia diagnosis.

# Sustainable development competencies among certified physical education and health teachers in Sweden

**Associate Professor Andreas Fröberg<sup>1</sup>**, Mr. Petter Wiklander<sup>1</sup>, Prof. Suzanne Lundvall<sup>1, 2</sup>

<sup>1</sup>Department of Food and Nutrition, and Sport Science, University of Gothenburg, Gothenburg, Sweden,

<sup>2</sup>Department of Sport, Food and Natural Sciences, Western Norway University of Applied Sciences, Høgskulen på Vestlandet Campus Sogndal, Bergen, Norway

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** N. Other

School physical education (PE) may not only be an important cornerstone to the holistic development of students, but may also have unique characteristics that can contribute to the sustainable development (SD) agenda. However, most research to date about PE and SD has been theoretical, and we lack empirical studies with focus on PE teachers. The present study adds to the literature by exploring SD competencies among 2078 certified PE teachers in Sweden. The participants (42% males, median age: 48 years) were recruited through a digital register provided by the Swedish National Agency for Education, and data was collected using an online questionnaire. SD competencies was measured with the Physical Education Scale for Sustainable Development in Future Teachers (PESD-FT) that contained 18 items and that were answered using an eight-point Likert scale (strongly disagree to strongly agree). A SD competence index (SDC-I) was created by summarising the total score for all the 18 items (score: 18-144), and the higher the SDC-I scores, the higher the SD competence. Data was analysed with non-parametric statistics. In the total sample, the median SDC-I score for all participants was 107 (range: 18-144) out of 144. Most participants agreed with the items about making PE lessons accessible to everyone regardless of gender, race, or personal situation, and that PE can be used to improve people's physical ability. The median SDC-I score was lower among males compared to females ( $p=0.027$ ). Of the 18 items, there were sex differences for one item that concerned the economic dimension, and three items that concerned the environmental dimension (all  $p<0.05$ ). For these items, the score for males were lower compared to females. There were differences between younger ( $<40$  years) and older ( $\geq 40$  years) participants, where older participants had higher score ( $p=0.042$ ). Moreover, 31% reported having taught about SD in PE, and 67% somewhat agreed or agreed that they needed professional development education in the area of SD. Future studies are required to understand more of what types of competencies PE teacher education programmes and practicing PE teachers are lacking to fulfil the call for a contribution to the SD agenda.

# Public health nurses' wishes, needs and expectations for the development and use of a new online resource on early nutrition – a qualitative study in the Nutrition Now project

**Dr. Christine Helle<sup>1</sup>**, Prof. Elisabet Rudjord Hillesund<sup>1</sup>, Prof. Nina Cecilie Øverby<sup>1</sup>

<sup>1</sup>University of Agder, Kristiansand, Norway

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** In Norway, public health nurses (PHNs) are responsible for securing that all parents are sufficiently skilled in feeding their child. This represents a heavy responsibility, but there is an untapped potential in integrating flexible, evidence-based e-learning resources to support in-person dietary guidance. The aim of this study was to explore PHNs needs, wishes and expectations regarding development and use of an online resource on early nutrition.

**Methods:** In 2021, semi-structured interviews were taken with six PHNs working at a child health centre in a medium sized Norwegian city. The interviews were transcribed verbatim, and data were subjected to thematic analysis.

**Results:** Across all interviews, four thematic areas and 12 sub-themes were identified. The main themes were: 1) *An online resource is desirable, within some limitations;* 2) *It must be easy to use and perceived as relevant by different users;* 3) *Convey that food and meals are about more than nutrients* and 4) *Taking part in a developmental process is meaningful.*

The PHNs reported that parents frequently searched online for information on early nutrition. This information was often incorrect or misleading, and the PHNs recognized a need for a safe website to refer to. They preferred an online resource as a supplement to the ordinary consultations, fearing that watching a screen could disturb the personal contact. The resource would have to be concise and concrete. Extensive use of illustrations that facilitated understanding, was recommended. It further had to be available in at least English and Arabic in addition to Norwegian, and to work well on a smart-phone. The content should promote enjoyment of food as well as parental knowledge and skills, attempting to make nutrition less complicated by focusing on what's "good enough". Taking part in the development of the resource was viewed as meaningful and could contribute to joint knowledge and professional consensus. However, the overall workload had to be considered, and sufficient time be ensured for preparations.

**Conclusion:** PHNs recognized the need and were positive about an online resource on early nutrition as a supplement to regular consultations. Their input is included in a new online resource.



# Evidence supporting a combined movement behavior approach for children and youth's mental health – A scoping review and environmental scan

Dr. Louise de Lannoy<sup>1</sup>, Mx. Kheana Barbeau<sup>2</sup>, Dr. Leigh Vanderloo<sup>1</sup>, Dr. Gary Goldfield<sup>1</sup>, Dr. Justin Lang<sup>1</sup>, Dr. Olivia MacLeod<sup>1</sup>, **Prof. Mark Tremblay<sup>1,2</sup>**

<sup>1</sup>CHEO Research Institute, Ottawa, Canada, <sup>2</sup>University of Ottawa, Ottawa, Canada

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Introduction:** Associations between physical activity (PA), sedentary behavior (SED), and sleep – 24-hour movement behaviors (MBs) – and children/youth's mental health (MH) is well-established though often only examined separately.

**Methods:** This scoping review sought to answer the question: What evidence is there on the association between 24-hour movement behaviors and children/youth's mental health and what integrated knowledge mobilization applications/tools exist? Included articles examined all three MBs and MH among children/youth. The electronic search was conducted in June 2022 on PsycINFO, MEDLINE, CINAHL, Scopus. An environmental scan was conducted to search for MB and MH integrated knowledge mobilization applications/tools.

**Results:** A total of 55 articles were included, where 42 reported on combined MB and MH; 27/42 (64%) examined MB and mental wellness; 27/42 (64%) examined MB and indicators of mental illness; an overlap of 12/42 (29%) articles examined MB in relation to both mental wellness and illness. In total, 21/27 (78%) articles reported a positive and 6/27 (22%) reported no association between combined MB and mental wellness. Additionally, 23/27 (85%) reported a negative association between combined MB and indicators of mental illness and 4/27 (15%) reported no association. The environmental scan revealed one tool that examined how integrated MBs are associated with MH outcomes.

**Discussion:** There is a wealth of knowledge on the association between combined MB and MH though only one tool examined how combined MB and MH are associated. Efforts are warranted to better track and intervene on population and individual-level 24-hour MB for MH promotion and disease prevention.

# Immigration-related policies are associated with Supplemental Nutrition Assistance Program (SNAP) participation among Hispanic households in the U.S.

**Assistant Prof. M. Pia Chaparro**<sup>1</sup>, Dr. Amy Auchincloss<sup>2</sup>, Ms. Sofia Argibay<sup>2</sup>, Mr. Dominic Ruggiero<sup>2</sup>, Dr. Jonathan Purtle<sup>3</sup>, Dr. Brent Langelier<sup>2</sup>

<sup>1</sup>University of Washington School of Public Health, Seattle, USA, <sup>2</sup>Drexel University Dornsife School of Public Health, Philadelphia, USA, <sup>3</sup>New York University School of Global Public Health, New York, USA

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** To investigate the association between county- and state-level immigration-related policies and county-level participation in the Supplemental Nutrition Assistance Program (SNAP) among Hispanic households in the United States. SNAP is the main safety net program against food insecurity and SNAP-eligible Hispanics do not fully participate in SNAP. We hypothesized that lower SNAP participation among Hispanic households is partly due to exposure to immigrant unfriendly policies, even when unrelated to SNAP eligibility. For example, Hispanics may fear that by enrolling in SNAP, an undocumented family member could be exposed and deported.

**Methods:** Data on SNAP participation came from the American Community Survey (ACS) county-level 1-year files, 2007-2019. Data on county and state immigrant unfriendly/friendly policies for the same years came from secondary sources including the Urban Institute Immigration Policy Resource database. Our exposure was the cross-classification of county and state policies, determining whether a county had favorable (e.g., prohibiting local enforcement to share residents' migration status with federal immigration) or unfavorable policies at the county and/or state. Our outcome was county-level proportion of SNAP-participating Hispanic households. We used multivariable generalized linear models accounting for geographic and temporal autocorrelation, adjusted for the proportion of non-Hispanic White households participating in SNAP and county-level socio-demographic confounders such as poverty rate and unemployment for Hispanics and non-Hispanic Whites (n=6309 county-years).

**Results/findings:** County-level SNAP participation among Hispanic households was 2 percentage-points (B=2.02, 95%CI=0.73-3.31) higher in counties with immigrant-favorable policies at both the county and state levels, compared to counties with unfavorable policies at both levels. County-level SNAP participation among Hispanic households was 1.1 percentage point (B=1.14, 95%CI=0.23-2.06) higher in counties with discordant county-state policies (i.e., favorable at one level but not the other), when compared to counties with no unfavorable policies at both levels.

**Conclusions:** Local and state immigration policies, even when unrelated to SNAP eligibility, may influence SNAP participation among Hispanic households. Given that food insecurity prevalence is consistently higher among Hispanic households vs. non-Hispanic White households, these results are relevant for policies and programs attempting to address inequities in food insecurity and its nutritional consequences.

# Is the child's mode of commuting to school affected by parental barriers? The role of gender

**Dr. Francisco Javier Huertas-delgado<sup>1</sup>**, Dr. Carla Hermida<sup>2</sup>, Dr. Yaira Barranco-Ruiz<sup>3</sup>, Dr. Emilio Villa-González<sup>3</sup>, Dr. Adriana Quezada<sup>4</sup>, Dr. Daniel Molina-Soberanes<sup>3</sup>, Ms. Ximena Palma-Leal<sup>3</sup>, Mr. Pablo Campos-Garzón<sup>3</sup>, Dr. Daniel Orellana<sup>4</sup>, Dr. Palma Chillón<sup>3</sup>

<sup>1</sup>Teacher Training Centre La Inmaculada, Physical Activity for Health Promotion (CTS 1810) University of Granada, Granada, Spain, <sup>2</sup>Universidad del Azuay, Cuenca, Ecuador, <sup>3</sup>Department of Physical Education and Sports, Faculty of Sport Sciences, Sport and Health University Research Institute (iMUDS), University of Granada, Granada, Spain, <sup>4</sup>Universidad de Cuenca, Cuenca, Ecuador

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Active commuting to school (ACS) has been related to several health benefits, such as a higher daily amount of physical activity. Parents are the main decision-makers, and their perceptions may affect their children's ACS rates. Thus, the purposes of this study were to analyze the parental barriers by child and parent's gender and to examine the association between the parental barriers and the ACS, separately by child and parent's gender.

**Methods:** A total of 692 parents (53.9% mothers), from Spain and Ecuador, participated in this study. Parents reported their gender, educational level, and barriers to allowing their children actively commute to school, and their children's age, gender, mode, and time of commuting to school. Differences in the parental barriers by child and parent's gender were analyzed using T-student tests. Several binary logistic regression models were fitted to analyze the associations between the ACS (dependent variable) and barrier categories (independent variable, one for each model). All regressions were controlled by children's age, parental educational level, and time to school.

**Results:** The barriers to cycling to school were highly perceived by girls' parents ( $2.89 \pm 0.87$ ) than boys' parents ( $2.60 \pm 0.97$ ),  $p=0.001$ . Mothers perceived significantly higher barriers (all  $p<0.001$ ) than fathers (general:  $3.22 \pm 0.80$  vs.  $2.89 \pm 0.75$ ; walking:  $2.87 \pm 0.92$  vs.  $2.37 \pm 0.87$ ; cycling:  $2.86 \pm 0.94$  vs.  $2.58 \pm 0.91$ ; and total:  $3.05 \pm 0.79$  vs.  $2.73 \pm 0.68$ ). Lower perception of general (Odd ratio=0.430, Confidence interval; CI=0.309-0.599), walking (OR=0.544, CI=0.413-0.716), cycling (OR=0.554, CI=0.434-0.708), and total (OR=0.423, CI=0.300-0.596) barriers were associated to ACS in children for the whole sample, and for boys' parents in relation to child's gender, and for both parents' gender. Lower general barriers (OR=0.512, CI=0.309-0.847) were associated with ACS only in girls' parents.

**Conclusions:** Mothers perceived higher barriers towards ACS than fathers. A lower perception of parental barriers was associated with ACS, especially for boys' parents, for both fathers and mothers. Consequently, results suggest that it is important to educate parents, especially mothers, about the perceptions to let their children do ACS. In addition, developing improvements related to parental concerns, are needed to increase the ACS rates in modern-day youth

# Will India ever become anemia free?: A qualitative inquiry

**Dr. Neha Rathi<sup>1</sup>**, Dr. Nikitha Pedapanga<sup>1</sup>, Dr. Immanuel Joshua<sup>1</sup>, Prof. Anthony Worsley<sup>2</sup>, Prof. Sangeeta Kansal<sup>1</sup>, Mr. Aryan Raj<sup>1</sup>

<sup>1</sup>Department of Community Medicine, Institute of Medical Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh, India, <sup>2</sup>School of Exercise and Nutrition Sciences, Deakin University, Geelong, Australia

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Anemia is a common micronutrient deficiency existing among adolescents in several developing countries, including India. Despite launching numerous health programs, the Indian Government has only seen a small decline in the prevalence of anemia. Therefore, it is critical to explore the reasons behind the lack of progress in anemia prevention. This study aimed to assess the views of adolescents regarding anemia and anemia prevention strategies.

**Methods:** Using convenience sampling 39 adolescents (20 males; 19 females) aged 10-19 years were recruited from Tikari village, Varanasi, India. In-depth, face-to-face interviews were conducted in Hindi to gather information on their knowledge and perceptions of anemia and its prevention. Hemoglobin concentration was also estimated using the prick method, and the interviewees were requested to share Home Science and Science textbooks. The transcribed interview data were thematically analyzed through the Template Analysis technique. Conceptual themes were identified using NVivo software. Descriptive statistics were used to examine the distributions of the hemoglobin data. Additionally, content analysis technique was implemented for analyzing textbooks to verify the coverage of anemia and anemia-related content.

**Results:** Seven themes were identified: (i) Poor understanding of the term 'anemia; (ii) Limited discussion about anemia in classroom; (iii) Awareness of few common symptoms of anemia; (iv) Awareness about prevention and cure of anemia; (v) Irregular supply of Iron Folic Acid and deworming tablets in schools; (vi) Poor engagement of health workers in the prevention of anemia; (vii) Little knowledge of health programs among adolescents. The mean hemoglobin levels in boys and girls were 12.8 g/dl and 11.1 g/dl respectively. More than half of the sample was anemic (16.7% mild, 33.3% moderate, 2.8% severe). Content analysis revealed that there was limited discussion about anemia in both Home Science and Science textbooks.

**Conclusions:** The emerging findings highlight the need for revision of Home Science and Science curricula (i.e. inclusion of both declarative and procedural nutrition knowledge) as well as the need for effective behavioral nutrition interventions to curb the escalation of anemia among adolescents. The behavioral interventions should focus on inculcating healthy culinary and dietary practices and addressing the gaps in knowledge and understanding of anemia and its prevention among adolescents.

# Longitudinal links of diet and physical activity with gestational weight gain among slum-dwelling Indian pregnant women

**Dr. Rubina Mandlik<sup>1</sup>**, Ms. Swapna Deshpande<sup>1,2</sup>, Dr. Anuradha Khadilkar<sup>1</sup>, Dr. Dipali Ladkat<sup>1</sup>, Dr. Tarun Katapally<sup>3</sup>, Dr. Jasmin Bhawra<sup>4</sup>, Dr. Sangita Kulathinal<sup>5</sup>, Dr. Tarja I Kinnunen<sup>2</sup>

<sup>1</sup>Hirabai Cowasji Jehangir Medical Research Institute, Pune, India, <sup>2</sup>Tampere University, Tampere, Finland, <sup>3</sup>Western University, Ontario, Canada, <sup>4</sup>Toronto Metropolitan University, Toronto, Canada, <sup>5</sup>University of Helsinki, Helsinki, Finland

Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM

**SIG - Primary Choice:** N. Other

**Purpose:** A third of the population of Indian cities live in slums. Prevalence of overweight and obesity are increasing among slum-dwelling women. Information on how diet and physical activity contribute to gestational weight gain (GWG) among slum-dwelling women is scarce. This study explores the association of diet and physical activity with GWG in slum-dwelling pregnant women from Pune, India.

**Methods:** A prospective observational study was conducted of slum-dwelling pregnant women ( $\geq 18$  yrs,  $n=282$ ) enrolled during early gestation [ $<12$  weeks; T1] and followed up at mid-gestation [21 to 25 weeks; T2] and childbirth. Data on maternal sociodemographic characteristics, anthropometrics, diet (24-hour recall), and physical activity (Pregnancy Physical Activity Questionnaire) were collected. Daily energy and macronutrient intake, and physical activity scores (MET-hours/week) were calculated at T1 and T2. Total GWG was calculated as the difference between weight at the prenatal visit closest to delivery and weight at T1. Nutritional and physical activity correlates of GWG were assessed using multiple linear regression analysis.

**Results:** At T1, the cohort had the following characteristics: mean age:  $24.7 \pm 4.6$  yrs, 43% completed  $\geq 12$  yrs of schooling, 88% were homemakers, 25% were classified as overweight, and 11% as obese. Mean daily energy intake at T1 and T2 were  $1408 \pm 482$  kcal and  $1853 \pm 499$  kcal, respectively (EAR – 2010 kcal/day). Energy obtained from carbohydrates, proteins, and fats was 63%, 10%, and 26%, respectively. Nearly half of the women exceeded suggested energy intake from carbohydrates (i.e. 45-65%). Mean total energy expenditure at T1 and T2 was  $183 \pm 70$  and  $179 \pm 69$  MET-hours/week, respectively. Women reported participating mostly in light-intensity physical activity followed by moderate-intensity activities in the form of household chores and caregiving. Mean GWG was  $10.2 \pm 4.3$  kgs. Greater carbohydrate intake independent of energy intake at T2 ( $\beta = 0.02$ ;  $p=0.06$ ) and higher sedentary activity at both visits (T1:  $\beta = 0.06$ ;  $p=0.008$ ; T2:  $\beta = 0.04$ ;  $p=0.05$ ) were associated with greater GWG.

**Conclusions:** High carbohydrate intake and low physical activity among slum-dwelling pregnant women can increase GWG and should be managed in consultation with healthcare providers. More importantly, public health policies and programs should support pregnant slum-dwelling women in preventing and managing pre-, during, and post-pregnancy weight gain.

# Developing causal directed acyclic graphs to guide observational physical activity research – a scoping review

**Dr. Louise Poppe<sup>1</sup>**, Dr. Johan Steen<sup>2</sup>, Dr. Wen Wei Loh<sup>3</sup>, Prof. Geert Crombez<sup>4</sup>, Ms. Fien De Block<sup>1,5</sup>, Ms. Noortje Jacobs<sup>1</sup>, Dr. Annick De Paepe<sup>4</sup>, Dr. Jelle Van Cauwenberg<sup>1</sup>

<sup>1</sup>Department of Public Health and Primary Care, Ghent University, Ghent, Belgium, <sup>2</sup>Department of Internal Medicine and Pediatrics, Ghent University, Ghent, Belgium, <sup>3</sup>Department of Data Analysis, Ghent University, Ghent, Belgium, <sup>4</sup>Department of Experimental Clinical and Health Psychology, Ghent University, Ghent, Belgium, <sup>5</sup>Department of Movement and Sports Sciences, Ghent University, Ghent, Belgium

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose.** Observational studies tend to rely on associational rather than causal analysis. Nevertheless, causal conclusions are often made or sought by researchers. Causal Directed Acyclic Graphs (DAGs) provide the necessary tools for articulating the assumptions on which causal interpretations of statistical associations rely and provide a clear basis for constructive discussion among researchers. As yet, the use of DAGs in physical activity and, more broadly, health promotion research is limited. Our aim is to provide researchers with an overview of guidelines and recommendations for developing DAGs to answer their research questions.

**Methods.** We conducted a scoping review searching for papers and resources explicitly focusing on the development of DAGs. Three bibliographic databases (PubMed, EMBASE, and Web of Science) were searched and reference lists of selected papers were screened. Information extracted was categorized according to the following three themes: (1) the purpose of DAG development (i.e., for guiding study design and/or data analysis), (2) similarities and differences between the papers and resources regarding the proposed steps for DAG development, and (3) guidance on how to obtain domain knowledge for the development of a DAG.

**Results.** A total of 902 records were identified from the bibliographic databases and a total of eleven papers and resources providing guidelines and recommendations regarding DAG development were included. Most of the included papers focused on DAG development for data analysis. Similar steps were proposed for developing a DAG. There were some differences on how to implement common causes (i.e. sequential inclusion versus exclusion). Little to no information was available on the implementation of domain knowledge in the development of DAGs.

**Conclusions.** Causal DAGs are relevant and useful tools for guiding different phases of the research process, from study design to data analysis. Key recommendations for physical activity researchers will be discussed. We hope that our scoping review facilitates, increases and improves the practical uptake of DAGs in physical activity and, more broadly, health promotion research.



# Compositional associations of 24-hour physical activities, sedentary time, and sleep with depressive symptoms in urban and rural environments

**Ms. Marjo Seppänen**<sup>1,2,3</sup>, Dr. Maisa Niemelä<sup>5</sup>, Ms. Soile Puhakka<sup>1,2,3</sup>, Dr. Tiina Lankila<sup>1,3</sup>, Prof. Markku Timonen<sup>2,6</sup>, Prof. Raija Korpelainen<sup>2,3,4</sup>, Dr. Vahid Farrahi<sup>5</sup>

<sup>1</sup>Geography Research Unit, University of Oulu, Oulu, Finland, <sup>2</sup>Center for Life Course Health Research, University of Oulu, Oulu, Finland, <sup>3</sup>Department of Sports and Exercise Medicine, Oulu Deaconess Institute Foundation sr., Oulu, Finland, <sup>4</sup>Medical Research Center, Oulu University Hospital and University of Oulu, Oulu, Finland, <sup>5</sup>Research Unit of Health Sciences and Technology, University of Oulu, Oulu, Finland, <sup>6</sup>Unit of General Practice, Oulu University Hospital, Oulu, Finland

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** This study examined how compositions of 24-hour time-use, and time reallocations between different movement behaviors are associated with depressive symptoms in urban and rural residential environments.

**Methods:** The study population consisted of 4305 46 years old participants from the Northern Finland Birth Cohort 1966 study. Time spent in light-intensity physical activity (LPA), moderate-to-vigorous-intensity physical activity (MVPA) and sedentary time were obtained from a hip-worn accelerometer. Sleep duration was self-reported and combined with activity behaviors to obtain the 24-hour composition. Residential environment was classified as urban or rural based on participant's home address. Depressive symptoms were evaluated using Beck Depression Inventory II (BDI-II). Multivariable adjusted regression analysis, using a compositional data analysis approach based on isometric log-ratio transformation, was used to examine the associations and pairwise time reallocations of 24-hour movement behaviors with BDI-II score. The analyses were stratified by urban (N=2868) and rural (N=1172) residential environments.

**Results:** The 24-hour composition of movement behaviors was significantly associated with depressive symptoms in both environments. The pairwise time-reallocations among movement behaviors showed that more daily time in MVPA at the expense of sedentary time, LPA or sleep was associated with less depressive symptoms in both environments, but to a different extent. Replacing 30 min/day of sedentary time with MVPA was associated with -0.33 (95% CI = -0.56 – -0.10) and -0.55 (95% CI = -0.86 – -0.23) lower BDI-II scores among those living in urban and rural environments accordingly. More daily time in sleep at the expense of sedentary time or LPA was associated with lower BDI-II score in rural, but not in urban environment.

**Conclusions:** These findings suggest that more physical activity from moderate to vigorous intensity at the expense of any other movement behavior could help to prevent depressive symptoms, and the beneficial effects seem be more pronounced for rural residents.

# Pragmatic Evaluation of Systems Approaches in Public Health: The Systems Evaluation Network

**Dr. James Nobles<sup>1</sup>**, Dr. Alexandra Potts<sup>1</sup>

<sup>1</sup>Leeds Beckett University, Leeds, United Kingdom

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** Calls for systems approaches to improve population health have grown rapidly in the last two decades. Systems approaches are characterised by a deep and shared understanding that many population health outcomes are the product of a complex adaptive system. To change such outcomes, we need to alter how the system functions through collective, systemic, and multi-sectoral action. This type of approach is widely advocated, and is being implemented, across the world. One challenge facing current and future systems approaches is the extent to which they can be evaluated within the traditional research paradigms. We aim to introduce the Systems Evaluation Network to help overcome this challenge.

**Methods:** The Systems Evaluation Network (SEN) was established in June 2021 to provide a mechanism for researchers, practitioners, and policy makers to share and advance methodological developments. The network meets quarterly for two hours in an online format. The focus of the SEN is member-led, meaning that the content adapts to meet the needs of its members. Here, we present a retrospective descriptive analysis of its membership and foci.

**Results:** As of March 2022, the SEN has grown to 538 members. Membership is predominantly UK-based, however there is a growing international audience, including those from the Netherlands, Finland, Sweden, the Middle East, South and Central America, the USA, Australia, Canada, and New Zealand. Over half are from academia (53.9%), with the remainder from policy, practice, and independent consultancy. The skill set and knowledge base of the current membership spans public health and health promotion, health systems and policy, behavioural science and insights, and engineering and infrastructure systems. The focus, throughout the last seven SEN meetings, has been on: designing a systems evaluation; monitoring the success of a systems approach; exploring terminology; case study examples; and, methods such as systems mapping.

**Conclusions:** The SEN was initially pitched at a UK-audience, however given the broader interest, it has now developed an international membership. The content of the SEN directly aligns to the issues covered within the ISBNPA conference, and as such, is likely to be of relevance to delegates.

# Effects of Goal-setting and Visualization on Collegiate Track & Field Athletes' Performance, Self-Confidence and Anxiety – A Pilot Study

**Dr. Jung Eun Lee<sup>1</sup>**

<sup>1</sup>University of Minnesota Duluth, Duluth, USA

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Psychological skills training has been effective in improving overall performance, self-confidence, and reducing anxiety in athletes of various sports such as tennis, field hockey, and basketball (Mamassis & Doganis, 2004). The purpose of this study was to examine the impact of goal setting and mental imagery training on the performance, anxiety, and confidence levels of collegiate track & field athletes. It was hypothesized that mental skills training would improve participants' performance and psychological variables.

**Methods:** A total of 12 males (mean age=19.5 years, previous experience= 6.73 years) were recruited from the University's Men's Track & Field team using an email flyer. One athlete competed in sprint events (60-600m), and 10 athletes competed in distance events (800-5,000m). Participant's anxiety and self-confidence were measured using the Competitive State Anxiety Inventory-2, and their competition performances were recorded on a separate data sheet. Participants met twice per week for four weeks for instructional session of goal setting and visualization training using excerpts from the US Olympic Committee Sport Psychology Training manual, and asked to practice visualization for at least 5 min daily on their own. Data was collected prior to, and following the intervention, as well as before each competition during the four-week intervention period.

**Results:** Paired t-tests indicated that cognitive anxiety ( $t(1,11) = 2.74, p < 0.05$ ) and somatic anxiety ( $t(1,11) = 2.65, p < 0.05$ ) significantly decreased, while self-confidence ( $t(1,11) = -2.48, p < 0.05$ ) significantly increased from pre-intervention to post-intervention. Participants' performance showed an increasing trend from pre- to post-test: however, did not reach a significant level.

**Conclusions:** The findings of this study suggest that four weeks of goal setting and mental imagery training is effective in reducing pre-competition anxiety in male collegiate Track & Field athletes. These findings provide adequate evidence that regular mental skills practice should be included in any training plan. Distance running by nature is a mental game, and the practice of visualization and goal setting has the potential to give athletes an edge by reducing their pre-competition anxiety and boosting self-confidence.

# Creating content for an app that enables coach advisors to support volunteer trainers

**Dr. Janet Moeijes**<sup>1</sup>, Mr. Cor Niks<sup>1</sup>

<sup>1</sup>Windesheim University of Applied Sciences, Zwolle, Netherlands

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose** Volunteer sports trainers have difficulties in 'reading' the behavior of children with psychosocial problems. Compared to their peers, these children more often stop with sports participation after a short period, while membership of a sports club might help them to reduce their psychosocial problems. Windesheim University of Applied Sciences is developing an app which could be helpful for coach advisors such as behavioral therapists, community sports motivators, and physical education teachers, to support volunteer trainers. In order to get content for the app, rules of thumb will be formulated on how sports trainers can respond to children who show troublesome behaviour due to psychosocial problems.

**Method** Sports students will use draft versions of the observation form during the training to observe the actions of trainers and the corresponding reactions of children. Afterwards, students will interview volunteer trainers about their observations and discuss with them how similar problems could be prevented during the next training.

In focus groups, solutions provided to the trainers will be calibrated. Also possible changes in trainers' behaviour towards children with psychosocial problems will be determined.

**Results** The first experiences indicate that the observation form is easy to use. Trainers find it pleasant that their training activities are being observed. They actively implement the advices given by students in consultation with them. In the current early stage of the research project, possible effects of these advices could not yet be determined.

**Conclusion** As an initial step in developing an app that coach advisors can use to support trainers to better respond to troublesome behavior of children with psychosocial problems, an observation form is being constructed. Using draft versions of this form seems to yield sufficient input for formulating rules of thumb that have to be incorporated in the future app.

# Promotion of a healthy salt intake in Brazilian adults: a theory-based mHealth intervention

**Dr. Marilia Cornélio<sup>1</sup>**, Mrs. Milena Perin<sup>1</sup>, Dr. Maria-Cecília Gallani<sup>2</sup>, Dr. Thais São-João<sup>3</sup>, Ms. Titilayo Tatiana Agbadje<sup>2</sup>, Dr. Roberta Rodrigues<sup>1</sup>

<sup>1</sup>University of Campinas, Campinas, Brazil, <sup>2</sup>Laval University, Quebec, Canada, <sup>3</sup>University of Rhode Island, Kingston, USA

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** To evaluate a theory-based m-Health intervention to promote healthy salt intake in Brazilian adults.

**Methods:** We conducted a two-arm randomized controlled study with adults from primary health care units of a city of São Paulo state, Brazil. Intervention development was guided by the Behavior Change Wheel framework and it was delivered by a mobile App. Participants responded questionnaires at baseline and 2 months post-intervention. The primary outcomes were Behavioral question on salt intake (using a maximum of 3g of salt/day during meal preparation) and Per capita salt consumption. Secondary outcomes were Intention and Self-efficacy of using a maximum of 3g of salt/day during meal preparation and Habit of using more than 3g of salt/day during meal preparation. The App usability was assessed by the System Usability Scale (SUS). We applied regression analysis to assess the effect of the intervention on salt intake measures and psychosocial variables, and mediation analysis to identify mediators of the intervention effect.

**Results/findings:** A total of 86 participants completed the study (Intervention group - IG n=43; Control group - CG n=43). Most participants in both groups were female (IG: 84%; CG: 86%) and with average age of IG: 34.2 and CG: 43.4 years. Participants of IG showed a significant reduction in the addition of salt/day during meal preparation (mean difference: - 1.08g; p-value: 0.0109). People of IG were 67% more likely to use, every day or most days of the week, a maximum of 3g of salt/day when preparing meals than CG. Also, participants of IG showed a significant increase of Intention and Self-efficacy and a reduction in Habit when compared to people in the CG. An average of 77.8 points was obtained on a SUS (0-100), indicating good usability. Also, Self-efficacy and Habit mediated the effect of the intervention on the Behavioral question of using, most days or every day of the week, 3g of salt/day during meal preparation.

**Conclusions:** The theory-based App intervention showed to be effective to promote healthy salt consumption and may have its impact expanded in future studies with different populations in the real context of health practice.

# Regulating the advertising of unhealthy foods and beverages on digital spaces – perspectives from stakeholders in Singapore

**Dr. Salome Rebello<sup>1</sup>**, Ms. Xin Hui Chua<sup>1</sup>, Mr. Clarence Lin Khang Chan<sup>1</sup>

<sup>1</sup>Saw Swee Hock School of Public Health, Singapore, Singapore

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Foods advertised on social media are predominantly unhealthy and there are growing calls to regulate the digital marketing of unhealthy foods and beverages. However, regulating digital spaces pose unique challenges. Understanding the perspectives of key stakeholders towards potential regulations for digital spaces can help inform policy design and implementation.

**Methods:** In this exploratory study, we interviewed nine key informants from media agencies (n=5), influencers (n=3) and regulators (n=1) to understand the (a) perceived roles of the government, the digital media industry, and social media influencers, and how these stakeholders impact and influence each other (b) operational opportunities, challenges, norms and best practices in the regulation of social media advertising and barriers to compliance.

**Results:** A preliminary regulatory landscape of the social media space with perceived roles and interactions of key actors was synthesized. Using thematic analysis, we identified two broad perceptions of the digital community in Singapore. Whilst users are law-abiding with government perceived as the legitimate source of regulation, there is a low level of regulatory presence with checks mainly driven by brands, agencies, and platforms, functioning with a self-regulatory approach. Participants narratives revealed potential barriers including perceived lack of need for regulation, presence of multiple drivers for unhealthy food choices, low barriers to entry, and business conflicts. Use of co-regulation, control points, education, equality and equity in policy design and technology for monitoring were identified as potential levers for compliance.

**Conclusion:** Leveraging on existing albeit less formal regulatory control and dissemination points, utilizing levers of compliance and explicitly addressing barriers to regulations may be of value to consider in designing and implementing digital marketing policies for unhealthy foods and beverages.



# Physical fitness tests in older adults – test reliability and exercise effects

**Mr. Manne Godhe**<sup>1,2</sup>, Prof. Johnny Nilsson<sup>1</sup>, Prof. Örjan Ekblom<sup>1</sup>, Mr. Gustaf Rönquist<sup>1</sup>, Dr. Eva Andersson<sup>1,2,3</sup>

<sup>1</sup>Department of Physical activity and Health, The Swedish School Of Sport And Health Sciences, Stockholm, Sweden, <sup>2</sup>Department of Molecular Medicine and Surgery, Karolinska institutet, Stockholm, Sweden,

<sup>3</sup>Department of Neuroscience, Karolinska Institutet, Stockholm, Sweden

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose** The aim of this study was to examine test-retest reliability of easy accommodated field-based tests and to describe how exercise, twice weekly, during eight weeks influence physical fitness in older adults. Low physical fitness is a risk factor for cardiovascular-, mental-, and musculoskeletal -diseases.

**Methods** Totally 1400 community dwelling older adults (66% women), mean age 71.5±5.0 yrs (range 65-85 yrs), performed an 8-week exercise period consisting of 1h combined strength, aerobic, and balance training, performed twice weekly. A field-based physical fitness test battery (~30 different test parameters) was conducted at three separate times (pre-1, pre-2 and post-test). All tests and exercise sessions were supervised by second-year students in the health promotion program at The Swedish School of Sport and Health Sciences. Data was analyzed for men and women separately in 5-year-interval age groups

**Results** All tests showed generally good reliability (ICC >0.75) between pre-1 and pre-2 tests.

Between pre-2 and post-test:

Muscular fitness tests: No significant differences were noted in the hand grip test for any age groups. Static trunk endurance improved significantly except in the oldest age groups. In the step-height test no significant differences were seen for men in either leg, however, for all age groups in both legs in women, except 80-84yrs. All age groups in both sexes significantly improved 5-sit-to-stand-time and the 50-sit-to-stand-speed.

Cardiorespiratory fitness: In the 6-min walk test, significant improvements were seen in all age groups in women, however, only men 65-69yrs.

Significant reduced heart rates were seen in women 65-69 and 70-74yrs at the loaded cycle test, but not for men.

Motor fitness tests: The timed-up-and-go test, significant improvements were seen in both sexes for all age groups except for men 80-84yrs.

Generally, no significant differences were noted in any of the performed balance tests for any age group.

**Conclusions** There was generally good reliability between the two pre-tests in all the physical fitness tests. In some physical fitness tests, there were significant improvements after the 8-week exercise period, demonstrating which physical fitness field-tests that are suitable when examining older adults in various interventions and health contexts.

# How are physical behavior and affective well-being associated in everyday life? Findings from a systematic review

**Ms. Irina Timm<sup>1</sup>**, Dr. Marco Giurgiu<sup>1,2</sup>, Prof. Ulrich W. Ebner-Priemer<sup>1,2</sup>, Prof. Markus Reichert<sup>1,2,3</sup>

<sup>1</sup>Mental mHealth Lab, Institute of Sports and Sports Science, Karlsruhe Institute of Technology, Karlsruhe, Germany, <sup>2</sup>Department of Psychiatry and Psychotherapy, Central Institute of Mental Health, Medical Faculty Mannheim/Heidelberg University, Mannheim, Germany, <sup>3</sup>Department of eHealth and Sports Analytics, Ruhr-University Bochum, Bochum, Germany

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose** Several systematic reviews have confirmed the positive effects of physical activity (PA) on affective well-being (AWB). The PB - AWB association is highly relevant to both human physical and mental health. Unfortunately, there are barely any reviews on the dynamic momentary interplay of physical behavior (PB), including both PA and sedentary behavior (SB), and AWB in everyday life.

**Methods** We included studies using intensive longitudinal data, combined with a device-based measurement of PB (i.e., accelerometer, smartwatches) and AWB assessment via electronic diaries, as we focused on within-subject associations. Literature was searched in three databases (Web of Science, PubMed, Scopus). A data extraction was developed to categorize included studies, and a quality assessment tool was adopted to illustrate the risk of bias for the included studies.

**Results** Of the n=66 included studies, most investigated adult populations (n = 50; 76%), followed by investigations of children and adolescents, and elderly persons. The reviewed evidence on PB - AWB associations under ecological valid conditions is heterogeneous, that is, the direction and strength of relationships are ambiguous across studies. However, associations of PB with feelings of energy were homogeneous across nearly all studies, implying a dominant role of subjective energy in interaction with PB in humans' everyday life. We found a large heterogeneity of methods applied to study PB - AWB associations, which further complicates the scrutinization of real-life evidence on PB - AWB associations. While overall, the quality of studies reviewed was rated moderate to high, there is considerable room for improvements.

**Conclusions** This review summarizes the current state of research, showing that PB and AWB are bidirectionally connected in everyday life. Further experimental or intervention studies are needed to fully understand the implications of PB and its relationship with AWB. Research should adhere to consistent guidelines in utilizing and reporting ambulatory assessment methods. These insights will help to promote and develop (mobile) interventions for prevention and therapy of human physical and mental health.

# Summer Day Camp Influences Child Sleep through Parent Health-Promoting Rules/Routines: Evidence from a Randomized Controlled Trial

**Dr. Layton Reesor-Oyer<sup>1</sup>**, Dr. Sarah Burkart<sup>1</sup>, Ms. Xuanxuan Zhu<sup>1</sup>, Dr. Christopher Pfladderer<sup>1</sup>, Dr. Alessandra Bandeira<sup>1</sup>, Dr. R. Glenn Weaver<sup>1</sup>, Dr. Bridget Armstrong<sup>1</sup>, Dr. Elizabeth Adams<sup>1</sup>, Dr. Michael Beets<sup>1</sup>

<sup>1</sup>University of South Carolina, Columbia, USA

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Elementary-age children exhibit shifted/disrupted sleep timing during the summer. It is hypothesized that this occurs because parents relax health-promoting rules/routines when children do not attend school. Attending summer day camp (SDC) may prevent degradation of rules/routines and promote more optimal sleep timing by mimicking the structure of school. In a secondary analysis of a randomized controlled trial, we evaluated the effect of SDC on child sleep timing via parent health-promoting rules/routines.

**Methods:** Children (n=374; 5-12 years, 47% female, 52% Black) recruited from Title I schools (serving majority families with low-income) were randomly assigned to receive free access to a community-based SDC for eight to ten weeks (n=205) or a control condition (n=169) during the summers of 2021 or 2022. Parents completed The Child Routines Inventory - Daily Living Routines Subscale during the school year (April/May) and summer (July/August). Potential scores 0-44; higher scores indicate greater health-promoting rules/routines. Parents reported child bed and wake times nightly for 14-days during the corresponding time frames. We used two structural equation models (one for each outcome) to evaluate the impact of access to free SDC on child 1) bedtime and 2) wake time during the summer via summer rules/routines controlling for spring measures. We used 95% bootstrap confidence intervals (5,000 resamples) to determine statistical significance. Unstandardized model results are presented.

**Results:** During the summer, parents of children who received access to free summer day camp reported an average bedtime of 9:49PM (SD=67min) and waketime of 7:50AM (SD=62min); those in the control condition reported an average bedtime of 10:02PM (SD=70min) and waketime of 8:20AM (SD=68min). Within the full models, children randomized to SDC had slightly higher health-promoting rule/routines scores (B=1.68; 95%CI=0.68,2.69), compared to those in the control condition. A one unit increase in rules/routines score was associated with a 2.8 minute earlier wake (B=-2.79; 95%CI=-3.99,-1.66) and 1.8 minute earlier bedtime (B=-1.79; 95%CI=-3.05,-0.55). SDC indirectly influenced child wake (B=-4.59; 95%CI=-8.54,-1.51) and bedtime (B=-3.01; 95%CI=-6.26,-0.65) via health-promoting rule/routines. Sensitivity analyses conducted on only weekdays produced similar results.

**Conclusions:** SDC influenced the home environment by facilitating greater health-promoting rules/routines which were associated with earlier bed and wake times.

# Estimating the effect of pre-diagnosis physical activity on survival after breast cancer: bias, bias and more bias.

Miss Frances Albers<sup>1,2</sup>, Ms. Ziyu Wang<sup>1,2</sup>, Dr. Sabrina Wang<sup>1,2</sup>, Prof. Dallas English<sup>1,2</sup>, **Associate Professor Brigid Lynch<sup>1,2</sup>**

<sup>1</sup>Cancer Council Victoria, Melbourne, Australia, <sup>2</sup>The University of Melbourne, Melbourne, Australia

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** Pre-diagnostic physical activity is reported to improve survival for women with breast cancer. However, studies of pre-diagnostic exposures and cancer survival are affected by several biases, made clear when applying a target trial framework. We investigated the impact of selection bias, immortal time bias, confounding and adjustment for mediators in a systematic review and meta-analysis of the effect of pre-diagnostic physical activity on survival following breast cancer.

**Methods:** Medline, Embase and Emcare were searched for studies examining pre-diagnostic physical activity and overall or breast cancer-specific survival after breast cancer diagnosis. Random-effects meta-analysis was used to estimate pooled hazard ratios (HRs) and 95% confidence intervals (CIs) comparing highest versus lowest pre-diagnostic physical activity levels. Subgroup meta-analyses were used to compare HRs of studies with and without different biases. ROBINS-E was used to assess risk of bias.

**Results:** We included 19 studies. Women with highest versus no or low pre-diagnostic physical activity had higher breast cancer-specific survival across most analyses. However, uncertainty exists because the overall risk of bias across eligible studies was serious. When we stratified results by immortal time bias status, studies without immortal time suggested no effect HR= 0.94 (95% CI: 0.76 to 1.16), whereas the HR pooled from studies with immortal time bias was suggestive of a protective effect (HR = 0.78; 95% CI: 0.67 to 0.91). The protective effect of pre-diagnostic physical activity on breast cancer-specific survival was stronger in the subgroup that did not adjust for mediators (HR = 0.67; 95% CI: 0.54 to 0.83) compared to the subgroup that did adjust for mediators (HR = 0.95; 95% CI: 0.86 to 1.04). Insufficient studies were available to investigate impacts of selection bias and confounding.

**Conclusions:** Biases can substantially change effect estimates. Due to misalignment of start of follow-up (before or after diagnosis), specification of eligibility (at diagnosis) and treatment assignment (i.e. measurement of exposure, before diagnosis), it is not possible to correctly estimate the effects of pre-diagnostic exposures such as physical activity with current epidemiological methods. Research examining pre-diagnostic exposures needs to acknowledge these limitations carefully.

# A web-based and mobile intervention providing complementary feeding guidelines to promote responsive parental feeding practices, healthy children's eating behaviour and optimal body mass index: protocol of the NutrienT randomised controlled trial

**Ms. Camille Riera-Navarro<sup>1</sup>**, Dr. Camille Schwartz<sup>1</sup>, Dr. Pauline Ducrot<sup>2</sup>, Ms. Laurence Noiro<sup>2</sup>, Dr. Corinne Delamaire<sup>2</sup>, Prof. Edith Salès-Wuillemin<sup>3</sup>, Dr. Denis Semama<sup>4</sup>, Dr. Sandrine Lioret<sup>5</sup>, Dr. Sophie Nicklaus<sup>1</sup>

<sup>1</sup>Centre des Sciences du Goût et de l'Alimentation, CNRS, INRAE, Institut Agro, Université de Bourgogne, F-21000 Dijon, France, <sup>2</sup>Santé publique France, French national public health agency, F-94415 Saint-Maurice, France, <sup>3</sup>Psy-DREPI (Psychologie: Dynamiques Relationnelles Et Processus Identitaires), Université de Bourgogne, EA 7458, 21000 Dijon, France, <sup>4</sup>CHRU Dijon, Department of Neonatal Pediatrics, Dijon University Hospital, 21000 Dijon, France, <sup>5</sup>Université Paris Cité and Université Sorbonne Paris Nord, Inserm, INRAE, Center for Research in Epidemiology and Statistics (CRESS), F-75004 Paris, France

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** In light of the latest epidemiological and nutritional knowledge and scientific evidence supporting responsive feeding, the French feeding guidelines for 0-3 years were recently updated and nationally disseminated through a brochure and media campaign by Santé publique France. Moreover, smartphone apps become increasingly popular and are likely relevant to provide timely information across development to inform parents about child feeding practices but their effect is seldom evaluated. This randomized controlled trial (RCT) aims to investigate whether the provision of guidelines through an app and a brochure (vs. brochure alone, usual service) results in healthier parental feeding practices, infant's eating behaviours and body mass index (BMI).

**Methods:** This double-blinded monocentric 2-arm trial is conducted among first-time parents living in the area of Dijon (France) and recruited in a maternity ward. A smartphone app was developed by INRAE for the outcome evaluation and for the timely distribution of the new guidelines content: from child age 3 to 36 months, 106 age-adapted messages with dietary recommendations, educational advice, recipes and tips provided in the form of short texts and videos (intervention group only), and 36 generic messages (both groups). The primary outcome is the BMI z-score at 36 months of age. Secondary outcome measures include online parents' reports and behavioural assessments (experimental meals) of parental feeding practices and infant eating behaviours from inclusion to 36 months of age. Analyses of covariance on these outcomes will assess the effect of the intervention. Mediation and moderation analyses will explore, respectively, the mechanisms of action of the intervention and the potential moderating effect of socioeconomic, parental (attitudes and beliefs about child feeding) and infants' (general temperament) factors. Sample size was determined to be n=118 in each arm, plus 20% to compensate for potential attrition.

**Results/findings:** The first participants were enrolled in March 2022 and the recruitment is ongoing (n=110 were included on February 2023).

**Conclusions:** This is the first French RCT to assess a digital intervention targeted to first-time parents to improve feeding practices and child growth. The app may represent a potential stand-alone communication tool to complement those already disseminated to the general population.

# The feasibility of a mHealth service promoting healthy lifestyle behaviours, a mixed methods approach

**Mr. Callum Regan**<sup>1</sup>, Dr. Jenny Rossen<sup>2</sup>, Dr. Phillip Von Rosen<sup>1</sup>, Dr. Susanne Andermo<sup>1</sup>, Prof. Maria Hagströmer<sup>1,2</sup>

<sup>1</sup>Karolinska Institutet, Stockholm, Sweden, <sup>2</sup>Sophiahemmet Högskola, Stockholm, Sweden

Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Mobile health (mHealth) represents a convenient and cost-effective strategy to promote health behaviours and minimise the impact of modifiable risk factors. Yet, they suffer from high attrition rates, thus there is a need to test their feasibility. This study explored the feasibility of a co-developed mHealth service, that promotes healthy lifestyle behaviours.

**Methods:** A sample of 50 adult participants (>18 years, 82% female) from the general population, signed up to use a mHealth service for 12 weeks. The service is a mobile app, functions include: goal and activity setting, knowledge library, community, coaching and feedback. A mixed method approach was applied with quantitative data from engagement and questionnaires on usability and acceptability, and qualitative data from semi-structured interviews, focus groups, self-reported feedback, and open-ended questionnaires. Quantitative data were available for 39 participants, 9 semi-structured interviews with participants and two focus groups with six coaches/product developers from the mHealth service were completed. Descriptives were used to present quantitative data, whilst an inductive content analysis approach was used to analyse qualitative data.

**Results:** The 'goal' function was used by 25 (64%) participants, 39 (100%) participants used the 'activity' function, 14 (36%) participants used the 'community' function, 20 (51%) participants used the 'individual coach' service, whilst seven (18%) participants used the 'feedback' function, under the 12 weeks. Engagement of functions reduced towards the end of the 12-week period. The mean score for usability was 50/100 and 3.3/5 for app quality (higher scores equalling higher ratings), rated by 15 participants. Participants expressed that the service helped them focus more on physical activity and diet, but voiced suggestions for optimisation, such as improving the visibility of functions. Product developers thought that the service worked well overall, however realised that the functions need to be simplified.

**Conclusion:** This study adds knowledge to how users and stakeholders experience a health promoting mHealth service. This service was found to be feasible, however functions need to be further developed to be more user-friendly and increase interaction. Results will be pivotal for its optimisation, and potentially for the design of similar services aiming to achieve long-term health behaviour change.



# Intersectionality in Eating-Related Pathology Research: A Scoping Review

**Ms. Mikyung Lee<sup>1</sup>**, Ms. Bridgett Chau<sup>1</sup>, Dr Eun-Young Lee<sup>1</sup>

<sup>1</sup>Queen's University, Kingston, Canada

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Background:** Individuals with marginalized social identities are susceptible to eating-related pathology (EP). When multiple marginalized identities are simultaneously considered, further increased risks of EP have been reported. In addition, individuals with marginalized identities experience discrimination which could contribute to greater EP risks. As such, better understanding of EP requires consideration of intersectionality which acknowledges the specificity of individuals' intersectional experiences within the systems of privilege and oppression such as discrimination, and their impact on health.

**Purpose:** To describe the application of intersectionality in the EP research and to identify the scope and gaps in EP studies that operationalized intersectionality.

**Methods:** Literature was searched on six databases between July and October 2022. All types of research were included if they addressed EP as an outcome and their investigation was guided by intersectionality.

**Results/findings:** Of 31 articles included in the review, 20, 10, and one article used quantitative, qualitative, and mixed method, respectively. Approximately, one third of the included articles (n=10) failed to define intersectionality. Half of the articles (n=15) included social identities and discrimination as exposures while 12 articles included social identities only as exposures. The most frequently observed social identity was gender (n=26), followed by race/ethnicity (n=22) and sexual orientation (n=9). The most commonly measured aspect of discrimination was racism (n=15), followed by sexism (n=10). All qualitative (100%) and three quantitative articles (15%) examined three- or four-way intersections among social identities and discrimination. Regarding EP outcomes, body image was the only outcome in qualitative articles whereas various outcomes (e.g., bingeing, purging, disordered eating) were included in quantitative articles. All included articles highlighted compounded risks of EP caused by multiple marginalized identities and discrimination.

**Conclusions:** Intersectionality-informed EP research has advanced our understanding of the influence of multiple social identities and discrimination on EP; however, major gaps are noted. The following recommendations are provided to guide future research: 1) explicitly define and apply intersectionality as a guiding framework, 2) provide theoretical conceptualization, 3) incorporate diverse social identities and discrimination, 4) examine multiple-way interactions in quantitative research, and 5) diversify EP outcomes in qualitative research.

**Key words:** Intersectionality, eating-related pathology, body image

# Realities of health consciousness and knowledge of protein and vegetable dietary intakes in college students

**Prof. Takako Tsutsui<sup>1</sup>**

<sup>1</sup>Tokyo Women's College of Physycal Education, Tokyo, Japan

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Objective:** Knowledge of food for health promotion and disease prevention should be acquired from a young age. In particular, the knowledge of food among college students is critical as they will be the caregivers of the future and will influence their family's dietary habits in subsequent years. This study investigated the current health awareness and knowledge about the intake of protein and vegetables of female college students.

**Methods:** The investigation involved 87 Tokyo Women's College of Physical Education students who belong to the Faculty of Child Education and Physical Education. The questions covered in the investigation were the levels of consciousness of health, diet, exercise, rest, and the anticipated protein and vegetable recommendations. Questionnaires on health awareness were surveyed using a Visual Analog Scale method (VAS), and knowledge of the subject's expected protein and vegetable requirements were answered numerically.

**Results:** Consciousness of total health ( $67.3 \pm 2.9$ ) was high but the behavior toward nutrition was found to be lower than that of other health-related activities such as exercise ( $p < 0.05$ ). However, the execution of nutrition and exercise in the faculty of physical education students was higher than in child education students ( $p < 0.05$ ). The students consistently overestimated the protein recommendations advised by the Ministry of Health. In addition, the students underestimated the vegetable recommendations advised by the Ministry of Health. As a result, their protein intake was  $54.4 \pm 1.7$ g, above the recommended amount, and their vegetable intake was  $335.2 \pm 15.2$ g, slightly below the recommended amount fulfilling 95% of the Ministry of Health's recommendation.

# Associations Between Device-Estimated Bedtime, Wake-Up Time, and Time in Bed Regularities and Adults' Cardiometabolic Health Markers

**Mrs. Laura Nauha**<sup>1,3,5</sup>, Dr. Vahid Farrahi<sup>1,2</sup>, Dr. Heidi Jurvelin<sup>3,4</sup>, Prof. Timo Jämsä<sup>1,5</sup>, Dr. Maisa Niemelä<sup>1,5</sup>, Dr. Maarit Kangas<sup>6</sup>, Dr. Leena Ala-Mursula<sup>3</sup>, Prof. Raija Korpelainen<sup>3,5,7</sup>

<sup>1</sup>Research Unit of Health Sciences and Technology, Oulu, Finland, <sup>2</sup>Center for Machine Vision and Signal Analysis, Oulu, Finland, <sup>3</sup>Research Unit of Population Health, Oulu, Finland, <sup>4</sup>Northern Ostrobothnia Hospital District, Oulu, Finland, <sup>5</sup>Medical Research Center, Oulu, Finland, <sup>6</sup>Infrastructure for Population Studies, Northern Finland Birth Cohorts, Faculty of Medicine, Oulu, Finland, <sup>7</sup>Oulu Deaconess Institute Foundation sr., Department of Sports and Exercise Medicine, Oulu, Finland

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** Inconsistent sleep timing has been shown to be associated with accumulation of cardiometabolic risks, while physical activity (PA) is a protective factor. This study investigated the relationship between bedtime, wake-up time, and time in bed (TIB) regularities and cardiometabolic health markers including blood pressure, adiposity, blood glucose and insulin and cholesterol levels at mid age.

**Methods:** In Northern Finland Birth Cohort 1966 study all the 24-hour movement behaviors were measured for seven consecutive days among 3698 middle-aged participants. Bedtime, wake-up time and TIB were identified using our in-lab validated algorithm. We used seven-day standard deviations to reflect bedtime, wake-up time, and TIB regularities. As covariates in linear regression models, we used gender, education, marital status, work schedule, smoking status, alcohol risk use, seven-day mean TIB, chronotype, and sedentary time or total PA (B coefficients with 95% confidence intervals [CI]).

**Results:** Higher variability in bedtime, wake-up time and TIB associated with higher blood triglyceride levels (0.053, 95% CI [0.008, 0.099],  $p = 0.021$ ; 0.051, 95% CI [0.009, 0.093],  $p = 0.017$ ; 0.049, 95% CI [0.013, 0.085],  $p = 0.008$ , respectively). Similarly, higher variability in wake-up time and TIB were both associated with significantly higher 2-hour insulin levels (0.039, 95% CI [0.012, 0.066],  $p = 0.005$ ; 0.033, 95% CI [0.010, 0.056],  $p = 0.005$ , respectively). Higher variability in TIB was associated with higher diastolic blood pressure (0.175, 95% CI [0.044, 0.306],  $p = 0.009$ ). In addition, variability in bedtime was positively associated with waist circumference and fasting glucose levels (0.294, 95% CI [0.136, 0.451],  $p < 0.001$ ; 0.224, 95% CI [0.026, 0.422],  $p = 0.027$ ). Variability in bedtime remained positively associated with waist circumference after controlling for total PA (0.199, 95% CI [0.042, 0.356],  $p = 0.013$ ).

**Conclusion:** Bedtime, wake-up time and TIB irregularities were linked to unfavorable cardiometabolic health markers, even after adjusting for other risk factors. The results suggest that, in addition to bedtime and TIB regularity, wake-up time regularity can be important factor in cardiometabolic health and should be considered in studies and health behavioral counseling.

# Young people's active travel in National Urban Policy documents of 15 Asian countries: a documentary framing analysis

**Ms. Rizka Maulida<sup>1,2</sup>**, Dr. Andrea Smith<sup>1</sup>, Dr. Amy Weimann<sup>3</sup>, Dr. Tolullah Oni<sup>1</sup>, Dr. Esther van Sluijs<sup>1</sup>

<sup>1</sup>MRC Epidemiology Unit, University of Cambridge, Cambridge, United Kingdom, <sup>2</sup>Department of Epidemiology, Faculty of Public Health, University of Indonesia, Depok, Indonesia, <sup>3</sup>African Centre for Cities, University of Cape Town, Cape Town, South Africa

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Active travel to school is associated with higher levels of daily physical activity and is linked to gains in planetary health. However, young people's active travel is challenging in many parts of Asia due to urbanization and car-focused infrastructure. The UN-Habitat aids governments worldwide in creating national urban policy (NUP) to promote sustainable urban development, to achieve economic growth, equitable quality of life, and environmental protection. This study aimed to provide a comprehensive framing analysis of how young people's active travel is discussed in NUP documents from Asia.

**Methods:** We conducted a policy document framing analysis with thematic coding applied on NUP documents from Asian countries available on the UN-Habitat's Urban Policy Platform website. A theory-based coding framework with inductive and deductive approach was applied to identify discussions on key themes related to young people's active travel (active travel, transport, physical activity, young people, school). All documents were double-coded. A semi-quantitative heatmap was used to visualise patterns of coverage of identified themes (presence; level of policy-relevant detail discussed).

**Findings:** NUP documents from 15 out of 47 Asian countries were identified and analysed. Through the aid of the heatmap, it was shown that NUPs recognized the importance of promoting transport (11/15 countries featured moderate mentions), but discussions were high level and young people rarely considered (only 7/15 featured detailed discussion). The main themes active travel, physical activity, young people, and schools were treated as secondary considerations. Active travel was framed as a utilitarian solution for transportation issues, rather than a means of promoting well-being. Through inductive analysis, additional contextual considerations that linked to active travel, such as sustainability, natural disaster risk, pollution, and the need to limit urban congestion were identified.

**Conclusions:** Young people and their active travel behaviour were largely absent from NUP documents. This highlights the need for stronger policy frameworks to promote active travel among young people in urban areas. Such policies should be more integrated across different sectors (transport, health, education, and environment). By considering strategies to support active travel, NUPs could help create healthier and more sustainable urban environments for young people in Asia.

# The use of outdoor education to support physical activity during the school day in Swedish-language primary schools in Finland

**Ms. Nanna Wackström<sup>1</sup>**, Ms. Jenny Ray<sup>1</sup>, Ms. Josefine Björkqvist<sup>1,2</sup>, Dr. Nina Simonsen<sup>1,3</sup>

<sup>1</sup>Folkhälsan Research Center, Helsinki, Finland, <sup>2</sup>Institute of Applied Health Sciences, University of Aberdeen, Aberdeen, United Kingdom, <sup>3</sup>Department of Public Health, University of Helsinki, Helsinki, Finland

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** N. Other

**Purpose** Schools are important arenas for promoting physical activity (PA) among children. Outdoor education (OE) has in previous studies been identified as a teaching method associated with increased PA during the school day. The national curriculum for basic education in Finland emphasizes the use of various teaching methods and learning environments. Still, very little is known about the use of OE in Finland. The aim of this study was to survey the use of OE to support PA during the school day in Swedish-language primary schools in Finland and to identify possible barriers to OE.

**Methods** This study is part of the LärMiljö (Learning Environment) study. Data was collected through national web-based surveys among principals and teachers in Swedish-language primary schools in Finland. The surveys were answered by principals from 82 schools (76 principals, 42% response rate at school level) and 134 teachers from 44 schools. Descriptive statistics on OE use and perceived barriers to OE are presented.

**Results** Preliminary findings show that OE is used to some extent in 97% of the schools, but regularly in 41%, as reported by the principals. In the schools using OE regularly, OE is used by most or all of the teachers in 50% and at least weekly in 31% of the schools. A fifth of the responding teachers reported that they use OE regularly. Of teachers using OE, 24% reported using it weekly. Lack of time and teachers' motivation were the most frequently reported barriers to OE use by both principals and teachers. Only a few principals and 24% of the teachers saw the local environment as a barrier to OE. Overall, principals reported less barriers than teachers.

**Conclusions** OE is used as a teaching method in Swedish-language primary schools in Finland, though the frequency of OE use varies among schools. In this study, teachers highlighted lack of time as an important barrier to implementing OE, this being in line with other international studies. Further research into teachers' perspectives on factors that support OE is needed to broaden understanding of OE implementation and thus increasing children's PA during the school day.

# The health-related lifestyle habits of Sámi in Sweden: the SámiHET study

**Dr. Lena Maria Nilsson**<sup>1,2</sup>, Prof. Miguel San Sebastián<sup>1</sup>, Dr. Jon Petter A Stoor<sup>1,3</sup>

<sup>1</sup>Department of Epidemiology and Global Health, Umeå University, Umeå, Sweden, <sup>2</sup>Arctic Centre at Umeå University, Umeå, Sweden, <sup>3</sup>Centre for Sami Health Research, UiT - the Arctic University of Norway, Tromsø, Norway

Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM

**SIG - Primary Choice:** N. Other

**Purpose** Little is known about the lifestyle habits of the Indigenous Sámi in Sweden. This study investigates this through examining ethnic differences among Sámi and the general Swedish population, 18-84 years.

**Methods** Data from two self-reported national population-based public health surveys conducted spring 2021 were used; the Swedish HET and the SámiHET. Lifestyle habit indicators included everyday physical activity, sedentary behaviour, intake of fruit & berries, intake of vegetables, and weekly frequency of sweetened drinks, and fish/shellfish. Some substance use indicators were also included; risky alcohol consumption, daily tobacco use (smoking and snus), and cannabis use during the last 12 months. Sex-stratified prevalence and prevalence ratios (95% CI) were calculated.

**Results** Adjusted for age and education, no ethnicity-related differences in prevalence ratios were found concerning daily physical activity. However, Sámi reported less daily intake of fruit & berries (male PR=0.85, female PR= 0.84), less daily intake of vegetables (male PR=0.84, female PR= 0.88), less weekly intake of fish/shellfish (female PR= 0.91), more weekly intake of sweetened drinks (female PR= 1.13), and more daily use of snus (male PR= 1.51, female PR 2.38). Furthermore, Sámi also reported less everyday sedentary behaviour (male PR=0.71, female PR= 0.89), less risky alcohol consumption (male PR= 0.79), less daily smoking (male PR=0.5), and less cannabis consumption (male PR= 0.63).

**Conclusion** To our knowledge, the findings in this study represent the first ever national Swedish mapping of health-related lifestyle habits among Sámi. Based on the findings, Sámi in Sweden are less likely to live a sedentary lifestyle but may need support to develop healthier food habits. Also, potential prejudices concerning Sámi men as having more problem with substance use than men in general are thoroughly disproved.



# The lifestyle habits of young adult Sámi: the SámiHET study

**Mr. Nils-Mikael Nilsson<sup>1</sup>**, Dr. Lena Maria Nilsson<sup>1,2</sup>, Prof. Miguel San Sebastián<sup>1</sup>, Dr. Jon Petter A Stoor<sup>1,3</sup>

<sup>1</sup>Department of Epidemiology and Global Health, Umeå University, Umeå, Sweden, <sup>2</sup>Arctic Centre at Umeå University, Umeå, Sweden, <sup>3</sup>Centre for Sami Health Research, UiT - the Arctic University of Norway, Tromsø, Norway

Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM

**SIG - Primary Choice:** N. Other

**Purpose** Little is known about the lifestyle habits of the Indigenous Sámi people, and even less as regards Sámi youth. This study investigates health related lifestyle habits through examining ethnic differences among young adult Sámi, 18-29 years, and peers in the general Swedish population.

**Methods** Self-reported lifestyle indicators from a Swedish national survey, Health on Equal Terms, were compared to the same indicators from the Sámi Health on Equal Terms survey, both conducted in spring 2021. Indicators included time spent on everyday physical activity, sedentary behaviour, daily intake of vegetables, fruit and berries, and drink frequency of soda and sweetened beverages per week. Also, substance use indicators included daily smoking and snus consumption, as well as risk consumption of alcohol. Prevalence and prevalence ratios (PR) with their 95% confidence intervals were calculated.

**Results** When adjusted for sex, age, civil status, education, and income, three out of the eight health outcomes differed depending on ethnicity (Sámi vs non-Sámi). Sedentary behaviour more than 10 hours per day was less common in the Sámi population (PR=0.75; 95% CI: 0.62-0.90) compared to the non-Sámi population. The Sámi group have a 1.27 times higher prevalence of eating vegetables <1 time/day (95% CI: 1.11-1.44), and the snus consumption among Sámi was 1.63 times as high as the non-Sámi (95% CI: 1.32-2.00).

**Conclusion** The findings show that the young adult Sámi struggle with getting enough vegetables into their diet, and that they have a higher consumption of snus. However, the lower prevalence of sedentary behaviour may be indicative of a healthier lifestyle among young Sámi. To our knowledge, these results represent the first ever study on health-related lifestyle habits among the young Sámi in Sweden, with the exception of substance use. The results are valuable when prioritising the need for public health interventions in this context.

# Healthy food in out-of-school-hours care (OSHC): evaluation of a competence program among OSHC employees in Norway

**Associate Professor Cecilie Beinert<sup>1</sup>**, Associate Professor Margrethe Røed<sup>1</sup>, Prof. Frøydis Nordgård Vik<sup>1</sup>  
<sup>1</sup>University of Agder, Kristiansand, Norway

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Enhancing the diet quality of children are of great importance as their diet will have both short- and long-term health effects. Out-of-school-hours care (OSHC) are offered to all children in year 1-4 in primary school in Norway and shall facilitate daily mealtimes. However, studies show that food offered in OSHC varies. To promote healthy food practices in OSHC, a non-profit foundation, Geitmyra Culinary Centre for Children, has developed a practical course to enhance the competence of OSHC employees, aiming to improve the food and meal practice within the framework (economy, time, facilities) of the OSHC. The aim of this study is to evaluate the course developed and conducted by Geitmyra.

**Methods:** A total of 6 schools in southern Norway participated in the course in the fall of 2021 and 2022. In 2021, the first two schools served as pilot-schools. After an evaluation, four schools participated in a revised version of the same course in the fall of 2022. For all schools, the course lasted for 3 months and consisted of a practical course day at Geitmyras facilities, followed by practical guidance at each SFO. The course also included a start-up meeting, evaluation meeting halfway through, and a close-up meeting in the end. Counselling, recipes, materials, and network meetings was provided throughout the course period. Qualitative and quantitative methods will be used to evaluate the course regarding its impact on OSHC food and meal practices. Interviews with the OSHC leaders and employees will be conducted and analyzed using thematic analysis. In addition, to get an objective measure on possible changes in their food purchase before and after the course, all food receipts from January to May (2021 to 2023) will be collected and analyzed to look for potential changes in primarily fish, fruit, and vegetable purchase. Comparative analysis using IBM SPSS statistics will be used to analyze these data.

**Results:** Data collection and analysis are still ongoing and is not finalized. See method section for analysis plan.

**Conclusion:** This study will yield valuable insight into how improve the food quality in out-of-school-hours care.

# The use of mobile phone is associated with unhealthy behaviors and educational variables: a study with Spanish adolescents

**Dr. Vicente J. Beltrán-Carrillo<sup>1</sup>**, Dr. Alejandro Jiménez-Loaisa<sup>2</sup>, Dr. Eva León-Zarceño<sup>3</sup>, Dr. Palma Chillón-Garzón<sup>4</sup>, Dr. José Antonio Jiménez-Barbero<sup>5</sup>, Dr. David González-Cutre<sup>1</sup>

<sup>1</sup>Department of Sport Sciences. Sports Research Centre. Miguel Hernández University of Elche, Elche, Spain, <sup>2</sup>Department of Didactics of Physical Education, Artistic and Music. Faculty of Education. University of Castilla-La Mancha, Toledo, Spain, <sup>3</sup>Department of Behavioural Sciences and Health. Miguel Hernández University of Elche, Elche, Spain, <sup>4</sup>Department of Physical Education and Sports, Faculty of Sport Sciences, Sport and Health University Research Institute (iMUDS), University of Granada, Granada, Spain, <sup>5</sup>Department of Nursing. Faculty of Nursing. University of Murcia, Murcia, Spain

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** The new generation of mobile phones (smartphones) has become nowadays a very popular screen media among adolescents. The multiple functions offered by these devices represent fascinating opportunities, but also a matter of concern. Therefore, the aim of this study was to analyze whether the use of mobile phone is related to different health behaviors and educational variables among adolescents.

**Methods:** A correlational study was carried out with 307 adolescents (159 boys and 148 girls;  $M_{age} = 13.95$  years,  $SD = 1.28$ ) from a secondary school located in Elche (Spain). The following variables were measured: Physical activity (PAQ-A questionnaire), adherence to a healthy Mediterranean diet (KIDMED questionnaire), consumption of tobacco, alcohol, and other drugs (HBSC questionnaire), agility and movement skill (CAMSA test), attitudinal beliefs towards violence in educational centers (CAHV-25 questionnaire), and academic performance (mean of marks in the different subjects, provided by the school center). A multiple regression analysis was done, controlled by gender, with mobile phone use as dependent variable, and the rest as independent variables.

**Results:** The multiple regression analysis was significant ( $F_{(10, 280)} = 6.511$ ,  $p < 0.001$ , adjusted  $R^2 = 0.164$ ). Girls spent more minutes per day on mobile phones than boys ( $\beta = .245$ ,  $p < .001$ ). Adolescents who showed higher attitudinal beliefs towards violence ( $\beta = .174$ ,  $p < .01$ ), lower academic performance ( $\beta = -.192$ ,  $p < .01$ ) and higher alcohol consumption ( $\beta = .230$ ,  $p < .01$ ) spent more time on mobile phones. No more significant relations were found.

**Conclusions:** The use of mobile phone seems to be associated with adolescents' health and education. Future school-based interventions for the promotion of a proper use of mobile phones by adolescents are desirable.

# Young People's Participation in Organized Physical Activity and Sport and Active and Sedentary Behaviors: The Role of Gender and School Educational Level

**Dr. Alejandro Jiménez-Loaisa<sup>1</sup>**, Dr. Javier Valenciano-Valcárcel<sup>1</sup>, Dr. Alexandra Valencia-Peris<sup>2</sup>, Dr. Javier Sevil-Serrano<sup>3</sup>

<sup>1</sup>Department of Didactics of Physical Education, Artistic and Music. Faculty of Education. University of Castilla-La Mancha. , Toledo, Spain, <sup>2</sup>Department of Teaching of Physical Education, Arts and Music. Faculty of Teacher Training. University of Valencia., València, Spain, <sup>3</sup>Department of Didactics of Musical, Plastics and Corporal Expression. Faculty of Teacher Training. University of Extremadura., Cáceres, Spain

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** N. Other

**Purpose:** This work explores gender- and educational level-based differences in physical activity (PA) and leisure-time sedentary behaviors of schoolchildren according to their (non)participation in organized PA and sport (PAS).

**Methods:** A total of 1968 schoolchildren (47.8% girls, 42.6% middle school), aged 10-15 years from 34 schools, completed the PAQ and the YLSBQ questionnaires to measure their habitual PA and sedentary behaviors. Children were defined as “participants” or “non-participants” according to their engagement in organized PAS. Differences in outcome variables were assessed using Student's T tests and analyses of covariance.

**Results:** Schoolchildren who engaged in organized PAS reported significantly higher PAQ total scores (+0.2 [95%CI: 0.22, 0.34]), less recreational screen time (−29.1 min/d [95%CI: −44.30, −13.76]), less time in academic tasks (−13.3 min/d [95% CI: −24.92, −2.25]), and on total sedentary time (−56.1 min/d [95%CI: −89.82, −22.35]) than their non-participant peers. Boys and girls who participated in organized PAS had significantly higher PAQ total scores than their non-participating peers ( $p<0.01$ ). Boys who participated in organized PAS spent less screen time (−39.5 min/d [95%CI: −60.7, −18.2]) than non-participating boys while girls who took part in organized PAS spent less sedentary time socializing (−27.0 min/d [95%CI: −48.2, −5.7]), in other sedentary activities (−13.6 min/d [95%CI: −26.1, −1.1]) and on total sedentary time (−65.8 min/d [95%CI: −119.2, −12.4]) than non-participant girls. Primary and secondary students who participated in organized PAS had significantly higher PAQ total scores compared to their non-participant peers ( $p<0.01$ ). No significant differences were found between participating and non-participating primary school students in leisure-time sedentary behaviors. However, participating secondary students spent less screen time (−34.8 min/d [95% CI: −54.9, −14.8]), doing sedentary academic tasks (−19.8 min/d [95%CI: −36.8, −2.8]), socializing sedentary time (−20.2 min/d [95%CI: −40.0, −0.3]), in other sedentary activities (−14.2 min/d [95%CI: −26.4, −2.0]), and on total sedentary time (−89.0 min/d [95%CI: −133.9, −44.2]) than non-participating secondary students.

**Conclusions:** Participation in organized PAS appears not only to increase PA levels in both genders and educational stages, but also to decrease some sedentary behaviors in secondary school students.

# Cultural considerations in health messaging for physical activity interventions – A comparison of the meaning of health to Chinese and UK school-aged children

**Dr. Fiona Chun Man Ling**, Dr. Eleanor Pui Kei Cheung

<sup>1</sup>Northumbria University, Newcastle, United Kingdom, <sup>2</sup>The Education University of Hong Kong, Hong Kong, Hong Kong

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** According to the health promotion model, a vital step to effective health promotion is understanding the target population's health experiences and their value about health, i.e. what health means to them. For physical activity (PA) interventions targeting children, often the value of PA/health was 'preached' by researchers or public health practitioners, thus lacking relevance to the target population, particularly to inactive children, which might have contributed to the futility of PA interventions. Given that health behaviours are contextual, cultural differences in the meaning of health is expected. Therefore, the aim of the study is to qualitatively explore the meaning of health to Chinese and UK children.

**Methods:** Chinese children aged 6-12yrs (n=320) and UK children aged 6-11yrs (n=146) were recruited from local primary schools in Hong Kong and in the UK respectively. All participants wore a pedometer for 3 consecutive weeks for habitual PA measurement. Focus groups were formed based on participants' PA level (highest vs lowest quartile), study year group and sex. Altogether 22 focus groups were formed for the Chinese participants and 20 for the UK participants. Semi-structure focus group discussions on the meaning of health took place at respective schools. During the discussions, participants were asked to depict their answers in drawing to promote engagement.

**Findings:** Common themes from both groups are physical health and cognitive health. For physical health, lower-ordered themes include optimal body functioning, absence of illness and having 'energy' – all were valued for the purpose of developing independence. The oldest Chinese children also expressed weight status represents health. Under cognitive health, UK children considered the ability to make appropriate lifestyle decisions and creativity as being healthy, whereas for Chinese children, being alert and free from worries was considered healthy. Themes not shared are social health (i.e. being with friends, UK children) and mental health (i.e. being relaxed and in good mood, Chinese children).

**Conclusion:** This study highlighted the similarities and differences in the meaning of health to children of different cultural backgrounds. In future PA interventions, promoting PA through health messages that resonate with children's health values may enhance their effectiveness.

# The Association Between Daycare Attendance and Screen Time in Preschool-Aged Children

**Ms. Hannah Parker<sup>1</sup>**, Dr. Sarah Burkart<sup>1</sup>, Dr. Layton Reesor-Oyer<sup>1</sup>, Mrs. Michal T. Smith<sup>1</sup>, Ms. Lauren von Klinggraff<sup>1</sup>, Mr. Roddrick Dugger<sup>1</sup>, Mr. James W. White III<sup>1</sup>, Ms. Olivia Finnegan<sup>1</sup>, Ms. Meghan Bastyr<sup>1</sup>, Dr. Christopher D. Pfledderer<sup>1</sup>, Dr. Elizabeth L. Adams<sup>1</sup>, Dr. R. Glenn Weaver<sup>1</sup>, Dr. Michael W. Beets<sup>1</sup>, Dr. Bridget Armstrong<sup>1</sup>

<sup>1</sup>University of South Carolina, Columbia, USA

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Excessive screen time is associated with negative health outcomes (e.g. obesity, cardiometabolic health.) in childhood and across the lifespan. Health behaviors, such as screen time, are variable each day. Identifying day-level contextual factors that influence the amount of time children spend on screens may help identify potential targets for improving children's screen time. Daycare, a common form of daily structure, is a day-level contextual factor that may be related to children's screen time by reducing opportunities to engage with screens. The purpose of this study was to examine the between- and within-person effect of daycare on screen time in preschool-aged children.

**Methods:** Participants included 74 caregivers (e.g., parents) and their preschool-age children (4.7±0.9 yrs, 48.3% female, 63.2% White). Caregivers completed daily texted surveys about the number of hours their child used a screen and whether their child attended daycare that day over a 14-day period. We used linear mixed-effects models to predict screen time from daycare attendance. Daycare attendance was treated as a day-level binary variable (attended vs. did not attend). We included child age, sex, and household income as covariates. Weekends were excluded from analysis.

**Results:** Caregivers reported an average of 3.6±2.2 (range = 0.5-13.2) hours per day of child screen time and children attended daycare on 68.5% of days (range = 0-11; Mean = 6.0; Median = 7.0). Compared to children who never attended daycare, children who always attended daycare had 2.2 hours (95%CI = -3.5, -0.8) less screen time on a given day. On days when children attended daycare, they had 1.9 hours (95%CI = -2.3, -1.5) less screen time compared to days that they did not attend daycare.

**Conclusion:** Children who consistently go to daycare spend significantly less time on screens compared to children who never attend daycare. Furthermore, on days when children do attend daycare, they have significantly less screen time. Ultimately, daycare might be leveraged as an intervention to positively impact preschoolers screen time.



# Outcomes and implementation factors facilitating and hindering a community-wide campaign on the U.S./Mexico Border

**Dr. Belinda Reininger<sup>1</sup>**, Ms. Lisa Mitchell-Bennett<sup>1</sup>, Dr. Minjae Lee<sup>3</sup>, Dr. Natalia Heredia<sup>2</sup>, Ms. Soo Kyung Park<sup>2</sup>, Mr. Tianlin xu<sup>2</sup>, Ms. Rebecca Lazoya<sup>1</sup>, Dr. Paul Yeh<sup>1</sup>, Ms. Amanda Dave<sup>1</sup>, Ms. Myrrinah Martinez<sup>1</sup>, Ms. Alma Ochoa Del Toro<sup>1</sup>

<sup>1</sup>UTHealth Houston School of Public Health, Brownsville, USA, <sup>2</sup>UTHealth Houston School of Public Health, Houston, USA, <sup>3</sup>UT Southwestern, Dallas, USA

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** This study describes the dynamic factors contributing to and hindering the scaling and sustainability of a community-wide campaign (CWC) to 11 municipalities over 8 years on the U.S./Mexico Border. The CWC is a large-scale physical activity and nutrition intervention including media, social support, education, outreach, risk factor screenings, environmental and policy changes.

**Methods:** We conducted a thematic analysis based on qualitative interviews with municipal leaders, staff implementing the program, and community leaders (average of 27 per year) between 2016 – 2022. The Consolidated Framework for Implementation (CFIR) (2009, 2022) informed the interview guide and analysis. To measure quantitative outcomes, each year, participants from every community were enrolled and followed, measuring level of engagement. We examined changes from baseline to last visit for fruit and vegetable consumption and self-reported physical (meeting guidelines) using multivariable linear and logistic regression analyses, respectively adjusting for participants' baseline data and duration of follow-up.

**Results:** Qualitative themes identified factors influencing the scaling and sustainability of the CWC. Under the Implementation Process Domain, constructs such as teaming, adapting strategies, and reflection and evaluation were facilitators. Barriers were identified under the Outer and Inner Setting Domains including critical incidents, performance-measurement pressure, and relative priority of the intervention; and from the Individual Domain changes to personnel. Each year of the CWC approximately 3000 outreach visits were conducted. Each week, approximately 200+ diverse, free exercise offerings in 24 community-based locations across the municipalities were offered.

Quantitative assessment of effectiveness compared highly engaged versus lower engaged participants. Among 6092 participants, those who were highly engaged in the program (n=1126) had 0.67 portion increase in fruit and vegetable intake compared to the low engagement group (adjusted mean change from baseline to last visit: 1.4 vs. 0.73;  $p<.0001$ ) and were more likely to meet moderate to vigorous physical activity (MVPA) guidelines (adjusted odds ratio=1.46;  $p=0.0002$ , among 3651 participants who did not meet MVPA guideline at baseline).

**Conclusions:** This study uses CFIR to provide insight into the multi-year scaling and sustainability efforts in persistent poverty municipalities where despite barriers, a sustained CWC intervention was associated with increased PA and fruit and vegetable consumption.

# Te Hau Kori: Addressing the gap between physical activity research, policy and practice through organisational co-design and genuine partnership

**Dr. Justin Richards<sup>1</sup>**, Dr. Oliver Wilson<sup>1</sup>, Dr. Lara Andrews<sup>1</sup>, Mr. Paora Te Hurihanganui<sup>1</sup>, Ms. Alana Hamill<sup>1</sup>, Associate Professor Geoff Kira<sup>1</sup>

<sup>1</sup>Te Hau Kori, Victoria University of Wellington, Wellington, New Zealand

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose** Research on physical activity (PA) promotion has progressed remarkably in the past fifty years. However, much of the evidence generated has not manifested into substantive improvements in population wellbeing. This is particularly the case for groups experiencing widespread inequities, such as Māori (i.e. Indigenous people of Aotearoa New Zealand (NZ)). We posit that this stems from fractured relationships among the institutional ternion of government, academia and delivery agencies in the PA sector. Our aim was to examine these relationships and identify alternative approaches to addressing the gaps observed.

**Methods** We undertook a pragmatic partnership and co-design approach to exploring the perspectives of key stakeholders in regard to the observed discordance among PA researchers, policy-makers and practitioners in NZ. This encompassed working with representatives from the institutional ternion and key communities experiencing inequities in NZ, including Māori. Our approach was informed by an engagement framework from Te Arawhiti (Office for Māori Crown Relations) and a research framework from Te Hiringa Hauora (Health Promotion Agency).

**Results** Historical interactions among PA stakeholders were largely characterised as “consultation” (policy-makers), “collaboration” (researchers) and/or “informing” (practitioners). Although these terms are often used interchangeably, they represent distinct types of inter-institutional engagement. Importantly, none of these engagement types align with the true “partnership” approach that stakeholders believe is necessary to address the identified gaps in research translation and ongoing inequities in PA participation in NZ. Specifically, the participating stakeholders called for a genuine “co-design” approach to the development of policy- and practice-relevant research projects and PA promotion training programmes. Te Hau Kori (Centre for Physical Activity and Wellbeing) has been established as a cross-sectoral and cross-cultural partnership with this explicit purpose.

**Conclusions** Discordance among the institutional ternion underpinned the establishment of Te Hau Kori, which has three priorities: a) Improve PA promotion workforce training; b) Facilitate research translation and relevance; c) Privilege Indigenous knowledge alongside conventional science. Addressing these through genuine partnerships and co-design is intended to transcend institutional competition and enable broader cross-sectoral focus on the ultimate objective, population wellbeing through PA.

# Aotearoa New Zealand Physical Activity Recommendations: Past, present, and future

**Dr. Oliver W. A. Wilson<sup>1</sup>**, Associate Professor Geoff Kira<sup>1</sup>, Dr. Lara Andrews<sup>1</sup>, Associate Professor Justin Richards<sup>1,2</sup>

<sup>1</sup>Te Hau Kori, Faculty of Health, Te Herenga Waka Victoria University of Wellington, Wellington, New Zealand,

<sup>2</sup>Sport New Zealand Ihi Aotearoa, Wellington, New Zealand

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** To examine the history of physical activity recommendations used in Aotearoa New Zealand (NZ), which stakeholders stated or implied recommendations, and how recommendations were developed.

**Methods:** Historical literature was reviewed to identify instances where government (Ministry of Health Manatū Hauora, Ministry of Education Te Tāhuhu o te Mātauranga, Waka Kotahi Transport Authority, Sport NZ Ihi Aotearoa (formerly Sport and Recreation New Zealand (SPARC), and before that Hillary Commission) and non-government (Heart Foundation, Cancer Society, and Mental Health Foundation) stakeholders stated or implied physical activity recommendations. Sources included within our review included: strategic plans, position statements, and reports. Information extracted included the: organisation; date of publication(s); the intensity, duration, and frequency of recommendations (stated or implied); and, evidence upon which recommendations were based.

**Results:** Recommendations for young people and adults have historically been, and continue to be, developed and disseminated separately. Adult recommendations can be traced back to the early 1990's based on the American College of Sports Medicine's 1978 guidelines. Though the guidelines have been based on the 1996 US Surgeon General's Report on Physical Activity and Health since the late 1990's, considerable variation within and between stakeholders is evident within sources and over time. Young people recommendations were first alluded to in 2001. In 2007 SPARC offered recommendations for young people, but in the years prior and since the Manatū Hauora have focussed on active transportation and screen time in their reporting of young people's 'physical activity' behaviours, implying screen time recommendations sporadically. Manatū Hauora published the most recent young people physical activity recommendations, which encompassed physical activity, sedentary behaviour, and sleep, in 2017 based largely on the Canadian 24-hour movement guidelines. Of the current physical activity recommendations for young people and adults, stated or implied across stakeholders, none quite align with the most recent ones communicated by the World Health Organisation.

**Conclusions:** Our findings suggest that there is a need to establish a cross-agency national plan to develop and disseminate physical activity recommendations for all ages to ensure that a cohesive message is delivered and that finite resources are not used to duplicate work.

# Feasibility and Impacts of a Childcare-Based Physical Activity Program in Children from Migrant and Seasonal Agricultural Worker Families in the Rio Grande Valley Region USA

**Dr. Zenong Yin<sup>1</sup>**, Dr. Melissa Valerio-Shewmaker<sup>2</sup>, Dr. Maria Valle<sup>3</sup>, Dr. Vanessa Errisuriz<sup>4</sup>, Mr. Jessh Mondesir Mavoungou<sup>1</sup>, Ms. Jill Johnstone<sup>1</sup>, Ms. Shiyu Li<sup>5</sup>, Mr. Christophor Huong<sup>1</sup>, Ms. Vanessa Estrada-Coats<sup>1</sup>, Dr. Alberto Cordova<sup>1</sup>, Dr. Deborah Parra-Medina<sup>4</sup>

<sup>1</sup>University of Texas San Antonio, San Antonio, USA, <sup>2</sup>UT School of Public Health, Houston, USA, <sup>3</sup>United Migrant Opportunity Services (UMOS), McAllen, USA, <sup>4</sup>University of Texas at Austin, Austin, USA, <sup>5</sup>UT Health San Antonio, San Antonio, USA

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** N. Other

**Background.** Children from migrant and seasonal agriculture worker (MSAW) families are at increased risk for physical inactivity. This study reports the feasibility and impacts of a pilot childcare-based program to increase physical activity (PA) and reduce sedentary behavior (SED) for children enrolled in the Migrant and Seasonal Head Start (MSHS) Program, a federal childcare program for MSAW families in the Rio Grande Valley region, Texas, USA.

**Methods.** Participants were 42 children (2-5 years old) from one MSHS center. Findings from a needs assessment of the MSHS center managers informed the 6-week pilot program (10/31/2022-12/9/2022), which included 1) the adoption of evidence-based guidelines and strategies for PA, SED, and gross motor development, 2) a 20-hour teacher training program, and 3) the provision of curricular resources, equipment for outdoor and indoor play, and instruction technologies. Teachers completed weekly evaluations and a post-study evaluation to assess the program's feasibility and acceptability. Accelerometry measured the time spent in light, moderate, and vigorous physical activity (LMVPA), SED, and step counts in randomly selected children during center hours (8:30am-2:30pm) pre-intervention and weeks 1-3 and 4-6 of the intervention. In addition, children's gross motor skills (jumping, galloping, ball kicking, and underarm ball rolling) were assessed pre-and post-intervention.

**Results.** Weekly evaluations indicated that teachers adhered to 35%-75% of the evidence-based guidelines and strategies. In the post-study evaluation, teachers' satisfaction with curricular resources, training program, and intervention strategies, and teachers' report on children's satisfaction with the pilot program activities ranged between 9.0 to 9.5 on an 11-point scale. The daily percentage of time in SED decreased from 73.5% (SD .03) to 59.5% (SD .03); the daily percentage of time in LMVPA increased from 26.4% (.03) to 40.4% (SD .03), and step counts risen from 3956 (SD 590) to 4842 (SD 484) across the three measurement time points ( $p < .001$  for all three measures). In addition, children's raw scores (range 0-12) of gross motor skill development increased from 6.04 (SD 2.69) to 9.97 (SD 2.38) from baseline to the end of the program ( $p < .001$ ).

**Conclusion.** Future studies should replicate the pilot program in an RCT to test its efficacy.

# Exploring the Relationship Between Maternal Sleepiness During and After Pregnancy with Breastfeeding Intentions and Attitudes and Infant Feeding Behaviors

**Dr. Tayla von Ash<sup>1</sup>**, Ms. Anna Alikhani<sup>1</sup>, Ms. Paola Solano<sup>1</sup>, Ms. Melanie Morales<sup>1</sup>, Ms. Selena Evora<sup>1</sup>, Dr. Katherine Sharkey<sup>1</sup>, Dr. Patricia Risica<sup>1</sup>

<sup>1</sup>Brown University, Providence, USA

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** G. Children and families

**Objective:** This exploratory secondary analysis examines the association between maternal sleepiness, both during pregnancy and after birth, with breastfeeding intentions, attitudes, and behaviors, as well as infant feeding practices at six months postpartum among a sample of low-income, tobacco smoke-exposed women in the United States.

**Methods:** We used the Epworth Sleepiness Scale (ESS) to examine maternal sleepiness at three timepoints (early pregnancy, late pregnancy, and six months postpartum), breastfeeding intentions and attitudes (the latter measured using the Mitra index) during pregnancy, and breastfeeding behavior and infant feeding practices (the latter measured using the Infant Feeding Questionnaire) postpartum. We used Pearson's correlations, t-tests, and analysis of variance (ANOVA) to assess descriptive statistics. Logistic regressions were used to examine the relationship between excessive sleepiness ( $ESS \geq 10$ ) and breastfeeding intentions and behavior. Generalized linear regressions were used to examine associations between excessive sleepiness and breastfeeding attitudes prenatally and infant feeding practices postpartum. Analyses adjusted for age, race/ethnicity, parity, marital status, and maternal education.

**Results:** Three quarters (76%) of the sample had intentions to breastfeed during both early and late pregnancy. However, 61% of the sample-initiated breastfeeding after birth, with 39% still breastfeeding at 12 weeks postpartum and only 10% still breastfeeding at 6 months postpartum. Excessive sleepiness in late pregnancy was associated with overall less favorable breastfeeding attitudes ( $B: -.19 [-.36, -.02]$ ) and embarrassment barriers, in particular ( $B: -.55 [-.87, -.24]$ ). At six months postpartum, excessive sleepiness was associated with lower likelihood of using food to calm infant fussiness ( $B: -.39 [-.77, -.02]$ ), but not after adjusting for age, race/ethnicity, parity, marital status, and maternal education. We did not find an association between excessive sleepiness with breastfeeding intentions or behavior.

**Discussion:** Our findings suggest that sleepiness during pregnancy might impact breastfeeding attitudes. More studies in diverse samples are needed to further explore relationships between not only maternal sleepiness, but also sleep quality and duration, with infant feeding attitudes and behavior.

# Validating the AX3 wearable sensor for assessing energy expenditure

**Mr. Tobias Cox**<sup>1</sup>, Dr. Tom Stewart<sup>1</sup>, Mr. Ben Smith<sup>1</sup>, Dr. Charlotte Jelleyman<sup>1</sup>, Prof. Scott Duncan<sup>1</sup>

<sup>1</sup>Auckland University of Technology, Auckland, New Zealand

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** Triaxial accelerometers are commonly used to measure physical activity behaviours. However, there is uncertainty surrounding the validity of accelerometers to accurately quantify energy expenditure and physical activity intensity, particularly given the lack of standardised data processing and analysis procedures. This study aimed to determine which accelerometer-derived metric most accurately predicted energy expenditure, and whether combining thigh and back accelerometers improved predictive accuracy.

**Methods:** Twenty-one adults (11 males, aged  $26.1 \pm 5.02$  years) were equipped with a COSMED K5 indirect calorimetry unit and two Axivity AX3 accelerometers placed on their thigh and lower back. They each performed a series of seven activities ranging from lying (intensity = 1–2 Metabolic Equivalents, METs) to running (intensity = 15–20 METs). The breath-by-breath K5 data were interpolated and METs were averaged over 5-second intervals. From the raw AX3 data, the Euclidean Norm Minus One (ENMO), Mean Absolute Deviation (MAD), ActigraphCounts, and ENMO-absolute (ENMOa) accelerometer metrics were calculated for each 5-second interval. The K5 and AX3 data were then merged and labelled with the corresponding activity type based on the timestamp. A series of linear mixed models were used to determine the predictive accuracy of each metric at 5-second intervals.

**Results:** The MAD metric from the back sensor displayed the highest single-sensor accuracy (RMSE = 0.921; the average error in METs). Similarly, the ENMO (RMSE = 0.959) and ENMOa (RMSE = 0.964) metrics were more accurate when obtained from the back when compared to the thigh (RMSE = 0.979, 0.987, respectively). When thigh and back sensors were combined, energy expenditure estimates were more accurate (e.g., single back ENMO RMSE = 0.959 vs. combined ENMO RMSE = 0.852). However, there were no clear differences between ENMO, ENMOa, and MAD after sensors were combined.

**Conclusion:** Different accelerometer metrics predicted energy expenditure with varying accuracy, with the back location tending to be more accurate than the thigh. Combining both thigh and back sensors resulted in approximately 10% higher accuracy. These linear models could be used to estimate energy expenditure with approximately 0.85–0.95 METs of error depending on whether one or two accelerometers are used.



# Parental role-modelling on 24-hour movement behaviours among preschoolers during the COVID-19 pandemic

**Miss Jie Feng**<sup>1</sup>, Prof. Asaduzzaman Khan<sup>2</sup>, Prof. Patrick Wing Chung Lau<sup>1,3</sup>, Dr. Wendy Yajun Huang<sup>1,4</sup>  
<sup>1</sup>Department of Sport, Physical Education and Health, Hong Kong Baptist University, Hong Kong, China, <sup>2</sup>School of Health and Rehabilitation Sciences, The University of Queensland, Brisbane, Australia, <sup>3</sup>Laboratory of Exercise Science and Health, BNU-HKBU United International College, Zhuhai, China, <sup>4</sup>Dr Stephen Hui Research Centre for Physical Recreation and Wellness, Hong Kong Baptist University, Hong Kong, China

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** The coronavirus (COVID-19) pandemic has resulted in children having a more sedentary lifestyle and increased family time. However, little is known about the relationships between parents' and children's 24-hour movement behaviours during the pandemic. Such knowledge may aid the development of strategies to promote healthy lifestyles for preschoolers. This study examined the association between the 24-hour movement behaviours of parents and their preschool children and investigated sex differences in this association.

**Methods:** A total of 1,740 preschoolers (4.5 ± 0.8 years old, 50.3% boys) and their parents (35.4 ± 4.9 years old, 24.3% males) in China participated in this study and provided valid and complete data. Parents completed an online survey or a written questionnaire in the period between October and December 2020. Preschoolers' and parents' movement behaviours (physical activity [PA], sedentary behaviour [SB], screen time, and sleep) and demographic information were reported by the parents. Generalised linear models and logistic regression models were used to examine the associations between the parents' and preschoolers' movement behaviours.

**Results:** Positive associations were found between parents' and preschoolers' moderate-to-vigorous intensity PA ( $\beta = 0.28$ ; 95% confidence interval [CI]: 0.20, 0.36), total PA ( $\beta = 0.21$ ; 95% CI: 0.17, 0.24), and sleep ( $\beta = 0.05$ ; 95% CI: 0.03, 0.06) with no apparent sex difference. No significant relationships were found between parents' and preschoolers' SB or screen time. Girls were more likely to meet all three 24-hour movement guidelines when their parents met them (odds ratio = 2.38; 95% CI: 1.42, 4.01), but the relationship was not significant for boys.

**Conclusions:** Parental role-modelling was positively associated with children's PA and sleep. This finding suggests that supporting parents' movement behaviours has the potential to promote a healthy lifestyle among preschoolers.

# Does the association between home food availability and accessibility and food consumption differ by a child's temperament?

**Mrs. Riikka Pajulahti**<sup>1,2</sup>, Prof. Katariina Salmela-Aro<sup>1</sup>, Dr. Reetta Lehto<sup>2</sup>, Dr. Henna Vepsäläinen<sup>1</sup>, Dr. Elviira Lehto<sup>1</sup>, Mrs. Kaija Nissinen<sup>3</sup>, Ms. Essi Skaffari<sup>1</sup>, Dr. Katri Sääksjärvi<sup>1</sup>, Prof. Eva Roos<sup>1,2</sup>, Prof. Nina Sajaniemi<sup>4</sup>, Prof. Maijaliisa Erkkola<sup>1</sup>, Associate Professor Carola Ray<sup>2</sup>

<sup>1</sup>University of Helsinki, Helsinki, Finland, <sup>2</sup>Folkhälsan research center, Helsinki, Finland, <sup>3</sup>Seinäjoki University of Applied Sciences, Seinäjoki, Finland, <sup>4</sup>University of Eastern Finland, Joensuu, Finland

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** The physical features of the home food environment, namely food availability, and accessibility, are well-established determinants for children's food consumption. Understudied are, however, whether the role of the physical home food environment is uniform for all children independent of their individual characteristics, such as temperament. This study examined whether a child's temperament modifies the association between home food availability and accessibility and the consumption of fruits and vegetables and sugar-rich foods and drinks.

**Methods:** Altogether, 1216 Finnish children aged 3–6 years provided data for the analyses. The study is part of the DAGIS (Increased Health and Wellbeing in Preschools) project and utilized data from a cross-sectional survey conducted in 2015–2016 and intervention baseline data collected in 2017. Parents reported home food availability and accessibility with a questionnaire, their child's food consumption frequency with a food frequency questionnaire, and the child's temperament with the very short form of the Children's Behavior Questionnaire. Concurrent associations between home availability and accessibility and the consumption of fruits and vegetables and sugar-rich foods and drinks were examined with linear regression models. The modifying role of temperament was examined by adding temperament as a moderator to the model. Analyses were adjusted for the child's age, gender, and mother's highest education.

**Results:** None of the examined temperament dimensions modified the association between availability and the consumption frequency of fruits and vegetables or sugar-rich foods and drinks. A child's negative affectivity modified the association between home food accessibility of sugar-rich foods and drinks and the consumption frequency of those foods. The association was stronger for children with higher scores on negative affectivity.

**Conclusions:** The findings imply that children with higher negative affectivity are more susceptible to the home accessibility of sugar-rich foods and drinks. Considering a child's individual temperamental dispositions when counseling families on eating issues could be beneficial.

# The Australian Park Life Project – a national survey of park use and the contribution of park-based physical activity to total physical activity

Dr. Paula Hooper<sup>1</sup>, Dr. Nicole Edwards<sup>1</sup>, Dr. Perri Edwards<sup>1</sup>

<sup>1</sup>The University of Western Australia, Perth, Australia

Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Within the physical activity and parks literature, few studies measure the exact parks people use. Additionally, studies have not typically measured where physical activity occurs, nor have they quantified the proportion of park-based physical activity to overall physical activity levels and intensity. In direct response to these gaps the Australian Park Life project aimed to:

- (1) Undertake a national survey of park use in Australian capital cities using a public participatory GIS survey.
- (2) Measure physical activity undertaken within and outside of parks to determine the contribution that park-based physical activity makes to overall physical activity levels.

**Methods:** Adults were surveyed from 8 Australian cities (Adelaide, Brisbane, Canberra, Darwin, Hobart, Melbourne, Perth, Sydney). Using a map-based survey, participants identified the park they typically use 'most often' and any other parks they visit. For each park mapped, participants identified the activities undertaken in the park, the frequency and duration of the visit, the mode of transport to the park and the usual origin of the trip to the park.

Using the Park Physical Activity Questionnaire participants self-reported their frequency and duration of walking for recreation, walking for transport and moderate and vigorous physical activity in the past week and that undertaken in parks.

Recruitment was via a snowball method with assistance from local governments, community groups, and sporting and industry associations.

**Results:** Analyses of the data from the participatory GIS survey will identify the parks used, the characteristics and features of the most popular reported spaces, and the demographic characteristics of park users and non-users. Regression models will estimate associations between park visits and physical activity time in parks and the contribution of park-based physical activity to total physical activity levels, adjusting for potential confounders.

**Conclusions:** Knowledge of how parks contribute to the physical activity patterns and health outcomes of communities is imperative to inform interventions and public health programs to increase park-based physical activity to help meet physical activity guidelines and provide health benefits. Additionally, to advocate effectively for improved park infrastructure, public health advocates must understand and demonstrate the benefits of parks to health behaviours and outcomes.

# The overflow effects of movement behavior change interventions in children and adolescents: A systematic review and meta-analysis of randomized controlled trials

**Dr. Wendy Yajun Huang**<sup>1,2</sup>, Ms. Jie Feng<sup>1</sup>, Dr. Chen Zheng<sup>3</sup>, Dr. Jiao Jiao<sup>1,2</sup>, Dr. Asaduzzaman Khan<sup>4</sup>, Ms. Mehwish Nisar<sup>4</sup>, Prof. Stephen Heung Sang Wong<sup>3</sup>

<sup>1</sup>Department of Sport, Physical Education and Health, Hong Kong Baptist University, Hong Kong, China, <sup>2</sup>Dr. Stephen Hui Research Centre for Physical Recreation and Wellness, Hong Kong Baptist University, Hong Kong, China, <sup>3</sup>Department of Sports Science and Physical Education, The Chinese University of Hong Kong, Hong Kong, China, <sup>4</sup>School of Health and Rehabilitation Sciences, The University of Queensland, Brisbane, Australia

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Physical activity (PA), sedentary behavior (SB), and sleep are co-dependent movement behaviors in a 24-hour day. Interventions to change movement behaviors have been widely reported for children and adolescents. The purpose of this systematic review and meta-analysis was to examine the overflow effects of interventions targeting a single movement behavior on other non-targeted movement behaviors in children and adolescents.

**Methods:** A systematic search of six databases (MEDLINE, PsycINFO, EMBASE, PubMed, Web of Science, and SPORTDiscus) was performed on 7 March 2022. Randomized controlled trials (RCTs) that examined the effect of single behavior (targeted) interventions on non-targeted behaviors in healthy children and adolescents under 18 years of age were included. Meta-analyses were conducted by using Review Manager 5.4. The revised Cochrane risk-of-bias tool for randomized trials (RoB 2) was employed to assess the risk of bias. Percentage of wear time spent in each movement behavior were computed whenever appropriate to facilitate comparison across studies.

**Results:** Of 8,135 publications considered, 87 RCTs comprising 39,566 participants from 21 countries met the inclusion criteria, and 54 of them were included in meta-analysis. Pooled analysis of PA (targeted) interventions ( $n = 34$ ) showed an overall significant mean difference in SB ( $-0.86\%$  of wear time;  $95\% \text{ CI} = -1.37, -0.35$ ). Subgroup analyses further indicated that these effects were stronger among school-aged children and adolescents (6 – 17 years), with intervention duration of at least 12 weeks, and in a school setting. For interventions targeting SB ( $n = 3$ ), meta-analyses yielded an increase in standing ( $3.87\%$  of wear time;  $95\% \text{ CI} = 1.99, 5.75$ ), but no significant effect on stepping time ( $Z = 0.95, p = 0.34$ ). Based on narrative synthesis, sleep interventions showed no effects on PA or SB ( $n = 2$ ), and vice versa ( $n = 6$ ).

**Conclusions:** Interventions targeting PA resulted in a small reduction in SB, while interventions aimed at reducing SB led to a small increase in standing time. The findings suggest that PA and SB should be considered as interrelated behaviors in future behavioral interventions. Co-dependence between sleep timing and daytime movement behaviors warrants further investigation.

# A Comprehensive Assessment of Chinese Physical Activity and Sedentary Behavior Policies

**Mr. Sitong Chen**<sup>1</sup>, Ms. Jintao Hong<sup>2</sup>, Associate Professor Karen Milton<sup>3</sup>, Dr. Bojana Klepac<sup>1</sup>, Dr. Jiani Ma<sup>4</sup>, Prof. Zeljko Pedisic<sup>1</sup>

<sup>1</sup>Victoria University, Melbourne, Australia, <sup>2</sup>Shanghai Research Institute of Sports Science (Shanghai Anti-Doping Agency), Shanghai, China, <sup>3</sup>University of East Anglia, Norwich, United Kingdom, <sup>4</sup>Deakin University, Melbourne, Australia

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose** Physical activity (PA) and sedentary behaviour (SB) policies play a key role in promoting PA and reducing SB at the population level. Research on PA and SB policies is developing, but, from a research perspective, little is known about the policy landscape in China. Therefore, the aims of this study were to: advance knowledge on PA and SB policies in China; highlight related gaps; and make recommendations for future policy development.

**Methods** Literature and web-based searches were performed to identify national PA and SB policies in China. The policies were assessed against 17 key elements for a successful national policy approach to PA promotion listed in the Health-Enhancing Physical Activity Policy Audit Tool (HEPA PAT, version 2). In addition, four 'cornerstones' of PA and SB policy (i.e., guidelines, targets, surveillance and monitoring, and public education) were examined based on the content of the policy documents.

**Results** Sixty national PA and SB policies were identified, of which 54 focused on PA only and 6 focused on both PA and SB. There were no standalone SB policies. There has been a rapid increase in the number of PA and SB policies issued over the past two decades. In totality, the policies include all 17 key elements for a successful national policy approach to PA promotion according to HEPA PAT. The policies reflect multisectoral efforts around PA targets, recommendations for PA and SB, strategies for public education on PA, and surveillance and monitoring of PA and SB.

**Conclusion** There has been an increasing focus on developing PA and SB policies in China, reflected in multisectoral policy efforts. SB policies may require more emphasis, as they seem to be less developed than PA policies. Collaboration and involvement of different sectors in the development and implementation of Chinese PA and SB policies should continue to be facilitated as part of a whole-of-system approach to health promotion.

# Interventions to Change School Recess Activity Levels in Elementary School Students from Space Utilization Perspective: A Systematic Review

**Dr. Yiping Yan<sup>1</sup>**, Dr. Youzhi Ke<sup>1</sup>, Prof. Yang Llu<sup>1</sup>

<sup>1</sup>Shanghai University of Sport, Shanghai, China

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Recess offers a key setting for elementary school students to promote physical activity (PA). In urban elementary schools with limited space, the choice of feasible recess interventions is an issue that needs to be addressed immediately. This review summarizes the results of PA interventions for elementary school students during recess based on space utilization perspective, to provide practical references for promoting PA levels during recess between classes of under global urbanization.

**Method:** Peer-reviewed literature was searched until 31st January 2023 in PubMed, Web of Sciences, ERIC, SPORTDiscus and Academic Search Premier databases. Inclusion criteria were used to screen out English articles that focused on elementary school students, employed controlled experiments or quasi-experiment, measured PA levels during school recess and chose the intervention of utilizing existing school spaces. Study quality was assessed using an adapted eight-item assessment scale described by Van Sluijs and colleagues.

**Result:** 27 studies were included in the review, of which 18 were identified as high-quality studies. In these studies, the frequencies of the selected space utilization strategies in descending order are: modification of physical environment (MPE) totaled 26, allocation of time and space for the use of sports venues (ATS) totaled 6, and development of unused space functions (DSF) totaled 3. A total of 11 studies used a single intervention protocol, of which 7 confirmed the effectiveness of the MPE, and 1 confirmed the uncertainty of the effectiveness of DSF. A total of 16 studies used the combination of interventions, of which 4 combined interventions of space utilization strategies were proven to be effective, and 9 combined interventions of space and non-space utilization strategies were confirmed to be effective.

**Conclusion:** To prompt the PA of students during recess, the intervention program of using single MPE, the combination of space utilization strategies and the combination of space and non-space utilization strategies can be used in urban elementary schools as a reference program, when the elementary school space is insufficient. Future studies should analyze the extent to which each intervention strategy in the combined intervention affects physical activity, so as to customize the elementary school recess intervention plan.



# Promoting Active Living Policies and Financing Environmental Change Strategies through School-Led Population Health Surveillance

**Dr. Elizabeth Ackley**<sup>1,2</sup>

<sup>1</sup>Center for Community Health Innovation, Salem, USA, <sup>2</sup>Roanoke College, Salem, USA

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** H. Policies and environments

While recognizing the need to invest in active environments and normalize a culture of health, municipal governments have struggled to identify effective approaches to actualize these goals due to inadequate citizen representation in available datasets. Innovative health surveillance strategies which leverage school systems in the data collection process may be effective in catalyzing policies, systems, and environmental change strategies to enhance active living at scale.

**Purpose:** To describe how a mid-sized urban community leveraged a school-led health surveillance system to (1) develop comprehensive active living policies and (2) finance environmental change strategies to promote active living.

**Methods:** From 2017 to 2019, mixed-methods data collection strategies were employed to gather youth health outcomes and barriers to active living from families with children enrolled in the city's public-school system. Data was analyzed geospatially to demonstrate associations between health outcomes and environmental barriers and resources impacting active living behaviors. Thirty-nine focus groups and six citizen working groups converged to examine surveillance findings, categorizing themes across active living barriers. Themes were used to develop community priorities, policies, and action items representing the needs of diverse residents. Geographical inequities in health outcomes and barriers to active living were used to identify the city's next target investment area.

**Results:** "Interwoven Equity" and "Healthy Community" were infused as novel themes in the city's 2040 Comprehensive Plan. Across the Plan, 10 priorities, 25 policies, and 75 action items were included to promote active living in the context of land use, transportation, urban design, and economic development. Residents allocated \$5 million in Housing and Urban Development funds to facilitate environmental change strategies in response to community needs.

**Conclusion:** School-led health surveillance serves as a promising strategy for enhancing community representation in policy and government finance decision-making efforts aimed at promoting active living.

# The selection and operationalization of implementation strategies in the Nutrition Now project

**Miss Natalie Garzon Osorio<sup>1</sup>**, Prof. Frøydis Nordgård Vik<sup>1</sup>, Associate Professor Anine Christine Medin<sup>1</sup>, Prof. Nina Cecilie Øverby<sup>1</sup>

<sup>1</sup>Department of Nutrition and Public Health, Faculty of Health and Sport Sciences, University of Agder, Kristiansand, Norway

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** Implementation strategies are crucial for bridging the evidence-to-practice gap in public health nutrition, but there is a lack of guidance regarding which to use and how to select them. The current paper aims to describe a practical approach using implementation mapping aspects for the selection and operationalization of implementation strategies in the Nutrition Now project, an eHealth intervention aiming to improve nutrition in the first 1000 days of life.

**Method:** A 3-step approach was used: **(1) Identify facilitators and barriers** for the implementation effort by conducting in-depth interviews, one concept mapping session, and several meetings with key stakeholders, **(2) Select strategies** from the ERIC (Expert Recommendations for Implementing Change) taxonomy based on the determinants identified in step 1, and **(3) Operationalize selected strategies** according to Proctor and colleagues' guidelines in terms of the seven dimensions: the actor, the action, the action target, temporality, dose, and justification, and addressing potential overlap between strategies guided by Waltz and colleagues' cluster map of ERIC strategies. The research group iteratively reviewed and refined the strategies until reaching agreement on a set perceived to be highly important and highly feasible for the Nutrition Now project.

**Results:** In total, 21 of the 73 ERIC strategies were selected across 8 out of 9 clusters: six strategies (#4, #14, #18, #27, #46, #56) under the 'Use evaluative and iterative strategies' cluster, one strategy (#33) under the 'Provide interactive assistance' cluster, two strategies (#51, #63) under the 'Adapt and tailor to context' cluster, five strategies (#6, #17, #35, #38, #47) under the 'Develop stakeholder interrelationships' cluster, three strategies (#15, #28, #31) under the 'Train and educate stakeholders' cluster, one strategy (#58) under the 'Support clinicians' cluster, two strategies (#41, #69) under the 'Engage consumers' cluster, one strategy (#44) under the 'Change infrastructure' cluster, and zero strategies from the 'Utilize financial strategies' cluster.

**Conclusion:** This study provides a practical example on how to use implementation mapping aspects to select and operationalize implementation strategies for complex multi-setting interventions in real-world conditions.

# Joint Associations of Device-based Physical Activity and Diet with Mortality and Incident CVD and Cancer: a prospective analysis of the UK Biobank Study

**Dr. Elif Inan-Eroglu<sup>1,2</sup>**, Dr. Matthew Ahmadi<sup>2</sup>, Dr. Raaj Biswas<sup>2</sup>, Associate Professor Ding Ding<sup>3</sup>, Prof. Emmanuel Stamatakis<sup>2</sup>

<sup>1</sup>Department of Molecular Epidemiology, German Institute of Human Nutrition, Potsdam-Rehbruecke, Germany, <sup>2</sup>Charles Perkins Centre, School of Health Sciences, Faculty of Medicine and Health, The University of Sydney, Sydney, Australia, <sup>3</sup>Sydney School of Public Health, Faculty of Medicine and Health, The University of Sydney, Sydney, Australia

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** Current evidence on the joint association of physical activity (PA) and diet relies exclusively on self-reported PA assessments, which can only capture partial PA accounts and are subject to several biases. We examined the joint associations of device-measured intensity-specific PA and diet with all-cause mortality, and cardiovascular disease (CVD) and cancer incidence.

**Methods:** We conducted our study using the UK Biobank population-based prospective cohort (n=79,988). Light PA (LPA), moderate to vigorous PA (MVPA), vigorous PA (VPA) and total PA (TPA) were measured using a wrist accelerometer. We categorised PA and diet quality score (DQS) based on tertiles and derived joint PA and diet variables. Outcomes were all-cause mortality, cardiovascular disease, and cancer incidence (total; PA, diet and adiposity-related (PDAR)).

**Results/Findings:** During a median follow-up of 6.9 years, 2,234 participants died from all causes, 9,412 participants developed CVD, 8,103 total cancer and 2,956 PDAR cancer. Compared with the least favourable referent group (PA tertile / low DQS), participants with middle and high (total and intensity specific) PA had lower all-cause mortality risk and incident CVD risk, regardless of DQS. For example, among middle and high MVPA and high DQS groups, CVD HR were 0.80 (95%CI 0.74, 0.87) and 0.77 (95%CI 0.70, 0.85), respectively. The pattern of cancer results was less pronounced but in broad agreement with the ACM and CVD incidence findings (e.g. HR 0.90, 95%CI 0.81-0.99, HR 0.89, 95%CI 0.81-0.98 and HR 0.85, 95%CI 0.77-0.93 among high VPA for low, moderate and high DQS group, respectively). PDAR cancer risk was lowered with higher VPA irrespective of DQS group, although the MVPA and DQS joint exposure showed less clear associations. LPA was not associated with any outcomes.

**Conclusion:** Regardless of diet quality, middle and high levels of device-measured PA of any intensity were favourably associated with mortality and CVD incidence risk. Compared to previous literature, device-based PA reveals novel joint associations with other health behaviours. Our results highlight the relative importance of sufficient PA for reducing risk of chronic disease and premature mortality.

# A longitudinal time-series analysis of celebrity chef popularity and its relation to household purchases: a potential game changer for health promotion campaigns?

**Mr. Viktor Proesmans<sup>1</sup>**, Prof. Dirk Van den Poel<sup>1</sup>, Prof. Iris Vermeir<sup>1</sup>, Prof. Maggie Geuens<sup>1</sup>

<sup>1</sup>Ghent University, Gent, Belgium

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Over the past two decades, celebrity chefs have gained widespread popularity in most Western countries. A trend that seems to be here to stay. While studies have been conducted on how celebrity chef popularity affects our dietary behavior, the available research is limited to focus groups and survey data. This provides only a partial understanding of the short-term and long-term effects of this phenomenon. This study aims to investigate the relationship between celebrity chef popularity, online and on television, and households' purchases of meat and vegetables across different age groups in the period 2009-2018. A significant relationship would signal celebrity chefs can play a role in health promotion campaigns.

**Methods:** This study took a time-series approach using impulse response functions to examine how changes in celebrity chef popularity affect purchase behavior among Flemish households in the same and subsequent months. Online celebrity chef popularity was estimated using Google Trends data on how often the most popular celebrity chefs and their cooking shows were looked up in Flanders (Belgium). Television celebrity chef popularity was estimated using data on the television-ratings of the most popular celebrity chef television - shows in Flanders. Finally, meat and vegetables purchases were estimated using data from the professional marketing agency GfK, which tracked all food purchases of 4300-6200 Flemish households over the period 2009-2018.

**Results/findings:** A standard deviation increase in online celebrity chef popularity resulted in an increase in vegetable and meat purchases in the following month in the age group <30 and 50-64years. This impact was higher among the age group <30 as they saw an 1.79% and 1.85% increase in meat and vegetable purchases in the following month compared to 0.82% and 1.09% increase in the age group 50-64. In contrast, television celebrity chef popularity showed no impact on purchase behavior in any age group, which is in line with previous survey studies.

**Conclusions:** This study showed how online celebrity chef popularity relates to dietary purchases, especially among younger generations. These findings are in line with previous studies that advocate for using online interventions and celebrity chefs for health promotion campaigns among younger generations.

# Examining the Referral of Patients with Elevated Blood Pressure to Health Resources in an Under-Resourced Community in South Africa

**Associate Professor Mark Stoutenberg<sup>1</sup>**, Ms. Lia K. McNulty<sup>1</sup>, Ms. Stephanie Evans<sup>1</sup>, Mr. Daniel Katiyo<sup>2</sup>, Ms. Delisile Kubheka<sup>2</sup>, Ms. Mimi Mhlaba<sup>2</sup>, Ms. Amy Harrison<sup>3</sup>, Associate Professor Lisa J. Ware<sup>2</sup>

<sup>1</sup>Temple University, Philadelphia, USA, <sup>2</sup>University of Witwatersrand, Johannesburg, South Africa, <sup>3</sup>Philasonke, Johannesburg, South Africa

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Introduction:** Under-resourced communities in low-and-middle income countries face disparities affecting access to healthcare services and necessary treatment. Community health workers (CHWs) can connect patients to health resources in these communities; however, little has been done to examine how referrals to these resources would be acted upon by community members.

**Purpose:** To investigate factors influencing patient engagement with referrals connecting them to appropriate resources for elevated blood pressure.

**Methods:** CHWs conducted home visits, including blood pressure (BP) screening and counseling, with community members in Soweto, South Africa. Based on their BP level, moderate (BP=120-139/80-89 mmHg) and high (BP≥140/90 mmHg) risk patients were referred to a local gym or health clinics, respectively. Interviews were conducted with individuals given a referral who: 1) went to the gym, 2) did not go to the gym, 3) went to the clinic, and 4) did not go to the clinic. The interviews were transcribed and analyzed to identify common themes and differences between groups regarding their decisions to act on the referrals.

**Results:** CHWs visited 1056 homes, with 1009 community members consenting to the screening; 27.9% of patients were classified as healthy, 38.7% as moderate risk, and 33.4% as high risk. Only 25.7% of community members accepted a referral from the CHW. Five themes emerged from the interviews: 1) prior knowledge and thoughts on BP, 2) psychosocial factors associated with BP control, 3) factors influencing acting on the referral, 4) perception about receiving the referral, and 5) perceived benefits of acting on the referral.

**Discussion:** CHWs can connect community members to health resources to which they may not have regular access. However, further examination is needed to explore community members hesitancy to receive and/or acting upon the referrals.

# Implementing and Evaluating the Integration of Physical Activity into a Major Health System and Connecting Patients to Community-Based Physical Activity Programs

**Associate Professor Mark Stoutenberg<sup>1</sup>**, Prof. Jennifer Trilk<sup>2</sup>, Prof. John Brooks<sup>3</sup>, Ms. Stephanie Eskuri<sup>4</sup>, Dr. Meenu Jindal<sup>4</sup>, Assistant Professor Leah Schumacher<sup>1</sup>, Assistant Professor Chris Wichman<sup>6</sup>, Mr. Alex Ewing<sup>4</sup>, Prof. Paul Estabrooks<sup>5</sup>

<sup>1</sup>Temple University, Philadelphia, USA, <sup>2</sup>University of South Carolina School of Medicine Greenville, Greenville, USA, <sup>3</sup>University of South Carolina, Columbia, USA, <sup>4</sup>Prisma Health, Greenville, USA, <sup>5</sup>University of Utah, Salt Lake City, USA, <sup>6</sup>University of Nebraska Medical Center, Omaha, USA

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** To examine strategies for optimally implementing a clinic-to-community model (Exercise is Medicine Greenville; EIMG®) that identifies physically inactive patients in primary care settings and connects them to a community-based physical activity (PA) program.

**Methods:** This study will utilize a pragmatic, stepped wedge cluster randomized design to examine EIMG® implementation across primary care clinics in a large U.S. health system. After a run-in period and onboard training, six primary care clinics will enter the study every six months. Our specific aims are to: 1) determine differences and factors associated with provider-level adoption, implementation, and reach of EIMG® at newly onboarded primary care clinics; 2) assess the effectiveness of patient engagement in a 12-week PA program offered at local community PA centers on self-reported PA levels and health outcomes captured via electronic health records, and 3) evaluate the cost of implementing EIMG® and the cost-effectiveness of patients participating in EIMG® vs. standard of care. As an exploratory aim, we will evaluate long-term adaptations and sustainability of EIMG® implementation in the primary care clinics.

**Results/Findings:** We will use a mixed methodological approach to explore factors related to achieving optimal implementation and reach of EIMG® (primary outcome = provider referrals) and patient engagement in the community-based PA program. The RE-AIM framework will inform the assessment of our primary implementation outcomes, while the i-PARIHS framework will explore contextual factors impacting clinic- and patient-level outcomes. To estimate the cost-effectiveness of EIMG®, we will compare extracted patient data from clinics with and without EIMG® to estimate healthcare costs. These estimates will be used in a short-term cost-effectiveness analysis and long-term modeling examining changes in secondary health outcomes on healthcare costs. Throughout the study, we will pay special attention to issues of health equity across all RE-AIM dimensions.

**Conclusions:** This study has the potential to significantly improve clinical practice by informing future strategies for optimizing and scaling up comprehensive PA models into health systems. This study also will provide information on potential savings to health systems looking to implement PA as a population health management tool through clinic-community linkages.



# Finding Food Security without Federal Food Assistance: A Look at US Households above Poverty Thresholds for SNAP

**Ms. Ana Altares<sup>1</sup>**, Dr. Megan Mueller<sup>1</sup>

<sup>1</sup>Colorado State University, Fort Collins, USA

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose** Federal programs in the United States such as the Supplemental Nutrition Assistance Program (SNAP) address food insecurity by providing financial assistance to households with income at or below 130% of the federal poverty level (FPL). These income requirements are the same across the US, despite regional variations in cost-of-living. While food insecurity often tracks with poverty, households in high cost-of-living regions may report income above 130% FPL, making them ineligible for SNAP; yet they may still experience food insecurity. One particular mountain resort-rural region in the US experiences food insecurity challenges including high cost-of-living due, in part, to ski tourism, long travel distances to food sources, and limited transportation routes.

This project will explore how households above and at/below 130% FPL in this region cope with food insecurity. Specifically, we aim to evaluate how they utilize community food assistance resources (i.e., food pantries) and whether they make different economic tradeoffs (i.e., forgoing medical expenses for food). We hope to understand how households navigate food access in this region and their lived experience of food insecurity.

**Methods** First, we will survey 1080 food insecure residents above and below 130% FPL within this region. We will assess food insecurity, use of community food assistance resources, and economic tradeoffs. We will analyze these findings using ordinal logistic regression to determine differences in food resources use and economic coping strategies by income group. We will then use a participatory action research method, photovoice, to encourage residents (n=30) to photograph and share their lived experience with food insecurity, and create action steps to improve regional food security.

**Results** These findings will add to our understanding of food insecurity coping strategies and experiences, particularly among households that cannot access federal food assistance due to income. This research also hopes to encourage and empower residents to take part in community change and knowledge production.

**Conclusions** The findings from this study will inform 5-year strategic plan to end food insecurity within this region. This research may also serve as a model to other high cost-of-living regions impacted by food insecurity across the United States and other countries.

# A systematic review and meta-analysis of interventions designed to increase moderate-to-vigorous physical activity among families

**Dr. Justin Guagliano**<sup>1,2</sup>, Miss Holly Hliounakis<sup>1</sup>, Associate Professor Emma George<sup>1,2</sup>, Dr. Cristy Brooks<sup>1</sup>, Dr. Sarah Kennedy<sup>1,2</sup>

<sup>1</sup>Western Sydney University, Sydney, Australia, <sup>2</sup>Translational Health Research Institute, Sydney, Australia

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Most young people and adults do not accumulate the recommended amount of moderate-to-vigorous physical activity (MVPA). Targeting whole families may be an important strategy for sustained behaviour change. However, many studies do not consider the family as a unit that may work together to change behaviour. The purpose of this study was to determine the effectiveness of interventions designed to increase MVPA among families.

**Methods:** A systematic review and meta-analysis were conducted. Four electronic databases were searched: MEDLINE, Scopus, SPORTDiscus, and PsycINFO, with forward searching in Google Scholar. Included studies sampled generally healthy school-aged children (i.e.,  $\geq 5$  to  $< 18$  years old) and at least one adult primarily responsible for their care. Studies must have tested an intervention aiming to increase family MVPA, using any experimental (e.g., randomised controlled trials, cross-over designs) or quasi-experimental design. Included studies also must have measured physical activity on at least one child and at least one adult primarily responsible for their care. Random-effects meta-analyses were conducted to determine the intervention effect on family MVPA. Analyses were conducted using Stata Version 17.

**Results/Findings:** From an initial pool of 24,913 nonduplicate records, 11 studies were included. Most studies were conducted in Europe ( $n=5$ ), followed by North America ( $n=3$ ), Asia ( $n=2$ ), and Oceania ( $n=1$ ). All studies used accelerometry as the primary physical activity measure. Nine studies provided sufficient data for inclusion in the meta-analyses at the time of abstract submission. Meta-analyses demonstrated a small nonsignificant effect for MVPA post-intervention for children (Hedge's  $g = .261$ , 95% CI  $-.148-.670$ ,  $p = .212$ ) and parents (Hedge's  $g = .156$ , 95% CI  $-.055-.367$ ,  $p = .149$ ). There was no effect for MVPA for children or parents at longer-term follow-up. Only 3 studies reported family co-participation in physical activity.

**Conclusions:** This study demonstrated that family-based physical activity interventions were not effective at increasing childrens' or parents' accelerometer-measured daily MVPA at post-intervention or at longer-term follow-up. Null findings may be due to well-designed interventions not reaching the target populations as intended (e.g., inactive/low-active families) or effects not maintained across the day. Family co-participation in physical activity was also rarely measured.

# Feasibility of Reducing and Breaking Up University Students' Sedentary Behaviour: Pilot Trial and Process Evaluation

**Dr. Oscar Castro**<sup>1,2</sup>, Dr. Ineke Vergeer<sup>1</sup>, Dr. Jason Bennie<sup>1</sup>, Prof. Stuart Biddle<sup>1,3</sup>

<sup>1</sup>Physically Active Lifestyles Research Group (USQ-PALs), Centre for Health Research, University of Southern Queensland, Springfield Central, QLD, Australia, <sup>2</sup>Future Health Technologies, Singapore-ETH Centre, Campus for Research Excellence And Technological Enterprise (CREATE), Singapore, Singapore, <sup>3</sup>Faculty of Sport & Health Sciences, University of Jyväskylä, Jyväskylä, Finland

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Accumulating high levels of sedentary behaviour has been linked to poor health outcomes. This quasi-experimental (pre-post) pilot study examined the feasibility and preliminary, short-term effects of a theory-based intervention aimed at reducing total and prolonged sedentary behaviour in university students.

**Methods:** Nine ambulatory undergraduate students (Mean age =  $22 \pm 2.32$ ) participated in a one-on-one session, including an educational component around the health effects of sedentary behaviour and three distinct activities (feedback, “pros and cons” exercise, and suggested behaviour change strategies). In addition, automated daily text messages targeting sedentary behaviour were sent for 6 days (four messages per day at fixed intervals). The Behaviour Change Wheel framework guided the intervention design process. Outcomes were assessed over 6 days in pre- and post-intervention periods and included accelerometer-based (activPAL) and self-reported (Nightly-Week-U) total sedentary time, as well as accelerometer-based number of steps and prolonged sedentary time. Students completed a process evaluation interview upon completing the trial.

**Results:** From pre- to post-intervention, there was a significant reduction in accelerometer-based total and prolonged sedentary time during weekend days. In addition, there was a significant increase in accelerometer-based standing time and stepping during weekend days. There were no statistically significant changes in accelerometer-based sedentary time, standing time or number of steps during weekdays. Process evaluation results indicated that the intervention and its assessment is feasible. Reductions in sedentary time were likely to be mediated by positive changes in the student’s reflective and automatic motivation.

**Conclusions:** Findings from this small, short-term intervention suggest that a single one-on-one session, together with automated text messages, may help university students reduce sedentary behaviour and enhance movement during weekend days. Additional strategies to maximise the intervention effects are discussed (e.g., establishing a collaboration with university staff, introducing sit-to-stand desks, and/or facilitating social support). A randomised control trial assessing sedentary behaviour over a longer period is needed to adequately study the intervention’s effectiveness.

# Development of a measurement tool to quantify park-based, and total, physical activity levels: Park-PAQ

**Dr. Nicole Edwards<sup>1</sup>**, Dr. Paula Hooper<sup>1</sup>

<sup>1</sup>University of Western Australia, Perth, Australia

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose** Few studies have explicitly quantified the proportion of park-based physical activity to park users' overall physical activity levels. Population studies need new context-specific physical activity measurement tools to achieve this. The objective of this study was to develop a reliable measure of self-reported park use and physical activity undertaken within and outside of parks to determine the contribution that park-based physical activity makes to overall physical activity levels.

**Methods** A test-retest reliability study ( $n=104$ ) was conducted using the Park Physical Activity Questionnaire (Park-PAQ), an instrument based on the Active Australia Survey. Park-PAQ items captured the frequency and duration of walking for recreation or exercise, walking for transport, moderate and vigorous physical activity and strength, conditioning and balance activities done in parks and elsewhere.

**Results** Recall of doing any walking for recreation ( $\kappa = 0.649$ ,  $p < 0.001$ ) and any vigorous physical activity ( $\kappa = 0.772$ ,  $p < 0.001$ ) was 'substantial', recall of doing any moderate physical activity ( $\kappa = 0.553$ ,  $p < 0.05$ ) was 'moderate/acceptable', and recall of any walking for transport ( $\kappa = 0.840$ ,  $p < 0.001$ ) 'near perfect'. Recall of the time spent walking for recreation in parks ( $ICC = 0.652$ ,  $p < 0.001$ ) was 'substantial', whilst recall of time spent doing moderate activity in parks ( $ICC = 0.925$ ,  $p < 0.001$ ) and vigorous activity in parks ( $ICC = 0.962$ ,  $p < 0.001$ ) was 'near perfect'. Time spent walking for transport in a park ( $ICC = 0.350$ ,  $p = 0.056$ ) showed 'fair' agreement. Repeatability of the usual level of park use ( $\kappa = 0.957$ ) was 'near perfect'.

**Conclusions** The Park-PAQ reliably measures four domains of physical activity and quantifies the proportion of physical activity done in parks as a proportion of total physical activity. The Park-PAQ, used alone or embedded into park or physical activity surveys, will reliably capture context-specific activities that will optimise population level physical activity interventions, park programming and park management and design.

# A Machine Learning Study on Risk Factors of Sleep Insufficiency in 3-month-old Infants

Dr. Sukrit Gupta<sup>1</sup>, Mr. Derric Zenghong Eng<sup>2</sup>, Dr. Elaine Kwang-Hsia Tham<sup>2</sup>, Prof. Daniel Yam Thiam Goh<sup>3,4</sup>, Dr. Oon Hoe Teoh<sup>5</sup>, Associate Professor Joshua J Gooley<sup>6</sup>, Associate Professor Mary FF Chong<sup>7</sup>, Prof. Lynette Pei Chi Shek<sup>2,3,4</sup>, Prof. Kok Hian Tan<sup>8,9</sup>, Prof. Fabian Yap<sup>10</sup>, Prof. Yap-Seng Chong<sup>2,11</sup>, Prof. Michael J Meaney<sup>2,12</sup>, **Assistant Professor Shirong Cai<sup>2,13</sup>**, Dr. Pavitra Krishnaswamy<sup>1</sup>

<sup>1</sup>Institute for Infocomm Research, Agency for Science, Technology and Research (A\*STAR), Singapore, Singapore,

<sup>2</sup>Singapore Institute for Clinical Sciences, Agency for Science, Technology and Research (A\*STAR), Singapore, Singapore, <sup>3</sup>Department of Paediatrics, Yong Loo Lin School of Medicine, National University of Singapore, National University Health System, Singapore, Singapore, <sup>4</sup>Khoo Teck Puat- National University Children's Medical Institute, National University Health System, Singapore, Singapore, <sup>5</sup>Respiratory Medicine Service, Department of Paediatrics, KK Women's and Children's Hospital, Singapore, Singapore, <sup>6</sup>Center for Cognitive Neuroscience, Program in Neuroscience and Behavioral Disorders, Duke-NUS Medical School, Singapore, Singapore, <sup>7</sup>Saw Swee Hock School of Public Health, National University of, Singapore, Singapore, <sup>8</sup>Duke-NUS Graduate Medical School, Singapore, Singapore, <sup>9</sup>Department of Maternal Fetal Medicine, KK Women's and Children's Hospital, Singapore, Singapore, <sup>10</sup>Department of Paediatric Endocrinology, KK Women's and Children's Hospital, Singapore, Singapore, Singapore, <sup>11</sup>Department of Obstetrics and gynaecology, Yong Loo Lin School of Medicine, National University of Singapore, National University Health System, Singapore, Singapore, <sup>12</sup>Department of Psychiatry, Faculty of Medicine, McGill University, Montreal, Canada, <sup>13</sup>Human Potential Translational Research Programme, Yong Loo Lin School of Medicine, National University of Singapore, Singapore, Singapore

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** G. Children and families

**Introduction:** Sleep is pivotal during infancy for optimal development including executive function, memory consolidation, language learning and physical growth, however many infants do not attain adequate sleep. Sleep is multi-factorial, yet most studies only investigate one or few factors at a time, hence we aim to apply machine learning on a multimodal dataset to identify potential risk factors underlying insufficient sleep among 3-month old infants from a Singaporean birth cohort.

**Materials and Methods:** We applied machine learning on perinatal data from 605 healthy mother-child dyads from the Growing Up in Singapore Towards healthy Outcomes (GUSTO) birth cohort study to model associations between different features in our dataset and sleep insufficiency in 3 months old infants (caregiver reported total sleep duration <14 hours using the Brief Infant Sleep Questionnaire). We considered all combinations of the 9 risk factor categories including demographics, parental and child health, polygenic score and lifestyle factors like sleep, physical activity and nutrition and developed feedforward neural networks (FFN) models for each combination. Salient features were identified using three salience detection methods (DeepLIFT, Integrated gradients and GradientSHAP).

**Results:** The key risk factor categories in the top performing models are maternal antenatal nutrition, demographics, infant sleep arrangement, maternal health and antenatal physical activity. After recursive model reduction, we identified the salient features to be maternal antenatal plasma fatty acid, betaine, calcium and tryptophan concentrations, co-sleeping and room sharing, feeding the infant to sleep, infant snoring, maternal physical activity before pregnancy, extent that stress impacted health, maternal education and having other children at home. Specifically, we found that higher maternal education, having other children at home, greater physical activity before conception, greater extent where stress affected their health in the past, lower oleic acid percentage and higher n-3:n-6 fatty acid ratio in the maternal antenatal plasma were associated with lower risk of sleep insufficiency in 3 months old infants.

**Conclusions:** Many of the risk factors associated with sleep insufficiency in 3 months old infants are antenatal and potentially modifiable. Our findings provide future opportunities for interventions that can target these risk factors to address infant sleep insufficiency.

# Development of “LvL UP”: A smartphone-based, conversational agent-delivered holistic lifestyle intervention for the prevention of non-communicable diseases and common mental disorders

**Dr. Oscar Castro**<sup>1</sup>, Dr Jacqueline Mair<sup>1,2</sup>, Dr. Alicia Salamanca-Sanabria<sup>1</sup>, Ms. Aishah Alattas<sup>1</sup>, Mr. Roman Keller<sup>1,2</sup>, Ms. Shenglin Zheng<sup>2</sup>, Mr. Ahmad Jabir<sup>7</sup>, Ms. Xiaowen Lin<sup>7</sup>, Ms. Bea Frese<sup>1,3</sup>, Mr. Chang Siang Lim<sup>1</sup>, Mr. Prabhakaran Santhanam<sup>5</sup>, Prof. Rob Van Dam<sup>2</sup>, Prof. Josip Car<sup>8,9</sup>, Prof. Jimmy Lee<sup>7,10,11</sup>, Prof. E Shyong Tai<sup>1,2,4</sup>, Prof. Elgar Fleisch<sup>1,3</sup>, Prof. Florian von Wangenheim<sup>1,5</sup>, Associate Professor Lorainne Tudor Car<sup>7,9</sup>, Dr. Falk Müller-Riemenschneider<sup>1,2,6</sup>, Associate Professor Tobias Kowatsch<sup>12,13,5,1</sup>

<sup>1</sup>Future Health Technologies, Singapore-ETH Centre, Campus for Research Excellence And Technological Enterprise (CREATE), Singapore, Singapore, <sup>2</sup>Saw Swee Hock School of Public Health, National University of Singapore, Singapore, Singapore, <sup>3</sup>Centre for Digital Health Interventions, Institute of Technology Management, University of St. Gallen, St. Gallen, Switzerland, <sup>4</sup>Yong Loo Lin School of Medicine, National University of Singapore, Singapore, Singapore, <sup>5</sup>Centre for Digital Health Interventions, Department of Management, Technology, and Economics, ETH Zurich, Zurich, Switzerland, <sup>6</sup>Digital Health Center, Berlin Institute of Health, Charité University Medical Centre Berlin, Berlin, Germany, <sup>7</sup>Neuroscience and Mental Health, Lee Kong Chian School of Medicine, Nanyang Technological University Singapore, Singapore, Singapore, <sup>8</sup>Centre for Population Health Sciences, LKCMedicine, Nanyang Technological University, Singapore, Singapore, <sup>9</sup>Department of Primary Care and Public Health, School of Public Health, Imperial College London, London, United Kingdom, <sup>10</sup>Research Division, Institute of Mental Health, Singapore, Singapore, <sup>11</sup>North Region & Department of Psychosis, Institute of Mental Health, Singapore, Singapore, <sup>12</sup>Institute for Implementation Science in Health Care, University of Zurich, Zurich, Switzerland, <sup>13</sup>School of Medicine, University of St. Gallen, St. Gallen, Switzerland

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Non-communicable diseases (NCDs) and common mental disorders (CMDs) are the leading causes of death and disability worldwide. Lifestyle interventions via mobile apps and conversational agents present themselves as low-cost, scalable solutions to prevent these conditions. This work describes the rationale for, and development of, “LvL UP”, a digital lifestyle intervention aimed at preventing NCDs and CMDs.

**Methods:** A multidisciplinary team led the intervention design process of LvL UP, involving four phases: (i) preliminary research (stakeholder consultations, systematic market reviews), (ii) selecting intervention components and developing the conceptual model, (iii) whiteboarding (prototype development), and (iv) testing and refinement. The Multiphase Optimization Strategy and the UK Medical Research Council framework for developing and evaluating complex interventions were used to guide the intervention development.

**Results:** Preliminary research highlighted the importance of targeting holistic wellbeing (i.e., both physical and mental health). Accordingly, the first version of LvL UP features a smartphone-based, conversational agent-delivered holistic lifestyle intervention built around three pillars: Move More (physical activity), Eat Well (nutrition and healthy eating), and Stress Less (emotional regulation and wellbeing). Intervention components include health literacy and psychoeducational coaching sessions, daily “Life Hacks” (healthy activity suggestions), breathing exercises, and journaling. In addition to the intervention components, formative research also stressed the need to introduce engagement-specific components to maximise uptake and long-term use. LvL UP includes a motivational interviewing and storytelling approach to deliver the coaching sessions, as well as progress feedback and gamification. Offline materials are also offered to allow users access to essential intervention content without needing a digital device.

**Conclusions:** The development process of LvL UP led to an evidence-based and user-informed digital health intervention that aims to help adults prevent NCDs and CMDs. LvL UP is designed to be a scalable, engaging, prevention-oriented intervention focused on healthy nutrition, physical activity, and psychological wellbeing. A feasibility study and subsequent optimisation and randomised-controlled trials are planned to further refine the



intervention and establish effectiveness. The development process described here may prove helpful to other intervention developers.

# Effects of Virtual Reality-Based Exercise Intervention on Promoting College Students' Physical Activity Levels

**Dr. Wenxi Liu<sup>1</sup>**, Dr. Kun Wang<sup>1</sup>, Dr. Tao Huang<sup>1</sup>, Dr. Zan Gao<sup>2</sup>

<sup>1</sup>Shanghai Jiao Tong University, Shanghai, China, <sup>2</sup>University of Minnesota Twin Cities, Minneapolis, USA

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** The present study examined the effects of an immersive virtual reality (VR) biking exercise intervention on promoting college students' physical activity (PA) levels.

**Methods:** 36 college students ( $M_{age} = 23.89$ ,  $SD = 3.57$ ;  $M_{BMI} = 25.29$ ,  $SD = 3.96$ ) participated in a 4-week intervention. Participants were randomly assigned to the intervention (participants exercised on an immersive VR-based exercise bike for one hour per session, two times per week, for 4 weeks) and control group (participants maintained their usual activities for 4 weeks). Participants' PA levels were assessed by the International Physical Activity Questionnaire (IPAQ) at baseline and post-intervention. Two-way repeated measures ANOVAs examined between-group differences on the preceding physiological and psychological outcomes over time.

**Results:** The two-way repeated measures ANOVA indicated a significant main effect of time on PA ( $F(1,34) = 15.84$ ,  $p < 0.001$ ,  $h_p^2 = 0.34$ ). Further, the significant "time \* group" interaction was observed ( $F(1,34) = 17.35$ ,  $p < 0.001$ ,  $h_p^2 = 0.36$ ). The tests of between-subjects effects indicated a significant group difference on PA after 4 weeks intervention ( $F(1,34) = 5.91$ ,  $p = 0.02$ ,  $h_p^2 = 0.16$ ), indicating that intervention participants reported significant higher level of PA as compared to control group after 4 weeks. In detail, Intervention group's PA has increased 1075.12 MET-minutes/week after 4 weeks, whereas control group's PA has decreased 24.44 MET-minutes/week after 4 weeks.

**Conclusion:** The findings suggested that the immersive VR-based exercise can be an enjoyable and effective tool for motivating college students participating in greater PA. The longitudinal study is warranted to further conclude the long-term effects of VR-based exercise on promoting PA and health.

# Screen time and cardiometabolic health risk: Are all screens the same?

**Ms. Haley Dennis<sup>1</sup>**, Dr. Jennifer Copeland<sup>1</sup>

<sup>1</sup>University of Lethbridge, Lethbridge, Canada

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** N. Other

**Purpose:** Engaging in high amounts of sedentary behaviour has been linked to poor health, and sedentary screen time may be especially detrimental. While TV viewing time has been associated with cardiometabolic health risk, contemporary screen time behaviours have changed to be ubiquitous and include many different types of “screens”. The purpose of this study was to explore the relationship between cardiometabolic health risk and self-reported leisure time spent using five common types of screens.

**Methods:** Healthy adult volunteers ( $n = 80$ , 61% women,  $40.7 \pm 16.1$  years of age) completed a screen time questionnaire regarding typical weekly sedentary screen use including TVs, TV-connected devices, laptops/computers, smartphones, and tablets. Clustered cardiometabolic risk scores (CMRS) were calculated based on eleven health biomarkers. To measure physical activity, ActivPAL4™ inclinometers were worn by participants continuously for one week. Cross-sectional associations between CMRS and time viewing each screen type were examined using Spearman's bivariate correlations and multiple linear regressions adjusted for age, sex, and physical activity.

**Results:** Participants reported total screen time of  $5.99 \pm 3.66$  hours per day with  $1.43 \pm 1.63$  hours per day of TV-viewing time and  $2.39 \pm 1.92$  hours per day of smartphone use. TV-viewing time was significantly associated with CMRS ( $\rho = 0.33$ ,  $p = 0.003$ ), whereas total sedentary time and the other screen types were not. Total screen time was significantly associated with CMRS in the fully adjusted model ( $B = 0.04$ , 95% CI 0.01–0.07,  $p = 0.013$ ). CMRS was associated with TV time ( $B = 0.09$ , 95% CI 0.02–0.16,  $p = 0.017$ ) and smartphone time ( $B = 0.07$ , 95% CI = 0.00–0.14,  $p = 0.048$ ) in unadjusted models, but after controlling for covariates these associations were no longer significant.

**Conclusions:** Greater self-reported screen time was associated with greater cardiometabolic health risk among healthy adults across a wide age range. These results suggest that the total screen time an individual accumulates might be more important than the type of screen they are viewing. However, we did not examine the types of activities completed by participants while using screens, which could have implications for cardiometabolic health.

# How can we make healthy young people increase physical activity?

**Associate Professor Harunobu Usui<sup>1</sup>**

<sup>1</sup>Aichi Medical College, Aichi pref., Japan

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Regular physical activity can help prevent cardiovascular disease. Low physical activity is an issue faced by for generations. Therefore, determining an effective way to increase physical activity is crucial. Previous studies have employed accelerometers to measure physical activities, and encouragement from others is shown to be effective in increasing physical activity. Online meeting systems were widely used during the coronavirus disease 2019 pandemic. Can online feedback be used to increase physical activity awareness? The purpose of this study is to investigate the impact of online feedback on physical activity among healthy young people.

**Methods:** The 20 young and healthy individuals participated in the study. All participants separated a control group or feedback group. They participated for 4 weeks study, and their physical activity was measured using an accelerometer (HJA-750C/OMRON). The feedback group participants were provided online feedback every week by the other volunteers. They showed the participants their one-week physical activity information and advised them to increase their physical activity using google meet online system. No feedback was provided the control group. Total active time (min) per week and physical activity [(METs\*hour) more than 3 METs (metabolic equivalents)] per week were calculated.

**Results:** The median total active time in the control group was 4344 min at the initial stage, 4496 min at two weeks after, and 4285 min at four weeks after. The median total active time in the feedback group was 4385 min at the initial stage, 4799 min at two weeks after, and 5071 min at four weeks after. The medians of physical activity more than 3 METs in the control group were 16.3 METs\*h at the initial stage, 16.9 METs\*h at two weeks after, and 18.4 METs\*h at four weeks after. The medians of physical activity more than 3 METs during the feedback group were 17.6 METs\*h, 22.4 METs\*h, and 25.3 METs\*h at the initial stage, two weeks after, and four weeks after, respectively.

**Conclusions:** Online feedback may influence and increase physical activity. Future study would allow for more participations and follow ups.

# Adherence and predictors of physical activity and screen viewing time guidelines among Singaporean toddlers

**Ms. Shuen Lin Tan<sup>1</sup>**, Ms. Natarajan Padmapriya<sup>2,3</sup>, Dr. Narasimhan Kothandaraman<sup>1</sup>, Dr. Anne HY Chu<sup>1,2</sup>, Ms. Claire Marie Jie Lin Goh<sup>2</sup>, Prof. Yap-Seng Chong<sup>1,3</sup>, Prof. Lynette P Shek<sup>1,4</sup>, Prof. Kok Hian Tan<sup>5</sup>, Prof. Peter D Gluckman<sup>1,6</sup>, Prof. Fabian KP Yap<sup>7,8,9</sup>, Prof. Yung Seng Lee<sup>1,4</sup>, Assistant Professor See Ling Loy<sup>7,10</sup>, Prof. Jerry KY Chan<sup>7,10</sup>, Prof. Keith M Godfrey<sup>11</sup>, Prof. Johan G Eriksson<sup>1,3,12,13</sup>, Associate Professor Shiao-Yng Chan<sup>1,3</sup>, Dr. Jonathan Y Bernard<sup>14</sup>, Prof. Falk Müller-Riemenschneider<sup>2,15</sup>

<sup>1</sup>Singapore Institute for Clinical Sciences (SICS), Agency for Science, Technology and Research (A\*STAR), Singapore, Singapore,

<sup>2</sup>Saw Swee Hock School of Public Health, National University of Singapore, Singapore, Singapore, <sup>3</sup>Department of Obstetrics & Gynaecology, Yong Loo Lin School of Medicine, National University of Singapore, Singapore, Singapore, <sup>4</sup>Department of Paediatrics, Yong Loo Lin School of Medicine, National University of Singapore, Singapore, Singapore, <sup>5</sup>Department of Maternal Fetal Medicine, KK Women's and Children's Hospital, Singapore, Singapore, <sup>6</sup>Liggins Institute, University of Auckland, Auckland, New Zealand, <sup>7</sup>Duke-NUS Medical School, Singapore, Singapore, <sup>8</sup>Department of Pediatrics, KK Women's and Children's Hospital, Singapore, Singapore, <sup>9</sup>Lee Kong Chian School of Medicine, Nanyang Technological University, Singapore, Singapore, <sup>10</sup>Department of Reproductive Medicine, KK Women's and Children's Hospital, Singapore, Singapore, <sup>11</sup>MRC Lifecourse Epidemiology Centre and NIHR Southampton Biomedical Research Centre, University of Southampton and University Hospital Southampton NHS Foundation Trust, Southampton, United Kingdom, <sup>12</sup>Department of General Practice and Primary Health Care, University of Helsinki, Helsinki, Finland, <sup>13</sup>Folkhälsan Research Center, Helsinki, Finland, <sup>14</sup>Université Paris Cité, Inserm, INRAE, Centre for Research in Epidemiology and Statistics (CRESS), Paris, France, <sup>15</sup>Center for Digital Health, Berlin Institute of Health, Charité University Medical Centre, Berlin, Germany

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**SIG - Primary Choice:** G. Children and families

**Purpose:** International guidelines recommend  $\geq 180$  minutes of physical activity (PA) and  $\leq 1$  hour per day of sedentary screen viewing time (SVT) for toddlers. There is limited research on whether these guidelines are being met in young children, particularly in Asia. We aimed to investigate the proportion of children meeting the recommendation among Singaporean toddlers.

**Methods:** In the longitudinal Singapore Pre-Conception Study of Long-Term Maternal and Child Outcomes (S-PRESTO), parents/caregivers reported information on light-intensity PA (LPA), moderate-to-vigorous PA (MVPA) and SVT of 2- and 3-year-old children. PA time and SVT were calculated and categorized based on Singapore PA guidelines ( $\geq 60$ -minutes of MVPA/day above 3-years,  $\geq 180$ -minutes of total PA/day,  $\leq 1$ -hour of SVT/day). Maternal age, education, and ethnicity were collected during pre-conception using an interviewer-administered questionnaire, and child sex ascertained at delivery. We used McNemar's chi-square test to compare the proportions of children meeting guidelines at ages 2- and 3-years, and multivariable logistic regression at both timepoints to investigate the associations of socio-demographic factors and adherence to the guidelines.

**Results/findings:** 239 children had PA and SVT data at both timepoints. Compared to age 2 years, at age 3 years, a higher proportion of children met total PA (2-years: 50% vs 3-years: 92%,  $p < 0.001$ ) and MVPA (2-years: 59% vs 3-years: 84%,  $p < 0.001$ ) guidelines. However, compared to age 2 years, at age 3 years a lower proportion of children met SVT guidelines (2-years: 52% vs 3-years: 37%,  $p < 0.001$ ). At both age 2- and 3-years, children of mothers with at least a university degree are more likely to meet SVT guidelines [Odds ratio (95% confidence interval): 2-years: 2.49 (1.33, 4.73), 3-years: 3.53 (1.76, 7.51)]. No other sociodemographic factors investigated had a significant association with SVT. Regression with PA did not yield significant predictors.

**Conclusions:** Our study shows that the proportion of children meeting SVT guidelines decreases as children grow older, and that maternal educational attainment is a significant predictor of children's SVT. We need to further explore the favorable changes in adherence to PA guidelines at age 3 years to see if they could possibly be attributed to motor skills development or school attendance.

# Facilitating Ambulatory Heart Rate Variability Analysis by using Accelerometer-based Classifications of Physical Behaviour

**Ms. Marlene Rietz<sup>1,2</sup>**, Dr. Jesper Schmidt-Persson<sup>1</sup>, Prof. Anders Grøntved<sup>1</sup>, Associate Professor Jan C. Brønd<sup>1</sup>

<sup>1</sup>Center for Research in Childhood Health, Research Unit for Exercise Epidemiology, Department of Sports Science and Clinical Biomechanics, Odense, Denmark, <sup>2</sup>Karolinska Institutet, Stockholm, Sweden

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose** This study compared ambulatory heart rate variability (HRV) across behaviours during wake and sleep in free-living settings to facilitate standardised analysis of HRV.

**Methods** Beat-to-beat heart rate (HR) and accelerometry were collected using single-lead ECG (Firstbeat Bodyguard 2) and trunk- and thigh-worn Axivity AX3 among 161 adults participating in the SCREENS trial (Region of Southern Denmark) for six days. HR files were loaded and processed in HRVdata structures employing the RHRV R-package. Using a validated algorithm, start time and duration spent in the behaviours sitting, standing, and lying were extracted, and information on self-reported sleep was added. Time and frequency analysis for each episode was executed in an automated fashion. Differences in root mean square of successive RR interval differences (RMSSD) and normalised unit (nu) low and high frequency (LFnu, HFnu) across activities were compared using linear mixed regression adjusted for age and sex with subject ID as random effect. Moreover, a nested repeated-measures Bland-Altman analysis was used to compare gold-standard 24 h summary RMSSD estimates with RMSSD during self-reported or normalised sleep (0:00 - 5:00), and limits of agreement (LoA) and concordance correlation coefficients (CCC) were computed.

**Results** HRV was estimated for 31,289 episodes in 161 individuals (52.8% female) at a mean age of 41.44 years. Compared to seated position, mean differences (95% confidence interval [CI]) in RMSSD while standing and lying (wake) were -2.63 ms (-3.24, -2.01) and 4.53 ms (4.15, 4.91), respectively. There were significant differences in lying HRV across sleep status including increased RMSSD and HFnu and decreased LFnu in asleep state. Bland-Altman analyses showed a bias (95% LoA) of 4.49 ms (-25.05, 16.07) and 4.42 ms (-26.88, 18.04) at a CCC (95% CI) of 0.78 (0.76, 0.80) and 0.72 (0.68, 0.75) for total and normalised sleep compared to 24 h RMSSD, respectively.

**Conclusions** This analysis characterised differences in HRV across activities during wake and sleep in a large, ambulatory sample. Findings highlight significant differences in HRV across physical behaviours and poor agreement between long-term HRV assessments (24h, sleep). Methodologies to address these differences are required to reduce measurement bias with ambulatory HRV analysis.



# Development of a Water Orientation measurement Tool for children with Autism Spectrum Disorders

**Mrs. Patty van t Hooft<sup>1</sup>**, Dr. Janet Moeijes<sup>1</sup>, Dr. Jooske van Busschbach<sup>1,2</sup>, Dr. Esther Hartman<sup>2</sup>

<sup>1</sup>Windesheim University of Applied Science, Zwolle, Netherlands, <sup>2</sup>University of Groningen, University Medical Center Groningen, Center for Human Movement Sciences, Groningen, Netherlands

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose** This study aims to develop and validate an observation instrument of water-related motor skills in Children with Autism Spectrum Disorders. Apart from disorders in social communication, interaction, and repetitive behaviors, 80% of children with Autism Spectrum Disorders (ASD) are at risk for motor impairments. Aquatic interventions offer opportunities to practice, experience, discover, and develop motor skills. However, to tailor training and therapy to the needs of these children, insight into their movement behavior is essential; therefore, an observation tool for these children is needed.

It is necessary that the observation tool aligns with the motor problems and the symptoms associated with ASD. A swimming method that meets these requirements, is the Halliwick method (Lambeck, 2015). Therefore, this method was taken as a starting point in developing the observation tool.

**Methods** The five-stage model for developing and validating a systematic observation tool was used (Brewer & Jones, 2002; Roberts & Fairclough, 2012). After a literature search, observation training followed to identify specific motor behavior (stage 1); in stage 2, the instrument was developed, and stage 3 contained the determination of the instrument's face and construct validity by experts. In stage 4, the phase we are currently in, inter-rater reliability will be established via the intraclass correlation coefficient (ICC); and in stage 5, internal consistency via Cronbach's alpha will be measured.

**Results** Stages 1 to 3 have resulted in a validated observation tool with 24 items. Existing observation tools based on the Halliwick method and experts with a solid knowledge of the Halliwick-swimming method and/or experts in the field of ASD were consulted. The results of stages 4 and 5 are expected in May 2023 and will be presented at the symposium.

**Conclusion** To evaluate the water-based motor skills of children with ASD and to measure improvement after training/therapy, this new observation tool based on the Halliwick method is developed. The observation instrument is valuable to help children with ASD gain water-based motor skills by offering child-centred programs.

# Food policy and facilitators and barriers to adoption and implementation of nutrition interventions in higher education settings in Flanders: findings from a qualitative study

**Ms. Evelyn Fonderie**<sup>1,2</sup>, Prof. Wendy Van Lippevelde<sup>1</sup>, Prof. Benedicte Deforche<sup>1,2</sup>, Prof. Maïté Verloigne<sup>1</sup>, Prof. Tom Deliëns<sup>2</sup>

<sup>1</sup>Ghent University, Ghent, Belgium, <sup>2</sup>Vrije Universiteit Brussel, Brussels, Belgium

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** As unhealthy dietary behavior and obesity are two main risk factors of cancer, it is of utmost importance to create a shift in younger individuals towards lifelong healthy dietary patterns and the prevention of weight gain. The transition from high school to college or university is a well-known and well-studied risk period for weight and/or fat gain and not meeting the recommended dietary guidelines. Unfortunately, students are an often neglected target group in health promotion efforts and, to date, there is only little understanding of the influencing factors of adoption and implementation of nutrition interventions in higher education settings. Therefore, the aim of this project is to provide insight into the organization of the food policies in higher education settings and stakeholders' perspectives on facilitators and barriers to adoption and implementation of nutrition interventions which aim at promoting healthy and sustainable eating behaviors among higher education students in Flanders.

**Methods:** Focus groups will be conducted with stakeholders (e.g., director/staff of student services or student restaurants, dieticians, responsible person for food policy on campus) from several Flemish higher education institutions with a semi-structured interview guide based on the Consolidated Framework for Implementation Research. Data collection will be continued until data saturation is reached. This goal is envisioned with an estimate of 5 to 10 focus groups with 6 to 10 participants. We aim to conduct 4 focus groups at colleges and 4 at universities with mixed food policy quality scores based on the regularly conducted Prevention Survey by the Flemish Institute of Healthy Living. Afterwards, the audio-recorded focus groups will be transcribed verbatim and analyzed using thematic analysis.

**Results:** The results are not yet available as the study is ongoing. Preliminary results will be presented at the congress. An overview of the organization of the food policies and facilitating and hindering factors will be reported.

**Conclusion:** The findings of this research will add to the literature on implementation science and will aim at informing future development and implementation of nutrition interventions promoting healthy and sustainable diets in higher education students in Flanders.

# “Including us, talking to us and creating a safe environment”- Youth Public and Patient Involvement (PPI) in the Walking In Schools (WISH) Study

**Prof. Marie Murphy**<sup>1,2</sup>, Dr. Maria O’Kane<sup>1</sup>, Dr. Angela Carlin<sup>1</sup>, Dr. Leanne Doherty<sup>1</sup>, Prof. Russell Jago<sup>3</sup>, Dr. Ian Lahart<sup>4</sup>, Dr. Maria Faulkner<sup>5</sup>, Mr. Gary McDermott<sup>1</sup>, Prof. Alison Gallagher<sup>6</sup>

<sup>1</sup>Centre for Exercise Medicine, Physical Activity and Health, Sports and Exercise Sciences Research Institute, Ulster University, Belfast, United Kingdom, <sup>2</sup>Physical Activity for Health Research Centre (PHARC), Institute for Sport, Physical Education and Health Sciences, University of Edinburgh, Edinburgh, United Kingdom, <sup>3</sup>Centre for Exercise, Nutrition & Health Sciences, School for Policy Studies, University of Bristol, Bristol, United Kingdom, <sup>4</sup>Faculty of Education, Health and Wellbeing, University of Wolverhampton, Walsall Campus, Walsall, United Kingdom, <sup>5</sup>Department of Law and Humanities, Atlantic Technological University, Letterkenny Campus, Letterkenny, Ireland, <sup>6</sup>Nutrition Innovation Centre for Food and Health (NICHE), Biomedical Sciences Research Institute, Ulster University, Coleraine Campus, Coleraine, United Kingdom

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Young people have the right to be informed, involved, and consulted about decisions affecting their lives. Patient and Public Involvement (PPI) ensures that research is carried out ‘with’ or ‘by’ young people rather than ‘to’, ‘about’ or ‘for’ them. To date, young people have had limited involvement in the design, implementation, and dissemination of public health research and in particular, physical activity (PA) research. We aimed to involve young people in the design, implementation, and dissemination of a PA intervention for adolescent girls.

**Methods:** Following the Walking In Schools (WISH) feasibility study that consulted young people pre- and post-intervention, a Youth Advisory Group (YAG) was set up within the main intervention trial. YAG meetings took place on three occasions and schools were asked to invite pupils aged 12-14 years and 15-18 years (walk leaders). Participative methods were used to answer researcher questions, develop study plans and review study documentation. The impact of these PPI activities was evaluated.

**Results/Findings:** The YAG meetings informed recruitment strategies for pupils and walk leaders. We aimed to recruit n384 pupils (average n24 pupils per school), this target was exceeded with n589 pupils recruited (average n32.7 pupils per school), and n51 (8.7%) of pupils subsequently withdrawing from the study. The YAG advised on the acceptability of data collection methods, accelerometry and incentives for returning accelerometers. At four timepoints, pupils were asked to wear the accelerometer for seven days (n2213 devices issued over 12 months). Only n3 (0.14%) devices were unreturned. Pupils were engaged with data collection and at all timepoints >84% of pupils met wear-time criteria. PPI shaped the development and refinement of the WISH Walk Leader Award and the number of walk leaders recruited (n149; n16.6 per school), exceeded the initial target of n135 or n15 per school. Over the intervention period, only n4 (2.7%) of walk leaders withdrew from the study.

**Conclusions** The views of young people were central to the development of the WISH Study and although difficult to evaluate the impact of PPI, in this instance, there is strong evidence of a positive impact on study recruitment, attrition, and data collection.

# Levels and barriers to physical activity and sport participation among equity-deserving groups in Canada with an intersectionality lens: A systematic review

**Ms. Mikyung Lee<sup>1</sup>**, Ms. Yas Alamshahi<sup>1</sup>, Ms. Bridgett Chau<sup>1</sup>, Ms. Joy Cheng<sup>1</sup>, Dr. Eun-Young Lee<sup>1</sup>

<sup>1</sup>Queen's University, Kingston, Canada

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Background:** Regular participation in physical activity has numerous benefits on health and well-being. Although it is important to ensure that all individuals have access to quality physical activity and sport experiences, most individuals living in Canada do not meet national physical activity guidelines, and members of equity-deserving groups generally report even lower rates of physical activity and sport participation, placing these populations at even greater risk for poor health outcomes and premature death. Equity-deserving groups also have been disproportionately impacted by COVID-19 with regards to access and opportunities to physical activity and sport participation. However, information about barriers to these opportunities among equity-deserving individuals is largely lacking.

**Purpose:** This systematic review was to summarize results from peer-reviewed, original research articles describing the levels of and barriers to physical activity and sport participation among the members of the equity-deserving groups, with an intersectionality lens.

**Methods:** Articles published in 2000 and up are identified and summarized, using Preferred Reporting Items for Systematic Reviews and Meta-Analyses. Searches were performed on five electronic databases using the following keywords: “physical activity”, “sport”, “exercise”, “equit\*”, “underserve\*”, “disadvantage\*”, “deprive\*”, and their variations and synonyms. Research articles were deemed eligible for inclusion if the following criteria were met: 1) peer-reviewed, published research articles; 2) described barriers to physical activity and sport participation; 3) written in English; 4) published between 2000 and present; 5) included the members of the equity-deserving groups; and 6) involved individuals living in Canada. Included articles will be synthesized both quantitatively and qualitatively.

**Results/findings:** After removing duplicates (n = 1,338), a total of 2,904 articles were available for the Level 1 screening. The review team is currently conducting the Level 2 screening and the results will be available by April 2023 and the full findings will be presented at the conference.

**Conclusions:** Multi-level barriers to physical activity and sport participation among the members of the equity-deserving groups will be identified. The outcome of this review will inform the development of inclusive strategies to promote physical activity and sport participation among people with diverse marginalized identities living in Canada.

# The acceptability and experiences of entomophagy in a UK adult population: an online survey.

**Dr. Lauren McGale**<sup>1</sup>, Dr. Maxine Sharps<sup>3</sup>, Dr. Jay Duckworth<sup>2</sup>

<sup>1</sup>Edge Hill University, Ormskirk, United Kingdom, <sup>2</sup>De Montfort University, Leicester, United Kingdom,

<sup>3</sup>University of Liverpool, Liverpool, United Kingdom

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** N. Other

**Purpose:** Food choice has been identified as an important consumer impact area in sustainability efforts (Nash, 2009). Entomophagy (consuming insects) is gaining attention, due to potential nutritional and environmental advantages over other protein sources, being both high in protein and micro-nutrients (Dobermann, 2017) and having less environmental impact than larger livestock (Food and Agriculture Organization of the United Nations, 2020). However, in Western countries, where consuming insects is not common practice, it is generally considered to be disgusting and reserved as a novelty food (Deroy et al., 2015). The purpose of this study is to identify factors which may affect willingness to consume insects and to establish existing experience with entomophagy in the UK.

**Methods:** UK adults ( $M=34.03$  yrs,  $SD=10.74$  yrs;  $n=603$ ) were recruited to complete an online, cross-sectional survey, using the Prolific recruitment platform. Participants were 76% female. The survey consisted of demographic measures (age, gender, ethnicity, and education level), as well as measures of socioeconomic status (measured using the NS-SEC), environmental concern (via the ISSP-R), attitudes towards commodities (in this case insects, using the AtIT), Food Disgust (via the Food Disgust Scale), in addition to measures of anticipated taste/sensory perceptions and willingness to consume insects. Quantitative data analysis will be carried out using SPSS and will include multivariate analysis of variance (MANOVA) and multinomial logistic regression analyses, as appropriate. This study protocol has been preregistered ([osf.io/p3z62](https://osf.io/p3z62)).

**Results/findings:** Results are to be determined.

**Conclusions:** This study provides a well-timed opportunity to understand willingness to consume insects in a novel, Western population. It could potentially inform strategies which may improve acceptability of entomophagy, which could contribute to a reduction of the double burden of malnutrition and obesity, in addition to providing a potential agricultural solution to global food security and sustainability. Understanding consumer attitudes towards, and perceptions of, insects as a novel food source is key, if we wish to avail of this opportunity.

# Does context matter? The association between affective states and physical behavior and its moderation by weather factors measured with ambulatory assessment

**Ms. Irina Timm<sup>1</sup>**, Prof. Markus Reichert<sup>1,2,3</sup>, Prof. Ulrich W. Ebner-Priemer<sup>1,2</sup>, Dr. Marco Giurgiu<sup>1,2</sup>

<sup>1</sup>Mental mHealth Lab, Institute of Sports and Sports Science, Karlsruhe Institute of Technology, Karlsruhe, Germany, <sup>2</sup>Department of Psychiatry and Psychotherapy, Central Institute of Mental Health, Medical Faculty Mannheim/Heidelberg University, Mannheim, Germany, <sup>3</sup>Department of eHealth and Sports Analytics, Ruhr University Bochum, Bochum, Germany

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Physical behavior (PB) is a key lifestyle factor in regulating and preventing diseases across the lifespan. Researchers identified affective, cognitive, and contextual factors like weather conditions, as significant contributors in determining if individuals are physically active. However, there is scarce empirical evidence about potential associations between PB (i.e., physical activity and sedentariness) and affective states influenced by weather conditions in daily life. This study examined the within-subject association between affective states and subsequent PB. Additionally, the effects of contextual weather factors on PB were analyzed and interactions were exploratively considered.

**Methods:** Utilizing ambulatory assessment, 79 participants completed electronic diaries about their affective states (i.e., valence, energetic arousal, and calmness) up to six times a day over five days, and their PB was simultaneously recorded via accelerometers. Weather conditions (i.e., temperature and precipitation) recorded near participants' locations served as moderators in the multilevel analyses.

**Results:** Exploratory analyses showed that temperature significantly moderated the relationship between calmness, valence, and PB. Higher temperatures enhanced the positive effects of valence on physical activity ( $\beta = .001$ ,  $p = .023$ ) and attenuated the negative effects of calmness on physical activity ( $\beta = .001$ ,  $p = .021$ ). Moreover, higher temperatures enhanced the positive effects of valence on reduced sedentary behavior ( $\beta = -0.011$ ,  $p = .043$ ). In addition, we revealed a significant positive association between temperature, and physical activity ( $\beta = 0.025$ ;  $p = .015$ ). Furthermore, we confirmed earlier findings associating affective states with PB. Increased valence and energetic arousal were positively associated with physical activity ( $\beta = 0.007$ ;  $p < .001$ ), whereas calmness predicted lower levels of physical activity ( $\beta = -0.006$ ;  $p < .001$ ). Higher levels of calmness showed a positive association with sedentary behavior ( $\beta = 0.054$ ;  $p = .003$ ).

**Conclusions:** Moderating effects, such as higher temperatures enhancing the positive effects of valence on physical activity, provide mechanistic real-life insights as a basis for future health technologies. Just-in-time adaptive interventions offer the possibility to incorporate weather conditions and allow triggering individuals within their preferred weather conditions to promote physical activity. Such personalized real-time systems have recently been promoted by the WHO as most promising.



# Maternal smoking, breastfeeding, birth outcomes and overweight/obesity at ages of 3 and 10 years

**Ms. Mian Bao**<sup>1</sup>, Prof. Torsten Plösch<sup>1</sup>, Prof. Torsten Plösch<sup>2</sup>, Dr. Eva Corpeleijn<sup>3</sup>

<sup>1</sup>Department of Obstetrics and Gynecology, University Medical Center Groningen, University of Groningen, Groningen, Netherlands, <sup>2</sup>Perinatal Neurobiology, School of Medicine and Health Sciences Carl von Ossietzky University Oldenburg, Oldenburg, Germany, <sup>3</sup>Department of Epidemiology, University Medical Center Groningen, University of Groningen, Groningen, Netherlands

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Objective:** Great emphasis has been placed on the negative impact of maternal smoking during pregnancy on the offspring, while breastfeeding is beneficial for both mothers and children. The purpose of this study is to investigate the short-term and long-term effects of maternal smoking, breastfeeding, and especially to investigate if breastfeeding can reduce the negative effect of maternal smoking during pregnancy, on children's risk of overweight/obesity.

**Method:** 2142 mother-child pairs from the Dutch GECKO Drenthe cohort were included. Maternal smoking and breastfeeding data were based on multiple questionnaires for mothers and midwives. Birth outcomes were derived from clinical records. Weight and height were measured by Well Baby Clinic nurses. Overweight and obesity of children were classified by International Obesity Task Force (IOTF) criteria. Linear and logistic regression analyses, adjusted for relevant confounders, were used for continuous and dichotomous outcomes, respectively. Two-way ANOVA was used to detect the interaction effect.

**Results:** Of the 2142 pregnant women, 20.7% (443) mothers smoked during pregnancy. Maternal smoking during pregnancy was found to be associated with a lower birth weight ( $\beta$ : -0.15, 95%CI: -0.30-(-0.17),  $p<0.001$ ), lower birth length ( $\beta$ : -0.11, 95%CI: -1.13-(-0.39),  $p<0.001$ ) and lower head circumference at birth ( $\beta$ : -0.17, 95%CI: -1.20-(-0.35),  $p<0.001$ ), but not with placenta weight ( $\beta$ : -0.01, 95%CI: -23.44-16.50,  $p=0.733$ ). Maternal smoking during pregnancy was also found to be associated with overweight/obesity in children at ages 3 and 10 (aOR: 2.24, 95%CI: 1.28-3.94,  $p<0.01$ ; aOR: 2.29, 95%CI: 1.55-3.38,  $p<0.001$ ). 74.6% (1598/2142) of the mothers gave breastfeeding ever. Ever breastfeeding was not found to be associated with overweight/obesity at ages 3 and 10 (aOR: 1.58, 95%CI: 0.93-2.65,  $p=0.093$ ; aOR: 1.15, 95%CI: 0.81-1.63,  $p=0.437$ ). There was no interaction effect between maternal smoking during pregnancy and breastfeeding on children's BMI at ages of 3 and 10 years ( $p=0.737$ ;  $p=0.636$ ).

**Conclusion:** Maternal smoking during pregnancy may have short-term and long-term effects on children's growth, while breastfeeding may not counteract the negative impact of maternal smoking during pregnancy on children's overweight/obesity.

**Keywords:** Maternal smoking; breastfeeding; growth parameters; overweight/obesity

# Are the university campuses built environment associated with the active commuting of Chilean and Spanish students?

Ms. Ximena Palma-Leal<sup>1,2</sup>, Dr. Francisco Sergio Campos-Sánchez<sup>3</sup>, Prof. Greet Cardon<sup>4</sup>, Dr. Delfien Van Dyck<sup>4</sup>, Dr. Maria Paula Santos<sup>5,6</sup>, Dr. Fernando Rodríguez-Rodríguez<sup>2</sup>, Dr. Daniel Camiletti-Moirón<sup>7,8</sup>, **Dr. Palma Chillón<sup>1</sup>**

<sup>1</sup>Department of Physical Education and Sports, Faculty of Sport Sciences, Sport and Health University Research Institute (iMUDS), University of Granada, Granada, Spain, <sup>2</sup>IRyS Group, School of Physical Education, Pontificia Universidad Católica de Valparaíso, Viña del Mar, Chile, <sup>3</sup>Department of Urban and Spatial Planning, University of Granada, Granada, Spain, <sup>4</sup>Department of Movement and Sports Sciences – Research Unit Physical Activity and Health, Ghent University, Ghent, Belgium, <sup>5</sup>Research Center on Physical Activity, Health and Leisure (CIAFEL), Faculty of Sport, University of Porto, Porto, Portugal, <sup>6</sup>Laboratory for Integrative and Translational Research in Population Health (ITR), Porto, Portugal, <sup>7</sup>GALENO Research Group, Department of Physical Education, Faculty of Education Sciences, University of Cádiz, Puerto Real, Spain, <sup>8</sup>Instituto de Investigación e Innovación Biomédica de Cádiz (INiBICA), Cádiz, Spain

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Background:** Considering the daily interaction between university students and their campuses, specific characteristics of the built environment of campuses could be important to increase physical activity while actively commuting to the university.

**Purpose:** firstly, to describe the mode of commuting of university students and the built environment of six university campuses in Chile and Spain; and secondly, to explore the associations between the built environment of their university campuses and active commuting of university students.

**Methods:** A total of 1419 university students (47.3% women; 25.6 ± 4.7 years old) self-reported their mode of commuting to the university. The built environment of six university campuses (3 in each country) was evaluated by the QGIS 3.22.14. software obtaining nine built environment characteristics. Associations were studied using multinomial logistic regression analysis.

**Results/findings:** The main mode of commuting in Chile was public transport (59.5%) followed by active commuting (38.2%), while in Spain the main mode was private transport (56.9%) followed by public transport (22.7%) ( $p < 0.001$ ). The built environment of campuses in Chile showed high scores in land-use mix, bicycle racks, public space ratio, and air pollution, while campuses in Spain showed high scores in residential density, connectivity, cycle lanes, service density, and green space density (all,  $p < 0.001$ ). In Chile, higher connectivity (Campus 1: Odds Ratio (OR): 81.58,  $p < 0.001$ ; Campus 2: OR: 4.75,  $p = 0.024$ ), higher land-use mix (Campus 1: OR: 17.17,  $p = 0.001$ ), more cycle lanes (Campus 1: OR: 62.12,  $p < 0.001$ ), and more green space density (Campus 1: OR: 72.77; Campus 2: OR: 3.97; Campus 3: OR: 7.74; all,  $p < 0.001$ ) were associated with higher odds of active commuting compared to private transport commuting. In Spain, higher green space density (Campus 4: OR: 3.97; Campus 5: OR: 4.39; both,  $p < 0.001$ ) was associated with higher odds of active commuting compared to private transport.

**Conclusions:** To increase the active commuting in university populations, it may be important to keep changing the built environment of university campuses, with a specific focus on connectivity and land-use mix in Chile, and green space density in both countries.

# Adaptation of the BIA-Obesity framework for countries facing a double burden of malnutrition based on a scoping review and a Delphi survey

**Ms. Carmen Klinger**<sup>1,2</sup>, Dr. Olufunke Alaba<sup>3,4</sup>, Associate Professor Peter Delobelle<sup>5,6</sup>, Ms. Nicole Holliday<sup>1,2</sup>, Prof. Estelle Vicki Lambert<sup>4</sup>, Ms. Anna Leibinger<sup>1,2</sup>, Mr. Elochukwu Christopher Okanmelu<sup>1,2</sup>, Prof. Eva Annette Rehfuess<sup>1,2</sup>, Dr. Peter von Philipsborn<sup>1,2</sup>

<sup>1</sup>Chair of Public Health and Health Services Research; Institute for Medical Information Processing, Biometry and Epidemiology; Ludwig-Maximilians-Universität (LMU Munich), Munich, Germany, <sup>2</sup>Pettenkofer School of Public Health, Munich, Germany, <sup>3</sup>Health Economics Unit; School of Public Health; University of Cape Town, Cape Town, South Africa, <sup>4</sup>Health through Physical Activity, Lifestyle and Sport Research Centre (HPALS); Department of Human Biology; University of Cape Town, Cape Town, South Africa, <sup>5</sup>Chronic Disease Initiative for Africa; University of Cape Town, Cape Town, South Africa, <sup>6</sup>Department of Public Health; Vrije Universiteit Brussels, Brussels, Belgium

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose** The aim of the Business Impact Assessment on Obesity and population-level nutrition (BIA-Obesity) framework, as developed by the International Network for Food and Obesity/Non-communicable Diseases Research, Monitoring and Action Support (INFORMAS), is to systematically assess and benchmark food industry policy and action and develop evidence-informed recommendations for food industry actors. The term 'double burden of malnutrition' (DBM) describes the co-existence of various forms of malnutrition (including undernutrition, micronutrient deficiencies, unhealthy diets, overnutrition and obesity) within an individual over the life course, at the household level or in communities or entire populations. As BIA-Obesity focuses on obesity and unhealthy diets, it is the objective of this research to adapt this framework for countries facing a DBM.

**Methods** Using scoping review methodology as recommended by the Joanna Briggs Institute, we will identify and map recommendations for and best practices by the formal food industry to address undernutrition and food insecurity, considered in isolation or as part of broader strategies to address the DBM. For the scoping review, we will include academic and grey literature that i) focus on individuals of any age with undernutrition, with or without other co-existing forms of malnutrition, ii) discuss recommendations and/or best practices and/or lived experiences of the formal food industry, iii) in any context. We will use the results of the scoping review to adapt the existing framework to the DBM, by adding, revising, and potentially removing existing indicators based on a Delphi survey with relevant experts.

**Results/Findings** Compared to similar frameworks, the adapted BIA-Obesity framework will be less resource-intensive and more easily implementable in countries affected by a DBM. Due to its staged approach, the first phase will only assess the commitments and level of disclosure of food industry actors, whereas the actual implementation will be assessed in a subsequent phase. Another advantage is the assessment of the entire range of the formal food industry, producing a comprehensive picture of its role in addressing the DBM.

**Conclusions** The formal food industry (food and beverage manufacturers, food retailers, food wholesalers, caterers, and quick-service-restaurants) represents an important lever to address the various components of the DBM.

# A hybrid 3 study evaluating the scale up of evidence-based early-life nutrition interventions in a community setting - the Nutrition Now project protocol for phase 2

**Associate Professor Anine Christine Medin**<sup>1</sup>, Prof. Frøydís Nordgård Vik<sup>1</sup>, Prof. Elisabet Rudjord Hillesund<sup>1</sup>, Prof. Nina Cecilie Øverby<sup>1</sup>

<sup>1</sup>Department of Nutrition and Public Health, Faculty of Health and Sport Sciences, University of Agder, Kristiansand, Norway

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** Very few efficacious dietary interventions are scaled up and implemented in real-life settings. The Nutrition Now project set out to improve dietary behaviours in pregnant women, 0–2-year-olds and their parents, both directly and through early childhood education and care (ECEC), and maternal and child health care. This is done by implementing and scaling up four interventions targeting early-life nutrition, which are combined in a digital resource (the Nutrition Now resource). The interventions in the Nutrition Now resource have previously been found to be efficacious in smaller trials and are currently being tested out in a Hybrid 1 study in one municipality, to gather information on implementation strategies and assess effectiveness. Building on this, the main aim of this study is to test the impact of different implementation strategy packages when scaling up. Evaluation of intervention effectiveness will also be assessed as a secondary outcome.

**Methods:** This is a hybrid 3 study in which 25 municipalities in the county of Agder, South Norway, will be given access to the Nutrition Now resource at the start of the study without being accompanied by specific implementation strategies. A non-randomized stepped wedge design will be used, in which different clusters (municipalities) will be exposed to implementation strategy packages at different time points. We will expose the different municipalities to either a low-, or medium-resource-demanding implementation strategy package and continuously monitor implementation outcomes in all municipalities throughout the study. Established implementation outcomes from the RE-AIM framework and others will be assessed, through user data and short popup questions embedded in the Nutrition Now resource, in addition to qualitative interviews. Effectiveness will be assessed using food purchase data from ECECs and municipal spending on nutrition-related activities documented in the municipalities' budget.

**Results/findings:** As of March 2023, we plan to start collecting data in autumn 2023.

**Conclusions:** Scaling up effective interventions is important. This work will advance the understanding of what it takes to implement and scale up early-life interventions, in a real-life community setting. This study may also inform future national implementation and scale-up of the Nutrition Now resource.

**Trial registration:** ISRCTN10694967

# Evaluation of the impact of the community-based complex intervention "10,000 Steps Duesseldorf" in two cities in North Rhine-Westphalia: replication study.

**Ms. Elena Schmitz<sup>1</sup>**, Dr. Paula M Matos Fialho<sup>1</sup>, Ms. Sorina Willemsen<sup>1</sup>, Dr. Markus Vomhof<sup>2,3,4</sup>, Prof. Andrea Icks<sup>2,3,4</sup>, Mr. Alexander Lang<sup>5</sup>, Prof. Oliver Kuss<sup>5,6</sup>, Dr. Simone Weyers<sup>1</sup>, Prof. Claudia Pischke<sup>1</sup>

<sup>1</sup>Institute of Medical Sociology, Centre for Health and Society, Medical Faculty, Heinrich Heine University Duesseldorf, Duesseldorf, Germany, <sup>2</sup>Institute for Health Services Research and Health Economics, Centre for Health and Society, Medical Faculty, Heinrich Heine University Duesseldorf, Duesseldorf, Germany, <sup>3</sup>Institute for Health Services Research and Health Economics, German Diabetes Center, Leibniz Center for Diabetes Research, Heinrich Heine University Duesseldorf, Duesseldorf, Germany, <sup>4</sup>German Center for Diabetes Research, Partner Duesseldorf, Muenchen-Neuherberg, Germany, <sup>5</sup>Institute for Biometrics and Epidemiology, German Diabetes Center, Leibniz Institute for Diabetes Research, Heinrich Heine University Duesseldorf, Duesseldorf, Germany, <sup>6</sup>Centre for Health and Society, Medical Faculty, Heinrich Heine University Duesseldorf, Duesseldorf, Germany

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** The World Health Organization (WHO) recommends that adults engage in 150-300 minutes of moderate physical activity (PA) per week. This corresponds to approximately 7,000-10,000 steps per day. In Germany, fewer than half of all adults achieve this goal. This highlights the need for population-based intervention approaches to promote regular daily PA. The aims of this replication study are to adapt, implement and evaluate a community-based complex PA intervention originally developed and successfully implemented in Belgium.

**Methods:** The intervention includes components at different levels (e.g. individual level: website; organizational level: promotion of PA e.g. in companies, senior citizens' associations; community level: media campaign, environmental changes, e.g. signage in parks). The intervention "10,000 Steps Ghent" was adapted in a participatory development phase with relevant stakeholders of the city of Duesseldorf and two health insurance companies, including a joint implementation strategy.

To investigate the effects of the intervention, PA and other secondary endpoints will be assessed in representative samples of adults aged 25-75 years (n=399) in the cities of Duesseldorf and Wuppertal (control city) at baseline and the follow-up. In spring 2021, participants took part in a one-hour telephone interview and wore a pedometer (30% of the sample wore an additional accelerometer) for one week. The follow-up assessment will take place starting May 2023 until September 2023 after the one year of intervention is completed.

In addition, a process evaluation will be conducted. To identify processes of implementation and maintenance of the program, as well as facilitating and hindering factors, organizations in the intervention city areas will be surveyed using an online questionnaire. To analyse the cost-effectiveness of the intervention, a health economic evaluation will be conducted.

**Results/findings:** The baseline survey for the study was conducted from April 2021 until the end of March 2022. The intervention began in April 2022 and will end in April 2023. Preliminary results on intervention development and baseline survey implementation will be presented at the ISBNPA.

**Conclusions:** To our knowledge, this study is the first research project aiming to replicate the effects of a complex PA intervention successfully implemented in another European country.



# Association between Chronotype, Social Jetlag and Body Mass Index in Adolescents

**Dr. Paula Jakszyn**<sup>1,2</sup>, Dr. Marta Crous-Bou<sup>1,3</sup>, Miss Nuria Nadal<sup>1</sup>, Dr. Nithya Shankar Krishnan<sup>1</sup>

<sup>1</sup>Catalan institute of Oncology, Barcelona, Spain, <sup>2</sup>Blanquerna School of Health Sciences, Ramon Llull University, , Barcelona, Spain, <sup>3</sup> Department of Epidemiology, Harvard TH Chan School of Public Health, Boston, USA

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Background:** Recent research has indicated that along with unhealthy dietary patterns, irregular sleeping habits too play an important role in adolescent health and wellbeing. Adolescents' circadian preference and sleeping patterns are predictive factors of health. The main aim of this review was to determine whether there is an association between chronotype and social jetlag with Body Mass Index in adolescents.

**Methods:** Electronic databases such as PubMed, Google Scholar and Scientific Electronic Library Online were screened to identify studies published in the last ten years (2012 to 2022) in the adolescent population (10-19 years). The final articles were selected based on the following criteria: target population; adolescent definition as per the WHO criteria ; study design (cross sectional, cohort); assessment methods for chronotype/social jetlag (Morningness Eveningness Questionnaire MEQ; Munich Chronotype Questionnaire MCQ; Morningness Eveningness Scale for Children MESQ; actigraphy; Reduaed Morningness Eveningness Questionnaire rMEQ; Morningness Eveningness Self Assessment MEQ SA and adapted versions) evaluation of the association between BMI and chronotype, and BMI and Social jet lag.

**Results:** Twenty-one studies were included in the final review. More than 60% of studies found a positive association between chronotype and Body Mass Index . Over 60% of studies also found a positive association between social jetlag and Body Mass Index. However, only few have found a statistically significant association.

**Conclusion:** However, despite not conclusive results, shorter sleep duration and social jetlag seem to prevail quite commonly among adolescents, thus it is imperative to promote healthy sleeping habits in this population. Future research specifically longitudinal studies could be beneficial in order to confirm these associations.



# The influence of dwelling type on food expenditure: a cross-sectional analysis of the 2020 Belgian Household Budget Survey

**Mr. Allan Estandarte**, Prof. Lukar Thornton

<sup>1</sup>Department of Marketing, Faculty of Business and Economics, University of Antwerp, Antwerp, Belgium

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** In Belgian cities, the persistent inaccessibility of housing compels individuals to reside in poor-quality dwellings often designed with small and non-functional kitchens. Dwelling conditions may therefore influence the types of foods individuals purchase, store, prepare, and consume in the household setting, yet this remains understudied. To address this knowledge gap, this study aims to explore differences in food expenditure by dwelling type among Belgian households.

**Methods:** Using nationally-representative data from the Belgian Statistics Office (Statbel) 2020 Household Budget Survey, this study examined food expenditure within 6,104 households. Preliminary analysis was performed to examine differences in median bi-monthly fruit and vegetable expenditure by dwelling types (categorised as detached house, semi-detached house, adjoining single-family house, and small (building with 1-2 dwellings), medium (building with 3-9 dwellings), and large (building 10 or more dwellings) apartment blocks. Further analysis will utilise two-part regression models controlling for confounding factors to help identify the independent influence of housing type on food expenditure using a broader range of food items.

**Results:** Households residing in detached houses reported the highest median expenditure (reported in EUR) on fruits (median=17.03; IQR=8.11, 30.12) and vegetables (median=23.82; IQR=12.93, 40.34), compared to other dwelling types. Households residing in small apartment blocks reported the lowest expenditure on fruits (median=10.08; IQR=4.75, 20.24) and vegetables (median=16.64; IQR=8.06, 30.81).

**Conclusions:** Belgian households residing in small apartment blocks tend to spend less on fruits and vegetables than those living in other dwelling types. These preliminary results suggest that dwelling type may influence food purchasing behaviours. With the adoption of compact living policies in Belgium, these findings require further investigation into how dwelling type and conditions may influence food purchasing behaviours.

# The impact of tiered soft drink taxes in Europe on sugar content of soft drinks: a controlled interrupted time series and synthetic control study

**Ms. Anna Leibinger**<sup>1,2</sup>, Mr. Oliver Huizinga<sup>3</sup>, Prof. Diana Rubin<sup>4</sup>, Mr. Karl Emmert-Fees<sup>5,6</sup>, Dr. Sara Pedron<sup>5</sup>, Prof. Michael Laxy<sup>5</sup>, Prof. Eva Rehfues<sup>1,2</sup>, Dr. Jacob Burns<sup>1,2,5</sup>, Dr. Peter von Philipsborn<sup>1,2</sup>

<sup>1</sup>Chair of Public Health and Health Services Research, Ludwig-Maximilians-Universität München (LMU Munich), Munich, Germany, <sup>2</sup>Pettenkofer School of Public Health, Munich, Germany, <sup>3</sup>German Non-Communicable Disease Alliance (DANK), Berlin, Germany, <sup>4</sup>Centre for Nutritional Medicine, Vivantes Humboldt-Klinikum, Berlin, Germany, <sup>5</sup>Professorship of Public Health and Prevention, Technical University of Munich, Munich, Germany, <sup>6</sup>Institute of Epidemiology, Helmholtz Zentrum München, Neuherberg, Germany

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose** A high intake of sugar from beverages is associated with an increased risk for obesity and other non-communicable diseases, such as diabetes and cardiovascular disease. The WHO recommends tiered soft drink taxes, with a higher tax rate on beverages with a higher sugar content, to incentivise reformulation and thus decrease sugar consumption. While most previous studies have explored the effect of soft drink taxes on soft drinks sales and consumption, the purpose of this study is to evaluate the impact of tiered soft drink taxes on the sugar content of soft drinks in four European countries that implemented such taxes: France, Ireland, Portugal, and the United Kingdom.

**Methods** We use aggregated annual sales data from Euromonitor International to calculate the mean sales-weighted sugar content of soft drinks in the intervention and control countries from 2009 to 2022. We employ two quasi-experimental approaches to assess the effects of tiered soft drink taxes on sugar content: a controlled interrupted time series study and a synthetic control study. These two analyses differ in their creation of a counterfactual post-intervention – whereas the former uses all control countries equally, the latter employs a data-driven approach to construct a “best-fitting” control.

**Results/Findings** The study's findings will provide insights into the effectiveness of tiered soft drink taxes in reducing sugar content in soft drinks in four European countries. The synthesis of findings from two quasi-experimental approaches will provide a more comprehensive evaluation, and hence increase the robustness of the study.

**Conclusions** The findings will shed light on the effectiveness of tiered soft drink taxes as a public health policy tool to decrease sugar content of beverages, and may inform policy development in other regions and thus contribute to the global effort to promote healthy diets and reduce the burden of diet-related diseases.

# Associations between waist circumference, device-measured physical activity, and incident cardiovascular disease in men and women: UK Biobank study

Dr. Miguel Adriano Sanchez-lastra<sup>1,2,3</sup>, Associate Prof. Melody Ding<sup>4</sup>, Señor. Borja Del Pozo Cruz<sup>5,6</sup>, Dr. Knut Eirik Dalene<sup>7</sup>, Dr. Jakob Tarp<sup>8</sup>, **Prof. Ulf Ekelund<sup>1,7</sup>**

<sup>1</sup>Norwegian School of Sport Sciences, Oslo, Norway, <sup>2</sup>University of Vigo, Vigo, Spain, <sup>3</sup>Galicia-Sur Health Research Institute, Vigo, Spain, <sup>4</sup>The University of Sydney, Sydney, Australia, <sup>5</sup>University of Southern Denmark, Odense, Denmark, <sup>6</sup>University of Cádiz, Cádiz, Spain, <sup>7</sup>Norwegian Institute of Public Health, Oslo, Norway, <sup>8</sup>Aarhus University & University Hospital, Aarhus, Denmark

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** Previous studies suggest that physical activity (PA) may mitigate the risk of cardiovascular diseases (CVD) associated with high waist circumference (WC). However, it remains unclear whether different intensities of PA may modify these associations and if the shape of the association is different between men and women. We aimed to examine the joint associations between WC and device-measured PA with incident fatal and non-fatal CVD in men and women.

**Methods:** Participants from the UK Biobank were classified according to WC as low (<88cm in women, <102cm in men) or high (equal-to or above the cut-offs) abdominal adiposity. PA data was obtained from accelerometer measurements and categorized as tertiles of light-intensity, moderate-to-vigorous-intensity, vigorous-intensity, and total weekly PA. CVD diagnoses and deaths were obtained from registries. Participants who had events in the first two years of follow-up, those with prevalent diseases and/or physical limitations were excluded to reduce reverse causality bias. We used hazard ratios from proportional sub-hazards models with multivariable adjustment, including the body mass index, to examine the associations between combined categories of WC with PA with CVD, accounting for non-CVD deaths as competing events.

**Results:** A total of 30,869 men and 39,967 women were included (mean age  $\pm$  SD = 61.6  $\pm$  7.9 years), and followed for a median of 6.9 years, during which 2,799 incident CVD events were recorded. High WC was associated with higher risk of CVD in both men and women, especially in those with low levels of moderate-to-vigorous intensity PA (hazard ratios [95 % confidence interval] = 1.33 [1.10, 1.61] for men and 1.49 [1.16, 1.91] for women). High volumes of PA across the entire intensity spectrum of PA attenuated and even eliminated the risk, particularly in those with a median of 510 minutes of moderate-to-vigorous intensity or 32 minutes of vigorous-intensity per week.

**Conclusion:** High levels of PA attenuate the risk of CVD associated with high WC in both men and women. Promoting small amounts of vigorous intensity physical activity may have similar beneficial effects compared to much larger volumes of moderate intensity to offset the risk of CVD.

# Mechanisms Underlying Acute Effects of Physical Activity on Cognitive Function in Healthy Young Individuals: A Systematic Review of Randomized Controlled Trials

**Miss Renyan Ma**<sup>1</sup>, Associate Professor Peter J. Joris<sup>1</sup>, Assistant Professor Brenda A.J. Berendsen<sup>1</sup>, Prof. Hans H.C.M. Savelberg<sup>2</sup>

<sup>1</sup>Department of Nutrition and Movement Sciences, NUTRIM, School of Nutrition and Translational Research in Metabolism, Maastricht University, Maastricht, Netherlands, <sup>2</sup>Department of Nutrition and Movement Sciences, NUTRIM, School of Nutrition and Translational Research in Metabolism and SHE, Maastricht School for Health Professions Education, Maastricht University, Maastricht, Netherlands

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose** Physical activity (PA) is well-known to beneficially affect mental health and cognitive function. Evidence has also already indicated that PA maintains normal brain vascular function (cerebral blood flow, CBF), increases neurogenesis, and further exerts neuroprotective effects on the brain. Nowadays, young individuals have unhealthy lifestyles with prolonged sedentary behavior and low PA levels, resulting in the development of cardiometabolic diseases, reduced mental health and cognitive function, and even premature death. Randomized controlled trials (RCTs) have already elucidated acute effects of PA on cognitive function, CBF, or other parameters in these young adults. Notably, PA was associated with an improved glucose metabolism, which may underlie the beneficial effects observed on cognitive function and problem-solving. However, the specific acute effects of PA on these outcomes and the involved mechanisms have not yet been fully elucidated. The aim of this systematic review is therefore to summarize these effects on cognitive function in healthy young individuals and to further address possible underlying mechanisms.

**Methods** A systematic literature search was performed until February 2023 involving three databases (PubMed, Web of Science and Medline). This search was performed independently by two reviewers using Rayyan software. Inclusion criteria were: RCTs; healthy (young) individuals, aged 18-35 years old; focusing on acute effects of PA; and involving the primary outcome with at least one of the secondary outcomes. The primary outcome was cognitive function, and the secondary outcomes included CBF, circulating (i.e., BDNF, IGF-1, VEGF, glucose, insulin) and salivary parameters (i.e., cortisol and testosterone concentrations).

**Results** The search resulted in a total of 6146 articles, of which 1810 articles were retrieved from PubMed, 3425 from Embase, and 911 from the Web of Science. After removing duplicates, 4471 articles were screened by title and abstract, and 241 articles were selected for retrieval and their full-texts will be screened.

**Discussion** This systematic review will discuss possible mechanisms underlying the beneficial acute effects of PA on cognitive function. These mechanisms include neurotrophic factors, neurotransmitters, glucose metabolism, hormones, and CBF. Lastly, we will also identify possible limitations and reveal interesting future study topics to explore that are related to the described outcomes/conclusions.

# Interim Evaluation of Germany's Sugar Reduction Strategy for Soft Drinks: Commitments versus Actual Trends in Sugar Content and Sugar Sales from Soft Drinks

**Dr. Peter von Philipsborn**<sup>1</sup>, Mr. Oliver Huizinga<sup>2</sup>, Mrs. Anna Leibinger<sup>1</sup>, Prof. Diana Rubin<sup>3</sup>, Dr. Jake Burns<sup>1, 4</sup>, Mr. Karl Emmert-Fees<sup>4, 5</sup>, Dr. Sara Pedron<sup>4</sup>, Prof. Michael Laxy<sup>4</sup>, Prof. Eva Rehfuess<sup>1</sup>

<sup>1</sup>Ludwig-Maximilians-Universität München (LMU Munich), Munich, Germany, <sup>2</sup>German Non-Communicable Disease Alliance (DANK), Berlin, Germany, <sup>3</sup>Centre for Nutritional Medicine, Vivantes Humboldt-Klinikum, Berlin, Germany, <sup>4</sup>Professorship of Public Health and Prevention, Technical University of Munich, Munich, Germany, <sup>5</sup>Institute of Epidemiology, Helmholtz Zentrum München, Neuherberg, Germany

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose** A high intake of sugar from sugar-sweetened soft drinks increases the risk for obesity, type 2 diabetes mellitus and dental caries. The German government has pursued a national strategy for sugar reduction in soft drinks based on voluntary commitments by industry since 2015, but its effects are unclear.

**Methods** We use aggregated annual sales data from Euromonitor International to assess trends in mean sales-weighted sugar content of soft drinks and per capita sugar sales from soft drinks in Germany from 2015-2021. We compare these trends to the reduction path set by Germany's national sugar reduction strategy, and to data for the United Kingdom, which adopted a soft drinks tax in 2017 and which we selected as best practice comparison country based on pre-defined criteria. Moreover, we compare the trend in the years before the policy was announced (2011-2015) to the trend after the policy was announced (2015-2021) by calculating the compound annual reduction rate.

**Results/Findings** Between 2015-2021, the mean sales-weighted sugar content of soft drinks sold in Germany decreased by 2% from 5.3 to 5.2 g/100ml, falling short of an interim 9% reduction target and a 29% reduction observed in the United Kingdom over the same period. Sugar sales from soft drinks in Germany decreased from 22.4 to 21.6 g/capita/day (-4%) between 2015-2021. After the sugar reduction strategy was announced in 2015, the compound annual reduction rate of the mean sales-weighted sugar content of soft drinks sold in Germany increased slightly from 0.2% to 0.4%.

**Conclusions** Reductions in the sugar content of soft drinks observed under Germany's voluntary sugar reduction strategy fall short of stated targets and trends observed internationally under best practice conditions. Additional policy measures may be needed to support sugar reduction in soft drinks in Germany, and should be considered as part of Germany's new national nutrition strategy announced for 2023.

**Note:** A shorter version of this abstract and the full paper on which it is based have been published in *Annals of Nutrition and Metabolism* (<https://doi.org/10.1159/000529592>).

# Impact on mental health of a three-armed randomized controlled trial using self-monitoring of daily steps with and without counseling in prediabetes and type 2 diabetes: the Sophia Step Study

**Mr. Yohannes Woldamanuel<sup>1</sup>**, Dr. Jenny Rossen<sup>1</sup>, Associate Professor Patrick Bergman<sup>4</sup>, Associate Professor Therese Anderbro<sup>3</sup>, Associate Professor Philip von Rosen<sup>2</sup>, Prof. Maria Hagströmer<sup>1,2,5</sup>, Prof. Unn-Britt Johansson<sup>1,6</sup>

<sup>1</sup>Department of Health Promoting Science, Sophiahemmet University, Stockholm, Sweden, <sup>2</sup>Department of Neurobiology, Care Sciences and Society, Karolinska Institutet, Sweden, Stockholm,, Sweden, <sup>3</sup>Department of Psychology, Stockholm University, Stockholm, Sweden, <sup>4</sup>Department of Medicine and Optometry, eHealth Institute, Linnaeus University, Kalmar, Sweden, <sup>5</sup>Academic Primary Care Center, Region Stockholm, Stockholm, Sweden, <sup>6</sup>Department of Clinical Science and Education, Södersjukhuset, Karolinska Institutet, Stockholm, Sweden

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Aim** This study aimed to evaluate the effect of a two-year self-monitoring daily steps intervention with or without counseling on a secondary outcome on mental health in people with prediabetes and type 2 diabetes.

**Method** Sophia Step Study was a three-armed parallel randomized controlled trial. Participants with prediabetes or type 2 diabetes were recruited in the primary care setting. Allocation 1:1:1 was made to a multi-component intervention (self-monitoring of steps with counseling support), a single-component intervention (self-monitoring of steps without counseling support) or standard care. Mental health was assessed using questionnaires about diabetes distress, depression, anxiety, and health-related quality of life at baseline and months 3, 6, 12, and 24. The intervention effects were evaluated by linear mixed model.

**Result** In total 188 participants were allocated, 64 to the multiple-component group, 59 to the single-component group, and 64 to the standard care group. Mean age was 64.1 (SD, 7.7) years, 40% were women, 20 % had prediabetes, 46.3% had high level of education, 66% lived with a partner, mean BMI was 30.0 (SD, 4.4) kg/m<sup>2</sup>, and mean HbA1c level was 49.9 (SD, 11.4) mmol/mol. The retention rate was 91% in the first year and 81% at two years. At baseline, the levels of mental health measures were within the normal range for all groups. The magnitude of reduction in all mental health outcomes showed no significant difference within each group at any measurement from baseline up to 24 months. The mental health symptoms showed no significant differences between the interventions (multi- or single-component intervention) and the control group in any assessed outcome or time point.

**Conclusion** The two-year self-monitoring of steps intervention with or without counseling in people with prediabetes and type 2 diabetes showed no effect on the mental health outcomes throughout the intervention. However, this sample showed a good mental wellbeing at baseline.

**Trial registration:** *ClinicalTrials.gov*, [NCT02374788](https://clinicaltrials.gov/ct2/show/NCT02374788), <https://clinicaltrials.gov/ct2/show/NCT02374788>

**Key words:** Activity tracker; Anxiety; Behavior; Depression; Diabetes distress; Mental health; Pedometer; Physical activity; Quality of life, Steps.



# Intervention adherence and Physical Activity Outcomes of a Behavioural Change Intervention: Findings from the Physical Activity at Work study in Thai Office Workers

**Dr. Katika Akksilp**<sup>1,2</sup>, Associate Professor Falk Mueller-Riemenschneider<sup>1,3</sup>, Dr. Yot Teerawattanannon<sup>1,2</sup>, Associate Professor Cynthia Chen<sup>1,3</sup>

<sup>1</sup>SAW SWEE HOCK School of Public Health, National University of Singapore, Singapore, Singapore, <sup>2</sup>Health Intervention and Technology Assessment Program, Bangkok, Thailand, <sup>3</sup>Yong Loo Lin School of Medicine, National University of Singapore, Singapore, Singapore

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

Sedentary reduction and physical activity promotion programmes require comprehensive multi-component intervention development and evaluation. Intervention adherence is important as it affects the outcomes of the programme. The Physical Activity at Work programme was developed to reduce sedentary time and increase physical activity in Thai office workers. Socio-ecological model was used to create multi-component interventions, including individual (pedometer and individual-level incentives), social (movement breaks and team-level incentives), organisational (leaders involvement), and environmental (posters) levels. A full-scale cluster-randomised trial with a 6-month intervention period was implemented. The ActiGraph<sup>TM</sup> accelerometer was used to measure objective physical activity data at baseline and 6-month follow-up. We conducted a process evaluation to identify the effects of adherence to the core intervention component; the four-times daily movement breaks, on between-group differences in sedentary time and physical activity at 6-month follow-up. Adherence was defined by the percent participation in movement breaks, calculated as the percentage of individual attendances out of the maximum of 480 movement-break sessions. Multivariable linear mixed-effect models adjusted for wear-time, office size, baseline data, and adherence were used to analyse between-group differences in sedentary time, time spent in moderate-to-vigorous physical activity, and steps, with intervention group as the fixed effect and offices as the random effect. 245 participants with valid ActiGraph<sup>TM</sup> data from 18 offices (124 control and 121 intervention participants, nine offices each) were included in the analyses. By increasing 10% adherence, the analyses showed a sedentary time reduction of -8.51 min (95%CI: -16.4 to -0.590 min), increased time spent in moderate-to-vigorous physical activity by 3.06 min (95%CI: 1.16 to 4.96 min), and increased step count of 313 (95%CI: 91 – 534 steps) during waking hours. Similar results were found during working hours, with increased time spent in moderate-to-vigorous physical activity of 3.00 min (1.81 – 4.20 min) and step count of 216 (88 – 344). The results emphasise the importance of intervention adherence on sedentary time reduction and physical activity promotion in office workers and the need to refine the multi-component intervention to increase adherence and maximise the programme's benefits.

# Individual-level correlates of active transportation among Queen's University employees

**Miss Megan Clemens<sup>1</sup>**, Dr. Patricia Collins<sup>2</sup>, Dr. Eun-Young Lee<sup>1</sup>

<sup>1</sup>School of Kinesiology and Health Studies, Queen's University, Kingston, Canada, <sup>2</sup>Department of Geography and Planning, Queen's University, Kingston, Canada

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** N. Other

**Purpose:** Active transportation (AT) has dual benefits: population health benefits with increased physical activity and environmental sustainability with decreased carbon emissions. Despite the city's low geographic density, residents of Kingston, Canada use AT for 9.5% of trips, compared to the country's average of 6.9%. Additionally, employees of Queen's University demonstrate even higher rates of active commuting. The objective of this study was to identify individual-level correlates of AT engagement among Queen's University employees to inform promotion strategies in Canada and potentially regions worldwide with similar geographical and climatic characteristics.

**Methods:** Self-reported, annually repeated cross-sectional data were used from the 2013-2017 Surveys of Commute Patterns among Queen's University Employees (n=3530). To conduct a cross-sectional analysis, unique respondents' data were considered only from their most recent survey completion, from either 2017 (n=1921), 2016 (n=782), 2015 (n=545), 2014 (n=282), or 2013 (n=344). The average age of respondents was 46 years (SD = 12.27), ranging between the ages of 20-84 years, and 61.3% of the analytic sample was female. Respondents' primary mode of transportation from home to work was categorized as either passive, active, or a combination of modes and analyzed using logistic regressions.

**Results:** The proportion of participants engaging in passive, active, and a combination of passive and active modes were 49.5%, 27.8%, and 22.8%, respectively. Individuals were less likely to use AT with a higher commuting distance (OR: 1.05 per 1 km increase; 95%CI: 1.04-1.06); poorer general health (OR: 1.63; 95%CI: 1.37-1.95); better mental health (OR: 1.20; 95%CI: 0.72-0.96); a moderately (OR: 1.56; 95%CI: 1.06-2.30) or somewhat physically active job (OR: 1.39; 95%CI: 1.06-1.84); and a low (i.e., <\$75,000; OR: 1.91; 95%CI: 1.32-2.75) or moderate (i.e., \$75,000-\$134,999; OR: 1.84; 95%CI: 1.39-2.43) household income. The association between age or household structure with transportation mode was not statistically significant.

**Conclusions:** There was a considerable variability in transportation modes by different individual-level correlates and these correlates were mostly not modifiable at the individual level but requires macro-level changes. Public health strategies should be tailored to target the groups that are underutilizing AT to achieve dual benefits of health and sustainability.

# Association between sedentary behaviour and glucose intolerance in rural South Indians

**Dr. Ranjit Mohan Anjana<sup>1</sup>**, Dr. Rajendra Pradeepa<sup>1</sup>, Mrs. Natarajan Lakshmi<sup>1</sup>, Dr. Ulagamathesan Venkatesan<sup>1</sup>, Dr. Hari Rakesh<sup>2</sup>, Dr. Moneeza Kalhan Siddiqui<sup>3</sup>, Dr. Colin NA Palmer<sup>3</sup>, Dr. Viswanathan Mohan<sup>1</sup>  
<sup>1</sup>Madras Diabetes Research Foundation & Dr.Mohan's Diabetes Specialities Centre, Chennai, India,  
<sup>2</sup>Dr.Mohan's Diabetes Specialities Centre, Chunampet, India, <sup>3</sup>University of Dundee, Dundee, United Kingdom

Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** Sedentary behavior is considered as a major risk factor for many chronic diseases, including diabetes. This door-to-door population-based Telemedicine PROject for screENing Diabetes and its complications in rural Tamil Nadu (TREND) study assessed the prevalence of diabetes and its associated complications in rural south India. In this analysis we aimed to assess the association between sedentary behaviour and glucose intolerance among rural south Indians.

**Methods:** Of the 15091 individuals screened for diabetes/prediabetes between 2018-2021 in 30 villages of Chengalpattu/Kancheepuram districts of Tamil Nadu, 14,117 participants who had information on venous oral glucose tolerance test and physical activity were included for analysis. Individuals were categorized as having normal glucose tolerance (NGT), prediabetes or diabetes using WHO criteria. Physical activity was assessed using a validated questionnaire for use in India called the Madras Diabetes Research Foundation (MDRF) Physical Activity Questionnaire. The time spent in sedentary behaviour on 4 domains such as television (TV) viewing, leisure time activities (reading/sitting/listening to music etc), sitting at work and transport (commute by bus, car) were captured.

**Results:** Mean age was 44±15 years and 59% were women. Overall, 76.5% (Men:71.8%;Women:79.7%) had normal glucose tolerance (NGT), 9.0% (Men:10.9%;Women:7.7%) had prediabetes and 14.5% (Men:17.3%;Women:12.5%) had diabetes. Sedentary time (hrs/day) was higher in diabetes (9.2±2.9) than prediabetes (8.4±2.8) and NGT (8.1±2.9). Of all sedentary behaviour, TV viewing was most popular and accounted for most of the sedentary time (3.2±1.6hrs/day Men:3.2±1.6; Women:3.3±1.5, p=0.32). Most individuals did not spend more than an hour sitting during transportation (0.32±0.21hrs/day) which was significantly higher in men (Men:0.42±0.24; Women: 0.26±0.15, p<0.001). Men were also found to be more sedentary at work than women (Men:2.7±2.5; Women:2.3±2.2 p<0.001). The prevalence of diabetes significantly increased with increasing tertiles of sedentary time both among women (Q1-<5hrs/d:9.2%;Q2-5-8hrs/d:12.9%;Q3->8hrs/d:17.1%;p<0.001) and men (Q1-<5hrs/d:16.2%;Q2-5-8hrs/d:15.3%;Q3->8.0hrs/d:19.2%;p=0.004). Women who spent >8hrs/day in sedentary behaviour had 1.4(95% CI 1.1–1.7; p<0.001) times risk for developing diabetes even after adjusting for age, BMI, income and systolic blood pressure.

**Conclusions:** Sedentary behaviour of >8hrs/d increases the risk of diabetes among both sexes, particularly among women in rural India which emphasizes the need for physical activity in this population for the prevention of non-communicable diseases.

# Identifying online networks and social media influencers to promote healthy behaviors: the sugar sweetened beverages (SSB) case in Mexico.

**Miss Isabel Valero-Morales**<sup>1</sup>, Miss Regina Durán<sup>1</sup>, Miss Ximena Zárate<sup>1</sup>, Dr. Simón Barquera<sup>1</sup>

<sup>1</sup>Center for Nutrition and Health Research, National Institute of Public Health, Cuernavaca, Mexico

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** D. e- & mHealth

Study objectives were 1) to explore online networks related to sugar sweetened beverages (SSB) consumption on Twitter and Instagram in Mexico, and 2) to map health influencers who could be potential partners and establish a collaborative strategy with the Center for Nutrition and Health Research (a recognized center in Mexico conducting high-level research and policy implementation [CINyS]) on Instagram to discourage SSB consumption. Tweets related to SSB were systematically collected via Twitter application programming interfaces via Academic Twitter. A content analysis was run, and health-related perceptions and online networks were identified. Influencers were identified from public rank lists and from followers list of the CINyS account; potential reach was estimated from the last 5 posts uploaded. Influencers who declared not potential conflict of interest and with the greatest potential reach were contacted to receive a communication tool kit.

18,000 tweets related to SSB were retrieved, data spanned from October 19<sup>th</sup>, 2021, to January 20<sup>th</sup>, 2023.

10,755 users, 8,717 original tweets, 8,020 retweets, and 1,427 replies were identified. Top users accounts belong to sport teams, health professionals or personal accounts. Health-related perceptions of the top tweets were supporting SSB, promoting water consumption, and complaining about the effects of SSB production has on climate change. The community created on Twitter was unreadable, mainly due to a lack of connections. Coca-Cola official account was the central user retrieved.

160 potential health influencers were identified, however, only 11 met the inclusion criteria and were contacted.

All of them accepted to participate, and 9 influencers received the full kit (a physical health book, 13 digital infographics related to SSB, and an invitation to an obesity conference). The CINyS was tagged in 8 posts, 2 posts about the book after the influencers received it, 2 posts about other health topics, 2 posts with the digital infographics, total impressions generated were 68,500.

Exploring health-related perceptions on social media can help to tailor health promotion campaigns and identify collaborators can help to increase the CINyS reach. This study can be adopted to explore other health nutrition and establish new strategies to help discourage SSB consumption.

# A mixed methods study of dietary and anthropometric changes in graduate paramedics over two years since commencing shift work

**Ms. Angela B Clark<sup>1</sup>**, Prof. Alison M Coates<sup>2</sup>, Dr. Tammie Choi<sup>1</sup>, Dr. Ben Meadley<sup>3,4,5</sup>, Associate Professor Kelly-Ann Bowles<sup>3,5</sup>, Prof. Maxine P Bonham<sup>1</sup>

<sup>1</sup>Department of Nutrition, Dietetics and Food, Monash University, Melbourne, Australia, <sup>2</sup>Alliance for Research in Exercise, Nutrition and Activity, University of South Australia, Adelaide, Australia, <sup>3</sup>Department of Paramedicine, Monash University, Frankston, Australia, <sup>4</sup>Ambulance Victoria, Doncaster, Australia,

<sup>5</sup>Paramedic Health and Wellbeing Research Unit, Monash University, Frankston, Australia

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** M. Disease prevention and management

The diets of shift workers are known to be negatively impacted by work schedules, however there is limited research demonstrating how and why dietary changes occur. This mixed methods study explored dietary behaviour changes in graduate paramedics over the first year of exposure to rotating shift work schedules while diet quality, energy intake and anthropometry were investigated for an additional year.

Participants from a graduate paramedic cohort in Australia were re-contacted for inclusion in this study. A convergent parallel mixed method study design was conducted; the qualitative component comprised of individual in-depth interviews to explore perceived dietary behaviour changes experienced over the first year of shift work. Interview transcripts were thematically analysed and guided by the COM-B (capability, opportunity, motivation and behaviour) model and theoretical domains framework (TDF). Changes to anthropometry (weight, waist circumference, body mass index (BMI)), diet quality and energy intake (using a food frequency questionnaire) were quantitatively assessed at baseline, one year and two years from commencing rotating shift work.

Eighteen participants were included in the study. From the interviews, participants reported; 1. food choices are driven by wanting to fit in with co-worker food habits, 2. food choices and meal times are unpredictable and 3. paramedics try to make healthy food choices but give in to less healthy options. Increases in weight ((mean difference (MD): 2.96kg; 95% CI: 0.89 – 5.04; p=0.003), waist circumference (MD: 5.07cm; 95% CI: 1.25 – 8.89; p=0.006) and BMI (MD: 1.07kg/m<sup>2</sup>; 95% CI: 0.26-1.87; p=0.006) were observed at two years. Daily energy intake and overall diet quality scores did not differ over the period whereas takeaway foods increased significantly from 7% to 10% of total daily energy (MD: 2.96%EI; 95% CI: 0.44 - 5.48; p=0.017).

This study contributes new information on dietary changes occurring in shift-working graduate paramedics. Providing access to healthier food choices is critical for intervening in the current early trajectory of unintentional weight gain and takeaway reliance among paramedics. Workplaces could invest in improving their food environments to include healthy food alternatives and better ambulance-based food storage facilities, to reduce the unintended metabolic consequences of rotating shift work.

# The impact of breaking up sitting during the nightshift on cognitive performance, sleepiness, hunger, and gastric upset

**Dr. Charlotte Gupta**<sup>1</sup>, Dr. Grace Vincent<sup>1</sup>, Prof. Corneel Vandelanotte<sup>1</sup>, Prof. Mitch Duncan<sup>2,3</sup>, Ms. Dayna Easton<sup>1</sup>, Associate Professor Philip Tucker<sup>4,5</sup>, Dr. Michele Lastella<sup>1</sup>, Prof. Sally Ferguson<sup>1</sup>

<sup>1</sup>Appleton Institute, Central Queensland University, SA, Australia, <sup>2</sup>School of Medicine & Public Health, The University of Newcastle, NSW, Australia, <sup>3</sup>Active Living Research Program, Hunter Medical Research Institute, NSW, Australia, <sup>4</sup>Psychology Department, Swansea University, Swansea, United Kingdom, <sup>5</sup>Stress Research Institute, Department of Psychology, Stockholm University, Stockholm, Sweden

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** N. Other

**Purpose:** The nightshift is associated with negative effects including cognitive impairments, increased sleepiness, disrupted hunger patterns, and gastric upset. A strategy to reduce these negative effects for day workers is to break up sitting with physical activity. However, it is unknown whether a physical activity intervention is effective at night, when the body is primed for sleep. This study investigated the impact of breaking up sitting during the nightshift on sleepiness, cognitive performance, hunger, and gastric upset.

**Methods:** 42 healthy adults (age M±SD: 24.3±4.6 years; 21 females) participated in a 7-day laboratory study, with 5 nightshifts (22:00-06:00). Participants were randomly allocated to a condition: Breaking up sitting (BUS; n=21) or Sedentary (SED; n=21). Every 30-min during the nightshift BUS completed 3-min bouts of light-intensity walking, while SED remained sitting. Each nightshift at 22:00, 00:00, 02:00, 04:00, participants completed the Karolinska Sleepiness Scale and 10-minute Psychomotor Vigilance Task (variables for analysis: reciprocal mean response time (mean RRT), and mean lapse count (lapse defined as reaction time greater than 500ms)). Participants consumed a lunch meal on the baseline day (13:00), and during each nightshift (01:00). Participants completed visual analogue scales of hunger, stomach upset, and bloating experienced during each nightshift.

**Results:** Linear mixed models showed significant interactions between nightshift (1-5) and time of night (2200-0600) for Mean RRT ( $p<0.001$ ), lapse count ( $p=0.02$ ), and subjective sleepiness ( $p<0.01$ ), such that cognitive performance was worse, and sleepiness was highest at 04:00 during nightshift 1. No significant interactions were found between condition and time of night or condition and nightshift. ANCOVA analyses adjusted for baseline showed no significant interactions between condition and nightshift for hunger ( $p=0.60$ ), stomach upset ( $p=0.65$ ), and bloating ( $p=0.46$ ).

**Conclusions:** Breaking up sitting with light-intensity walking did not reduce the impact of nightshift on cognitive performance, sleepiness, hunger, and gastric upset. Findings highlight the impairments associated with nightshifts, with cognitive performance and sleepiness worsening across the night, and acute impairments seen on the first nightshift. Future research should investigate the impact of breaking up sitting at night with physical activity of varied intensity and duration.



# Physical activity monitoring in rail driving: Are we on the right track?

**Dr. Stephanie Chappel**<sup>1</sup>, Prof. Anjum Naweed<sup>1</sup>, Associate Professor Janine Chapman<sup>1,2</sup>, Prof. Corneel Vandelanotte<sup>3</sup>, Prof. Andreas Holtermann<sup>4</sup>, Prof. Leon Straker<sup>5</sup>

<sup>1</sup>Appleton Institute, School of Health, Medical and Applied Sciences, Central Queensland University, Adelaide, Australia, <sup>2</sup>National Centre for Education and Training on Addiction, Flinders University, Adelaide, Australia,

<sup>3</sup>Physical Activity Research Group, Appleton Institute, Central Queensland University, Queensland, Australia,

<sup>4</sup>National Research Centre for the Working Environment, Copenhagen, Denmark, <sup>5</sup>School of Allied Health and enAble Institute, Curtin University, Perth, Australia

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose** Little to no research has investigated rail drivers' physical activity (PA) levels, especially using objective methods. The complexity of the rail environment, particularly industrial sensitivities, may impact the amount of data and the collection methods used. The aim of this presentation is to explore rail drivers' experiences of a PA monitoring data collection process.

**Methods** As part of a larger, ongoing project, rail drivers within South Australia, Australia participated in an 8-day PA data collection. Drivers continuously wore a thigh-mounted Axivity AX3 device, that collects postural data as well, and completed a work logbook. This PA data collection took into consideration industrial sensitivities within the rail industry. After the data collection drivers participated in a de-brief to review and evaluate their experiences of PA monitoring. Data were assessed to identify drivers' experience and potential problems/changes required for future data collections within this population.

**Results** Thirty-one rail drivers completed the PA monitoring protocol. The majority of the drivers (n=30) found the activity monitor comfortable to wear and would wear the device again. Interestingly, 23 drivers stated they could wear the device for longer than 8-days, ensuring attachment materials were provided. Problems identified included the attachment area getting itchy, limited materials provided, some materials being too big, and unclear instructions for attachment. Although drivers found the work logbook easy to complete (n=30), they expected more information surrounding their activity outside of work, specifics on their work tasks, and their sleep habits to be collected. This information was excluded from the data collection to align with industrial sensitivities.

**Conclusions** Rail drivers found the activity monitor comfortable and the logbook easy to complete. However, several problems were identified and should be modified for future work. Interestingly, industrial sensitivity restrictions on the collection of information did not align with drivers' expectations, especially surrounding sleep information. This highlights the importance of considering industrial sensitivities when collecting PA data in complex work environments. Furthermore, to alleviate concerns and allow robust datasets to be collected, researchers working with these population need to provide better explanations as to why and how PA information should be collected.

# A systems map of interventions to improve dietary behaviours of pre-school children: a systematic scoping review

**Ms. Jacqueline Chan**<sup>1,2</sup>, Mr. Patrick Conroy<sup>2</sup>, Prof. Philayrath Phongsavan<sup>2,3</sup>, Prof. David Raubenheimer<sup>2,4</sup>, Prof. Margaret Allman-Farinelli<sup>1,2</sup>

<sup>1</sup>Nutrition and Dietetics Group, Sydney School of Nursing, Faculty of Medicine and Health, The University of Sydney, Sydney, Australia, <sup>2</sup>Charles Perkins Centre, The University of Sydney, Sydney, Australia, <sup>3</sup>Prevention Research Collaboration, Sydney School of Public Health, Faculty of Medicine and Health, The University of Sydney, Sydney, Australia, <sup>4</sup>School of Life and Environmental Sciences, The University of Sydney, Sydney, Australia

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** The success of early childhood nutritional interventions may be limited unless we understand the complex associations between determinants across multiple systems. The aim of this literature review was to synthesise the evidence on interventions targeting dietary intake and eating behaviours in preschool children using a systems approach.

**Methods:** The review was conducted in accordance with the *Joanna Briggs Institute (JBI) Methodology for Scoping Reviews*. The search identified intervention studies targeting the dietary intake of preschool children aged 2-5 years in high income countries, published in English after January 2000. Screening of abstracts and titles were by one researcher with full texts screened in duplicate with a third reviewer to resolve conflicts. Data was extracted using a standardised form and interventions were categorised to the Determinants of Nutrition and Eating (DONE) Framework 2.0 for children developed and evaluated by experts across multiple fields. The framework maps and ranks 411 factors driving eating behaviours and nutrition and can be used to systematically summarise determinants. DONE ranks each determinant for its perceived research priority.

**Results:** The search yielded 21,369 articles. After title and abstract screening, 1066 full texts were reviewed with 160 primary studies meeting inclusion criteria. Most interventions targeted individual (55.6%, n=89) and interpersonal (64.4%, n=103) level determinants, with fewer targeting environmental (33.8%, n=54) and policy level (10.6%, n=17) determinants. The most frequently addressed determinants were Parental Resources and Risk Factors (n=85) at the interpersonal level, which included parental nutrition, food market and food product knowledge rated as medium to high priority for research by DONE. Children's Food Knowledge, Skills and Abilities (n=71) at the individual level and Parental Behaviours (n=53) at the interpersonal level were also well studied and rated as low to medium and medium priority respectively. Home Food Availability and Accessibility at the environmental level is classified as the highest research priority, however, only 15 of 160 interventions addressed these determinants.

**Conclusions:** This review highlights home food availability and accessibility as potential leverage points for future interventions to improve children's dietary intake and eating behaviours.

# Impact of COVID-19 on movement behaviors in overweight and obese adults

**Prof. Stephen Heung-Sang Wong<sup>1</sup>**, Dr. Chen Zheng<sup>1</sup>, Associate Professor Wendy Yajun Huang<sup>2,3</sup>, Dr. Xiangke Chen<sup>4</sup>, Associate Professor Fenghua Sun<sup>5</sup>

<sup>1</sup>Department of Sports Science and Physical Education, The Chinese University of Hong Kong, Hong Kong, China, <sup>2</sup>Department of Sport, Physical Education and Health, Hong Kong Baptist University, Hong Kong, China, <sup>3</sup>Dr. Stephen Hui Research Centre for Physical Recreation and Wellness, Hong Kong Baptist University, Hong Kong, China, <sup>4</sup>Department of Health Technology and Informatics, The Hong Kong Polytechnic University, Hong Kong, China, <sup>5</sup>Department of Health and Physical Education, The Education University of Hong Kong, Hong Kong, China

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Movement behaviors, including physical activity (PA), sedentary behavior (SB), and sleep, have been affected by the COVID-19 lockdown. This study examined the changes in movement behaviors among overweight and obese adults during the fifth wave of COVID-19 pandemic in Hong Kong and compared these behaviors between COVID-19 patients and healthy adults.

**Methods:** This is a retrospective study. Adults aged 18 years or above who stayed in Hong Kong during the fifth wave of COVID-19 (from February to April 2022) were invited. Participants self-reported their daily behaviors before and during the fifth wave of COVID-19. PA, SB, and sleep were assessed by International Physical Activity Questionnaire Short Form, sedentary behavior questionnaire, and Pittsburgh sleep quality index, respectively. The generalized linear model was used to analyze the difference between the groups (COVID-19 patients and healthy adults) and time (before and during the fifth wave), adjusting for sex, age, and body mass index (BMI).

**Results:** A total of 1587 overweight or obese adults (52.4% male, age:  $37.6 \pm 13.8$  years, BMI:  $26.2 \pm 3.0$  kg/m<sup>2</sup>) were recruited, and 571 were COVID-19 patients. Sleep duration was shorter during the fifth wave of COVID-19 in both COVID-19 patients ( $7.7 \pm 1.7$  vs.  $7.5 \pm 1.7$  h/day,  $p < 0.001$ ) and healthy adults ( $7.8 \pm 1.6$  vs.  $7.5 \pm 1.7$  h/day,  $p < 0.001$ ). COVID-19 patients had better sleep quality than healthy adults before the wave ( $5.8 \pm 3.1$  vs.  $6.1 \pm 3.2$ ,  $p = 0.001$ ). However, their sleep quality significantly reduced and was worse than healthy adults during the fifth wave ( $6.7 \pm 3.5$  vs.  $6.0 \pm 3.3$ ,  $p < 0.001$ ). During the COVID-19 wave, healthy adults have more moderate to vigorous PA than COVID-19 patients ( $37.2 \pm 53.4$  vs.  $35.4 \pm 50.4$  min/day,  $p = 0.04$ ). In addition, healthy adults reported a higher level of SB on weekends before ( $9.5 \pm 5.6$  vs.  $8.8 \pm 5.3$  h/day,  $p = 0.02$ ) and during ( $9.6 \pm 5.6$  vs.  $8.7 \pm 5.2$  h/day,  $p = 0.02$ ) the COVID-19 wave.

**Conclusions:** Worse sleep quality and less PA were observed during the COVID-19 outbreak, with a greater influence on COVID-19 patients. Long-term impact of COVID-19 pandemic warrants further investigation. Intervention studies are needed to improve movement behaviors among overweight and obese adults.

# Associations of movement behaviors with anxiety and depressive symptoms in COVID-19 patients

**Dr. Chen Zheng**<sup>1</sup>, Dr. Xiangke Chen<sup>2</sup>, Associate Professor Wendy Yajun Huang<sup>3,4</sup>, Prof. Stephen Heung Sang Wong<sup>1</sup>, Associate Professor Fenghua Sun<sup>5</sup>

<sup>1</sup>Department of Sports Science and Physical Education, The Chinese University of Hong Kong, Hong Kong, China, <sup>2</sup>Department of Health Technology and Informatics, The Hong Kong Polytechnic University, Hong Kong, China, <sup>3</sup>Department of Sport, Physical Education and Health, Hong Kong Baptist University, Hong Kong, China, <sup>4</sup>Dr. Stephen Hui Research Centre for Physical Recreation and Wellness, Hong Kong Baptist University, Hong Kong, China, <sup>5</sup>Department of Health and Physical Education, The Education University of Hong Kong, Hong Kong, China

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Twenty-four hours movement behaviors, including physical activity (PA), sedentary behavior (SB), and sleep, are associated with anxiety and depressive symptoms. The spreading of COVID-19 and the lockdown might increase those symptoms disorders. This study aimed to investigate the association between movement behavior before COVID-19 infection and anxiety and depressive symptoms in COVID-19 patients.

**Methods:** In this retrospective study, adults who were infected with COVID-19 in Hong Kong were invited to respond to an online survey from June to August 2022. Participants reported their PA, SB, and sleep before the infection using by International Physical Activity Questionnaire short form, sedentary behavior questionnaire, and Pittsburgh sleep quality index, respectively. The anxiety and depressive symptoms after the COVID-19 infection were assessed by the hospital anxiety and depression scale. The anxiety and depression score higher than 7 was treated as borderline abnormal. Generalized linear models were constructed to examine the relationships between movement behaviors and anxiety and depressive symptoms while controlling for sex, age, body mass index, education level, employment status, and vaccine dosage.

**Results:** The final analytic sample included 1542 adults (36.8% male) aged from 18 to 88 years old. One third and 29.2% of participants had the anxiety and depressive score higher than 7, respectively. Poor sleep quality was correlated with a higher anxiety score ( $B = 0.414$ , 95% confidence interval [CI]: 0.353 to 0.474). Daily SB was positively associated with anxiety score ( $B = 0.044$ , 95% CI: 0.005 to 0.084). Longer sleep duration ( $B = 0.129$ , 95% CI: 0.002 to 0.257) and poor sleep quality before COVID-19 infection were associated with worse depressive symptoms ( $B = 0.388$ , 95% CI: 0.324 to 0.452). More moderate to vigorous PA ( $B = -0.005$ , 95% CI: -0.009 to -0.000) and walking ( $B = -0.008$ , 95% CI: -0.012 to -0.003) were associated with a lower depression score.

**Conclusions:** Better sleep quality, less SB, and more PA were related to less anxiety and depressive symptoms among COVID-19 patients. The results provide a valuable reference for promoting healthy movement behaviors as protective factors for anxiety and depressive disorder.

# Physical activity, sedentary time, and public health care utilization in middle-aged individuals – A Northern Finland Birth Cohort 1966 Study

**Mr. Mikko Vaaramo**<sup>1,2</sup>, Dr. Anna-Maiju Leinonen<sup>1,3</sup>, Dr. Jaana Kari<sup>1,5</sup>, Mr. Iiro Nerg<sup>2</sup>, Dr. Sanna Huikari<sup>2</sup>, Prof. Raija Korpelainen<sup>1,3,4</sup>, Dr. Marko Korhonen<sup>2</sup>

<sup>1</sup>Department of Sports and Exercise Medicine, Oulu Deaconess Institute Foundation sr., Oulu, Finland,

<sup>2</sup>Department of Economics, Accounting and Finance, Oulu Business School, University of Oulu, Oulu, Finland,

<sup>3</sup>Research Unit of Population Health, Faculty of Medicine, University of Oulu, Oulu, Finland, <sup>4</sup>Medical Research Center, Oulu University Hospital and University of Oulu, Oulu, Finland, <sup>5</sup>Jyväskylä University School of Business and Economics, University of Jyväskylä, Jyväskylä, Finland

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** N. Other

**Purpose:** To study the individual-level association of physical activity (PA) and sedentary time (ST) with the public health care utilization among Finnish middle-aged individuals.

**Method:** The study utilized data from the 46-year follow-up of the Northern Finland Birth Cohort 1966 -study. PA and ST were measured with an accelerometer for 14 days. Register data on outpatient and mental health visits at health care centres, as well as hospital outpatient and inpatient visits were collected over a six-year period from PA and ST measurements onwards. Participants (N=4567) were divided into three categories based on both moderate-to-vigorous PA and ST. To avoid overdispersion due to zero counts, we utilize a two-part hurdle negative binomial model in the analysis.

**Results:** Compared with the lowest PA group, females with the highest PA group were 5.7 percentage points ( $P < 0.01$ ) less likely to have health care centre visits and 5.8 percentage points ( $P < 0.05$ ) less likely to have hospital inpatient visits. Males with the highest PA group had fewer health care centre visits (-2.8,  $P < 0.01$ ) and hospital inpatient stays (-0.6,  $P < 0.01$ ). Females and males with the highest PA group had fewer hospital outpatient visits (Females: -2.1,  $P < 0.05$ ; Males: -2.9,  $P < 0.01$ ) and days in hospital (Females: -4.8,  $P < 0.001$ ; Males: -5.2,  $P < 0.05$ ). Males with the highest ST group were 13 ( $P < 0.001$ ) and females 7.7 percentage points ( $P < 0.001$ ) less likely to visit a health care centre compared to the lowest ST group. Females with the highest ST group were also 5.1 percentage points ( $P < 0.05$ ) less likely to have a hospital outpatient and 5.6 percentage points ( $P < 0.05$ ) less likely to have a hospital inpatient visit. Females with the highest ST group had fewer health care centre visits (-2.8,  $P < 0.001$ ).

**Conclusions:** The results confirm that high PA is associated with the lower use of public health care. High ST appears also to be associated with the lower use of health care. This could reflect a relationship between high occupational sitting and occupational health care use while low PA might be a burden on public health.

# High-intensity Interval Training in Youth with Special Educational Needs: A Systematic Review

**Dr. Eric Tsz-Chun Poon<sup>1</sup>**, Dr. Waris Wongpipit<sup>2</sup>, Dr. Fenghua Sun<sup>1</sup>, Dr. Andy Choi-Yeung Tse<sup>1</sup>, Prof. Cindy Hui-Ping Sit<sup>3</sup>

<sup>1</sup>The Education University of Hong Kong, Hong Kong, Hong Kong, <sup>2</sup>Chulalongkorn University, Bangkok, Thailand, <sup>3</sup>The Chinese University of Hong Kong, Hong Kong, Hong Kong

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** High-intensity interval training (HIIT) has been promoted as a time-efficient exercise strategy to improve health and fitness in children and adolescents. However, there remains little consensus in the literature regarding its efficacy in children and adolescents with special educational needs (SEN). This study aimed to examine HIIT as a means of improving key health and fitness parameters in children and adolescents with SEN.

**Methods:** A systematic search was conducted on eight databases (MEDLINE, Embase, SPORTDiscus, Web of Science, Scopus, PsycINFO, CINAHL, and Cochrane Library). Studies were eligible if they 1) included an HIIT protocol, 2) examined parameters related to both physical and mental aspects of health and fitness, and 3) examined children and adolescents with SEN aged 5–17 years.

**Results/findings:** Of the 1727 studies yielded by the database search, 13 (453 participants) were included and reviewed. We found that HIIT generally improved body composition, physical fitness, and cardiometabolic risk biomarkers across a spectrum of SEN (e.g., attention deficit hyperactivity disorder, cerebral palsy, developmental coordination disorder, and mental illness). Improvements in mental health and cognitive performance following HIIT have also been observed.

**Conclusion:** This review provides up-to-date evidence for HIIT as a viable exercise strategy for children and adolescents with SEN. Further research investigating the benefits of HIIT in a wider range of SEN populations is warranted.



# Pregnant and postpartum women's experiences and perspectives on their dietary behavior based on semi-structured interviews

**Ms. Janine Faessen<sup>1</sup>**, Assistant Professor Indré Kalinauskaitė<sup>2</sup>, Dr. Desiree Lucassen<sup>1</sup>, Prof. Edith Feskens<sup>1</sup>, Assistant Professor Elske Brouwer-Brolsma<sup>1</sup>

<sup>1</sup>Division of Human Nutrition and Health, Wageningen University & Research, Wageningen, Netherlands,

<sup>2</sup>Julius Centre for Health Sciences and Primary Care, University Medical Centre Utrecht (UMCU), Utrecht, Netherlands

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** N. Other

**Purpose** – Healthy dietary habits are crucial to promote optimal development of the infant and prevent maternal complications during pregnancy and postpartum. Mobile health (mHealth) applications are promising approaches to improve dietary habits of women during these periods. Yet, to develop effective mHealth applications, first, insight in women's needs in dietary coaching is essential. Therefore, we aim to explore pregnant and postpartum women's experiences and perspectives on their dietary behavior.

**Methods** – Semi-structured interviews are being organized with 15 pregnant women and 15 women during the year postpartum or until data saturation is reached. Women living in the Netherlands who are able to understand and speak Dutch can participate. The results of the precedingly distributed questionnaire and the COM-B model were used to develop the interview guide. Postcards on eating related topics are used as probes to sensitize and contextualize women before the interview. The postcards are used during the interviews to start the conversation. Interviews elaborate on recent experiences with eating and related activities, such as grocery shopping, cooking and social activities, using the experience mapping method. Interviews are preferably performed offline and take about 45-60 minutes. Transcripts will be analysed via thematic content analyses by two researchers. Interviews will be inductively coded after which axial coding will be performed to determine overarching themes. These themes will be used to write a narrative including quotes to describe and analyse the results.

**Results** – Interviews are currently performed. Results of the interviews will be available by May 2023.

**Conclusion** – For interventions to be effective, it is important to determine what the target group's perspectives and requirements are with respect to dietary behavior change. This study will provide useful insights for designing an mHealth application for dietary coaching of pregnant women and women during the first year postpartum.

# The power of a bundling plant-based ingredients to reduce meat consumption in the supermarket

**Ms. Eileen Alexander<sup>1</sup>**, Prof. Wendy Van Lippevelde<sup>1</sup>, Prof. Hendrik Slabbinck<sup>1</sup>

<sup>1</sup>Ghent University, Ghent, Belgium

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Background:** Convincing people to change their eating habits to more healthy and sustainable consumption is becoming increasingly pressing. As a result, various government and commercial initiatives are currently being taken to promote more sustainable eating habits, particularly in Western countries, including more plant-based and less animal-based foods.

Changing food preferences and habits, on the other hand, is notoriously difficult since they are integral to an individual's lifestyle and socio-cultural environment. Given the importance of supermarkets in household food provision, they are in a unique position to steer both consumers and producers towards sustainable practices. This study examines the effectiveness of a multi-component nudge to shift animal-based to plant-based protein sources in a supermarket.

**Method:** We first determined which behavioral determinants this nudge should target based on a review of the literature. Previous research shows that habits, beliefs about meat consumption and lack of familiarity with alternative plant-based foods remain barriers to adopt a plant-based diet. Additionally, plant-based foods are often perceived inconvenient and less tasty. We argue that this is partly due to a lack of understanding about how to prepare and combine plant-based products into a delicious meal with high taste qualities.

Second, during a co-creative workshop with retailers and food and marketing experts, we designed a nudging intervention supported by this theory but that is also practical and financially feasible for retailers. As a result we propose that grouping plant-based products with other foods so that it forms a complete meal will encourage plant-based food purchasing. We add recipe cards with a catchy name to the bundled food items to increase attractiveness.

This strategy is being tested in a field-experiment in a Belgian supermarket. To evaluate the effectiveness of our intervention, results are benchmarked against a pre- and post-intervention period, as well as a control store of the same supermarket chain.

**Results:** Preliminary results will be available and presented at the conference.

**Conclusion:** The finding will give insights in the development, implementation and effect of interventions with a positive return on investment both for society and companies.

# Factors contributing to the perceived effectiveness of a Just-in-Time Adaptive Intervention targeting healthy eating

**Dr. Laura Winkens<sup>1</sup>**, Dr. Arend Ligtenberg<sup>2</sup>, Ms. Nieke Sonneveld<sup>1</sup>, Dr. Monique Simons<sup>1</sup>

<sup>1</sup>Chair group Consumption and Healthy Lifestyles, Wageningen University and Research, Wageningen, Netherlands, <sup>2</sup>Laboratory of Geo-information Science and Remote Sensing, Wageningen University and Research, Wageningen, Netherlands

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose.** A healthy lifestyle, especially healthy eating, can prevent the development of chronic diseases. However, the majority of people experience difficulties in adopting and maintaining healthy eating behaviors. Just-In-Time Adaptive Interventions (JITAs), a novel intervention design, shows promise for long-term behavior change as it adapts to variations in people and environments being sensed by smartphones/wearables and can provide personalized support. Despite the promising value of JITAs, research is still in its early stages and knowledge about the optimal design principles of JITAs is lacking. This study aims to provide an overview of factors relevant to app performance that future interventions should use for determining 'just-in time' and 'just in place'.

**Methods:** We developed a JITAI using geofencing techniques targeting healthy eating (i.e. eating more fruit and vegetables; eating less meat; less unhealthy snacking) to provide behavioral support at locations in the city of Wageningen where people make food decisions (e.g. the supermarket) and/or at times when people make these decisions (e.g. during lunch). From January to April 2023, a 1-week pilot will be conducted among approximately 20 residents of the city of Wageningen to gain insight into the places (just-in-place) and times (just-in-time) when people need support and are most receptive to support. Data is collected within the app: after receiving behavioral support, participants are asked about their current feeling/emotion, the perceived relevance of the message, and its location. Perceived effectiveness is measured by asking whether the message contributes to their chosen goal. The results will be analyzed using n-of-1 multivariate time series data. An aggregated analysis of the associations between location, time and emotion with perceived effectiveness is done using mixed models with participant ID as random factor and the elements as fixed factors.

**Results and conclusion:** The results of the pilot study will provide insight into factors that are important in developing JITAs aimed at healthy eating. JITAs are very promising given their ability to deliver individualized interventions. The JITAI we developed has great potential in directing behavioral support for healthy eating to the locations and times when people need it and are most receptive to it.

# Cross-sectional associations between general parenting and young children's vegetable and fruit consumption

**Ms. Jenna Rahkola**<sup>1</sup>, Dr. Carola Ray<sup>1,2</sup>, Dr. Reetta Lehto<sup>1,2</sup>, Dr. Ester van der Borgh-Sleddens<sup>3</sup>, Associate Professor Jessica Gubbels<sup>4</sup>, Dr. Henna Vepsäläinen<sup>2</sup>, Dr. Alissa Burnett<sup>5</sup>, Ms. Josefine Björkqvist<sup>1,6</sup>, Ms. Henna Launistola<sup>1</sup>, Prof. Maijaliisa Erkkola<sup>2</sup>, Prof. Eva Roos<sup>1,7,8</sup>

<sup>1</sup>Folkhälsan Research Center, Helsinki, Finland, <sup>2</sup>University of Helsinki, Department of Food and Nutrition, Helsinki, Finland, <sup>3</sup>Mondriaan Mental Health Center, Heerlen, Netherlands, <sup>4</sup>Maastricht University, Department of Health Promotion, NUTRIM School of Nutrition and Translational Research in Metabolism, Maastricht, Netherlands, <sup>5</sup>Deakin University, Institute for Physical Activity and Nutrition (IPAN), School of Exercise and Nutrition Sciences, Burwood, Australia, <sup>6</sup>University of Aberdeen, Aberdeen, United Kingdom, <sup>7</sup>Uppsala University, Department of food studies, Nutrition and Dietetics, Uppsala, Sweden, <sup>8</sup>University of Helsinki, Department of public health, Helsinki, Finland

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** The Comprehensive General Parenting questionnaire (CGPQ) categorizes parenting into five constructs: nurturance, structure, behavioral control, inappropriate control, and overprotection. Nurturance, structure, and behavioral control are generally considered positive for child outcomes, whereas inappropriate control and overprotection potentially have adverse effects. Even though parenting assessed with different measures has been associated with children's fruit and vegetable consumption, studies examining these CGPQ constructs in relation to children's food consumption are scarce. Therefore, we explored associations of the five CGPQ constructs with vegetable and fruit consumption among preschool aged children.

**Methods:** A cross-sectional sample of 767 preschoolers (3–6 years old) from the DAGIS survey conducted in Finland in 2015–2016 was used. Parents completed a 22-item version of the CGPQ assessing all five parenting constructs. Children's food consumption of three days was assessed using a food record filled by parents at home and by early educators at preschool. Three-day mean of child's vegetable consumption (fresh, frozen, or canned vegetables, excluding potatoes and vegetables incorporated into mixed dishes) and of fruit consumption (fresh fruit and fresh and frozen berries) were computed as g/MJ, and the resulting variables were square root transformed. The associations between the parenting constructs and food consumption were analyzed using linear regression models adjusted for child's age and gender, and parental educational level.

**Results:** Higher overprotection was associated with lower vegetable consumption ( $B = -0.154$ , 95% CI =  $-0.294; -0.013$ ). The other constructs were not significantly associated with vegetable consumption, and no associations with fruit consumption emerged.

**Conclusions:** This study suggests that higher overprotection is associated with lower vegetable consumption among preschool aged children, which is in line with the only previous study – to our knowledge – assessing overprotection and children's vegetable consumption. Explanations for this association, which may include differential use of feeding practices, should be investigated. Furthermore, although no associations with the other constructs were found, they might have a moderating role in associations between feeding practices and children's food consumption, which calls for further research.

# Ultraprocessed food consumption and adequacy of energy, macronutrients and micronutrients recommended daily intake in young patients with celiac disease.

**Dr. Marta Flor-Aleman<sup>1,2</sup>**, Dr. Rafael Martín-Masot<sup>2,3</sup>, Ms. María Jiménez Muñoz<sup>3</sup>, Ms. Marta Herrador López<sup>3</sup>, Dr. Víctor Manuel Navas López<sup>3</sup>, Dr. Teresa Nestares<sup>1,2</sup>

<sup>1</sup>Department of Physiology, Faculty of Pharmacy, University of Granada, Granada, Spain, <sup>2</sup>Institute of Nutrition and Food Technology “José MataixVerdú” (INYTA), Biomedical Research Centre (CIBM), University of Granada, Granada, Spain, <sup>3</sup>Pediatric Gastroenterology and Nutrition Unit, Hospital Regional Universitario de Málaga, Málaga, Spain

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** The nutritional adequacy of gluten-free diets (GFD) is a controversial issue, as the exclusion of gluten-containing cereals from the diet may lead to nutritional imbalances. Patients with celiac disease (CD) have lower intakes of micronutrients and greater intakes of total fat and simple and added sugars; however, whether these differences are explained by the ultra-processed food (UPF) intake of patients with CD is unclear. To assess the influence of UPF consumption on the adequacy of macronutrient and micronutrient recommendations in young patients with CD.

**Methods:** This cross-sectional study included 58 children with CD (age: 7.4±3.9 years; 60% female). Dietary intake was assessed through a three-day record (two on weekdays and one on weekends). The Evalfinut 2.0 software, was employed for analyzing all daily diaries. The Spanish population's recommended energy and nutrient intake levels and the European Food Safety Authority (EFSA) recommendations were taken as reference values. The NOVA classification, which categorizes foods according to the degree and purpose of industrial processing was employed.

**Results:** The mean % of total energy from UPF was 48%. The morning and afternoon snacks were the meals with the highest proportion of energy intake from UPF (66% and 76%, respectively), followed by breakfast (55%), dinner (44%) and lunch (21%). The group with the highest intake of energy from UPF (above 50% of total energy) showed lower adequacy to vitamin A ( $p=0.009$ ), calcium ( $p=0.027$ ), potassium ( $p=0.023$ ) and magnesium ( $p=0.046$ ) recommended daily intake. Those participants whose 50% or more of their energy intake comes from UPF showed lower adherence to the fat-recommended intake compared with their peers with lower UPF intake ( $p=0.048$ ). No differences were found regarding carbohydrate recommended intake ( $p=0.597$ ).

**Conclusion:** Overall, our results indicate that children who consumed more UPF presented more dietary imbalances (i.e., lower % of adequacy to vitamin A, calcium, potassium, magnesium, and fat recommended daily intake) which may contribute to inadequate nutritional adequacy to GFD. The % of energy intake from UPF should be closely monitored by nutritionists, especially in morning and afternoon snacks, to meet the macronutrients and micronutrient recommended daily intakes in patients following GFD.

# Physical activity, cognitive function, and classroom behaviour

**Dr. Chris Heemskerk<sup>1</sup>**

<sup>1</sup>University of Bern, Bern, Switzerland

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** N. Other

**Purpose:** To investigate the effect of acute PA on measures of executive functions (EF) and task-related behaviour in the classroom, and whether the effect of PA on behaviour is mediated by EF. These relations have been investigated in isolation, but not concurrently in the same sample. This may shed light on the mechanisms by which PA affects task-related behaviour in the classroom.

We hypothesised that: 1) EF correlate positively with on-task and negatively with off-task behaviours; 2) PA breaks positively affect on-task behaviour, inhibition and switching; 3) Inhibition and switching mediate the relationship between acute PA and behaviour.

**Methods:** We used a cluster-randomised experimental design. We collected data from 212 4<sup>th</sup> grade children (M=10.6years, 52.4% females). The experimental group had a 15-minute PA break, the control group continued classroom lessons as usual. Before and after, participants had normal classroom lessons, during which they were observed for 25 minutes and completed the Hearts and Flowers task (HF) to measure EF. Control variables were fluid intelligence, sex, and BMI z-score. We used spearman correlations between behaviour and EF, logistic multilevel models for effects of PA on behaviour, mixed ANOVA for effects of PA on EF, and structural equation models for mediation effects.

**Results:** At pre-test, fluid intelligence correlated with accuracy in the HF mixed block ( $\rho=.16$ ,  $p=.024$ ), and active off-task behaviour ( $\rho= -.15$ ,  $p=.030$ ). At post-test, accuracy in the mixed HF block correlated with BMI ( $\rho= -.23$ ,  $p=.005$ ). ANOVAs indicated no time-by-condition effects of PA on EF. Logistic regressions found increased off-task behaviour only in the control ( $d=0.22$ , small effect) but not the PA group ( $d=0.15$ ). Passive off-task and on-task behaviours were unaffected ( $d= -.04$  to  $-.11$ ). No mediation via EF was identified.

**Conclusion:** PA was found to reduce off-task behaviour in the 4<sup>th</sup> grade classroom. No correlations with or mediation by EF was found. This suggests that the effect of PA on task-related behaviour is not due to an increase in inhibitory control. This contributes to the growing literature on the mechanisms by which PA benefits cognitive skills and academic achievements in children.



# Effectiveness comparison of exercise strategies for bodyweight management among children and adolescents: A network meta-analysis

**Dr. Robin ST Ho<sup>1</sup>**, Mr. King Yin Chui<sup>1</sup>, Mr. Felix YC Kwok<sup>1</sup>, Prof. Stephen HS Wong<sup>1</sup>

<sup>1</sup>The Chinese University of Hong Kong, Hong Kong, China

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Exercises including aerobic exercise, resistance exercise, and combined aerobic and resistance exercise are current exercise strategies to be performed among children and adolescents for bodyweight management. Existing evidence on this research topic has been synthesized using direct head-to-head meta-analyses. However, these three main types of exercises have not been ranked comprehensively based on existing data from randomized control trials (RCTs) by network meta-analysis (NMA). We synthesized and analyzed the comparative evidence on these exercise strategies and ranking the best option using NMA using the most updated data from existing RCTs.

**Methods:** An overview of systematic reviews (SRs) and NMA (PROSPERO: CRD42022338829) was employed. A search for relevant literature published in English was conducted in four electronic databases from their inception until May 2022. SRs containing RCTs and fulfilling our pre-specified PICOS inclusion criteria were included. RCTs included were a comparison of exercise groups including aerobic exercise, resistance exercise, and the combination of both aerobic and resistance exercises among children and adolescents between 6 and 19. Effectiveness of reducing bodyweight, body fat percentage, waist circumference, cholesterol, and triglyceride were compared among exercise groups using both head-to-head pairwise meta-analyses directly and NMA indirectly.

**Results/findings:** Overall, 25 SRs were identified from the 2,749 screened citations. Of the eligible SRs, 366 citations were retrieved, and 37 RCTs were finally included. From the NMA results, five networks were constructed among five outcomes. Among the indirect comparison groups calculated by the cumulative probability as shown by the SCURA results, aerobic exercise was shown to be most effective option for reducing bodyweight (84.4%), waist circumference (88.3%), and triglyceride (89.6%), while combined aerobic and resistance exercise was to be the most effective option for reducing body fat (99.6%) and cholesterol (76.2%).

**Conclusions:** Aerobic exercise component is crucial in bodyweight management for designing exercise program for children and adolescents. Resistance exercise component might also be critical that it can be incorporated into aerobic exercise program to maximize the potential to reduce body fat and cholesterol among children and adolescents.

# Cross-device comparability for wrist-worn accelerometry in large-scale population-based cohort studies

**Dr. Laura Brocklebank**<sup>1</sup>, Dr. Scott Small<sup>2</sup>, Dr. Mikaela Bloomberg<sup>1</sup>, Prof. Andrew Steptoe<sup>1</sup>, Prof. Aiden Doherty<sup>2</sup>

<sup>1</sup>Department of Behavioural Science and Health, University College London, London, United Kingdom, <sup>2</sup>Big Data Institute, University of Oxford, Oxford, United Kingdom

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose** Accelerometry is increasingly being used in large-scale population-based cohort studies to objectively measure movement behaviours, including physical activity, sedentary behaviour, and sleep. This free-living validation study aims to assess the comparability of movement behaviour quantification between Axivity AX3 and Matrix 003 wrist-worn accelerometers. The Axivity was used in the UK Biobank (UKB; ~100,000 participants) and, more recently, in the English Longitudinal Study of Ageing (ELSA; ~10,000 participants). The Matrix is a more economical, multimodal alternative (i.e., triaxial accelerometer, gyroscope, and heart rate monitor) recently developed for use in the China Health and Retirement Longitudinal Study (CHARLS; ~20,000 participants).

**Methods** A convenience sample of 75 British adults aged  $\geq 50$  years wore Axivity and Matrix accelerometers simultaneously in a random positional order on their dominant wrist 24 hours per day for 8 days. Raw accelerometer data were processed using the Biobank Accelerometer Analysis tool to extract meaningful movement behaviour outcomes, including overall acceleration - the foundational physical activity metric used in the UKB. Valid data were considered as having  $\geq 3$  days of wear and contribution in each 1-hour period of the 24-hour cycle. Agreement was assessed using pairwise intraclass correlation coefficients (ICC) with 95% confidence intervals (CI), 95% equivalence tests ( $\pm 10\%$  equivalence zone), and limits of agreement (LoA). Participants also wore an automated camera during waking hours for 1 day as the basis for future training of machine learning movement behaviour classification models.

**Results** 72 participants (63% female; mean age  $66.6 \pm 10.2$  years) contributed valid data. Preliminary analyses suggest equivalent overall acceleration between Axivity and Matrix accelerometers (ICC [95% CI] 0.96 [0.87-0.98]). The Axivity recorded slightly higher overall acceleration than the Matrix ( $28.2 \pm 9.3$  and  $26.7 \pm 8.9$  mg, respectively; mean bias [LoA] 1.49 mg [-2.64-5.72]).

**Conclusions** In preliminary analyses, the newly-developed Matrix 003 demonstrates functional equivalence to the previously-validated Axivity AX3 when measuring free-living physical activity over 7 days. Therefore, it is potentially a more attractive option for future large-scale population-based cohort studies, particularly those in low- and middle-income countries, and cross-cohort comparisons with large Axivity cohorts, such as UKB and ELSA, would be viable.

# Investigating homeworking experiences associative impact on health behaviours and wellbeing: A Network Analysis

**Mr. Samuel Keightley<sup>1</sup>**, Dr. Myanna Duncan<sup>1</sup>, Dr. Benjamin Gardner<sup>2</sup>

<sup>1</sup>King's College London, London, United Kingdom, <sup>2</sup>University of Surrey, Surrey, United Kingdom

Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** The recent move towards hybrid and remote working has introduced evidence of the impact of such working practices on employee health behaviour and wellbeing. For example, a homeworker typically experiences a reduction in daily incidental physical movement as well as a blurring of work and non-work boundaries. Informed by previous qualitative findings, this study aimed to quantitatively understand the importance of identified homeworking experiences and to explore hypothesised associative impacts on health-related behaviours and wellbeing.

**Methods:** A cross sectional online survey was utilised to gather homeworking, wellbeing and health-related experiences of 491 participants (272 females & 218 males, age range 18 – 73y, M = 36.59, SD = 10.40). Drawn from a previous first stage qualitative to quantitative conversion study, ten homeworking experience constructs (25 items) were measured (e.g. 'ability to switch off from work'). Five validated health-related (e.g. physical activity) and seven wellbeing related (e.g. work-life conflict) constructs were also measured. Interrelations of homeworking, health-related and wellbeing-related experiences were examined through method of network, bridge node, and shortest path analyses. Centrality indices (e.g. *expected influence*) informed analyses throughout.

**Results:** Among the homeworking experiences, four interrelation clusters were identified (homeworking mastery, home-work transition, daily work pressure, & work-day forecast). In the observed network, homeworking experiences more closely related to wellbeing-related indicators as opposed to health-related indicators. Homeworking autonomy, daily workload manageability, ability to switch off from work, and 'work-day planning and organisation' demonstrated particularly important influential roles in the observed network, with notable interrelations with work-life conflict, job satisfaction, sleep trouble, and indicators of sedentary behaviour. General wellbeing, burnout, work-related physical activity, sleep trouble and break taking were identified to play key associative roles in the observed network, and were examined in relation to shortest and direct pathways in relation to homeworking experiences.

**Conclusions:** Results highlight and support the interplay between key aspects of homeworking experiences and indicators of health and wellbeing. Findings may inform further investigation towards the development of behavioural interventions for homeworkers. Our study points toward the potential for altering individual health and wellbeing by modifying workload, work autonomy and work-life conflict.

# School-based physical activity in relation to active travel among adolescents

**Ms. Lena Malnes**<sup>1</sup>, Prof. Sveinung Berntsen<sup>1</sup>, Prof. Elin Kolle<sup>2</sup>, Prof. Andreas Ivarsson<sup>1,3</sup>, Prof. Sindre M. Dyrstad<sup>4</sup>, Prof. Geir K. Resaland<sup>5</sup>, Dr. Runar Solberg<sup>2,6</sup>, Prof. Tommy Haugen<sup>1</sup>

<sup>1</sup>Department of Sport Science and Physical Education, University of Agder, Kristiansand, Norway, <sup>2</sup>Department Sports Medicine, Norwegian School of Sport Sciences, Oslo, Norway, <sup>3</sup>Center of Research on Welfare, Health and Sport, Halmstad University, Halmstad, Sweden, <sup>4</sup>Department of Public Health, University of Stavanger, Stavanger, Norway, <sup>5</sup>Center for Physically Active Learning, Western Norway University of Applied Sciences, Sogndal, Norway, <sup>6</sup>Centre for Epidemic Interventions Research, Norwegian Institute for Public Health, Oslo, Norway

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Background:** Active travel and school settings have been perceived as ideal domains to promote physical activity. Our aim was to determine whether increased physical activity in one setting leads to a compensatory change in another setting – more specifically if two weekly hours of extra school-based physical activity affected rates of active travel among Norwegian adolescents enrolled in the School In Motion (SciM) project.

**Method:** We included 9th-grade pupils (n = 2084) from the cluster RCT SciM project. Schools in the intervention group (n = 20) implemented 120 min of class-scheduled physical activity and physical education, in addition to the normal two hours of weekly physical education the schools in the control group (n = 10) performed, for nine months. Pupils who reported walking or cycling to school were defined as active transport, while motorized transport was pupils commuting by bus or car. Thereafter, the pupils were categorized as either maintaining active travel (active-active), maintaining motorized travel (motorized–motorized), changing to active travel (motorized–active), or changing to motorized travel (active–motorized) from pretest to posttest. Multilevel logistic regression was used to analyze the intervention effect on travel mode, adjusted for age, gender, ethnicity, parents' education, and location.

**Results:** In total, most participants used active travel at baseline and maintained their travel habits throughout the intervention period; n (%): active–active 1025 (73 %), motorized – motorized 271 (19 %), active–motorized 79 (6 %), motorized–active 31 (2 %). The likelihood of maintaining active travel or changing travel mode was not associated with the intervention; active–active (Odds ratio [95%CI]: 2.56 [0.46-6.48]), active–motorized (2.06 [0.82-3.95]) and motorized–active (1.58 [0.10-4.54]), with motorized–motorized as the reference group. The findings were consistent to and from school, during the winter and summer.

**Conclusion:** Active travel rates did not seem to be affected by the extra school-based physical activity among adolescents in the SciM project.

# Higher Healthy Diet Index associates with better eating competence and lower adiposity in two adult cohorts in Finland

**Miss Kirsikka Aittola<sup>1</sup>**, Dr. Leila Karhunen<sup>1</sup>, Dr. Tanja Tilles-Tirkkonen<sup>1</sup>, Dr. Elina Järvelä-Reijonen<sup>1</sup>, Prof. Marjukka Kolehmainen<sup>1</sup>, Prof. Ursula Schwab<sup>1,2</sup>, Dr. Jaana Lindström<sup>3</sup>, Prof. Arto Mannermaa<sup>4,5</sup>, Prof. Timo Lakka<sup>6,7,8</sup>, Prof. Jussi Pihlajamäki<sup>1,2</sup>

<sup>1</sup>School of Medicine, Institute of Public Health and Clinical Nutrition, University of Eastern Finland, Kuopio, Finland, <sup>2</sup>Department of Medicine, Endocrinology and Clinical Nutrition, Kuopio University Hospital, Kuopio, Finland, <sup>3</sup>Department of Public Health and Welfare, National Institute for Health and Welfare, Helsinki, Finland, <sup>4</sup>School of Medicine, Institute of Clinical Medicine, Clinical Pathology and Forensic Medicine, University of Eastern Finland, Kuopio, Finland, <sup>5</sup>Biobank of Eastern Finland, Kuopio University Hospital, Kuopio, Finland, <sup>6</sup>Institute of Biomedicine, School of Medicine, University of Eastern Finland, Kuopio, Finland, <sup>7</sup>Department of Clinical Physiology and Nuclear Medicine, Kuopio University Hospital, Kuopio, Finland, <sup>8</sup>Kuopio Research Institute of Exercise Medicine, Kuopio, Finland

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** A health promoting diet and eating behavior that supports it are crucial in the prevention of type 2 diabetes (T2D). Many valid indices have been created to measure diet quality, but few of them are used in clinical practice or health promotion, and more information is therefore needed of their usefulness. Biobanks offer a novel platform for prevention of T2D combining individual's health and clinical information, as well as genetic and lifestyle data. In this study, we investigated the associations of diet quality with eating competence (EC) and risk factors for T2D in two Finnish adult cohorts consisting of participants of T2D prevention and biobank studies.

**Methods:** A cross-sectional analysis of two cohorts, including the 3100 adult participants of the Stop Diabetes (StopDia) study, who were selected based on their increased T2D risk screened using the Finnish Diabetes Risk Score (FINDRISC) and 626 adult patients from the Biobank of Eastern Finland, was performed. Diet quality was measured with the Healthy Diet Index (HDI) and its 7 subdomains, a higher score indicating a healthier diet. A digital questionnaire was used to collect data on EC (assessed with the Satter Eating Competence Inventory 2.0<sup>TM</sup>), body mass index (BMI), and physical activity (h/wk) and in the Biobank cohort also T2D risk (assessed with FINDRISC). The HDI score was divided into tertiles in both study cohorts, and correlation and covariance analyses adjusted for age and sex were performed.

**Results/findings:** In both cohorts, EC ( $r=0.281$ ,  $p<0.01$  in StopDia;  $r=0.250$ ,  $p<0.01$  in Biobank cohort) and total physical activity ( $r=0.190$ ,  $p<0.01$ ;  $r=0.175$ ,  $p<0.01$ ) increased and BMI ( $r=-0.130$ ,  $p<0.01$ ;  $r=-0.148$ ,  $p<0.01$ ) decreased with increasing HDI. Of the subdomains of HDI, "Fruit and vegetables" and "Fish and meat" had the strongest associations with these risk factors. Moreover, the FINDRISC score was inversely associated with the HDI in the Biobank cohort ( $r=-0.101$ ,  $p<0.05$ ).

**Conclusions:** A higher HDI score was linearly associated with better EC, higher physical activity, and lower adiposity in two Finnish adult cohorts. The findings suggest that HDI is useful to evaluate and promote a healthy diet in clinical practice, health promotion and prevention of T2D.

# Urban mobility analysis for understanding health and well-being – Big data approach by mobile phone tracking

**Dr. Tiina Lankila**<sup>1,2</sup>, Associate Professor Ossi Kotavaara<sup>3</sup>, Dr. Terhi Ala-Hulkko<sup>1,3</sup>, Prof. Raija Korpelainen<sup>2,4,5</sup>, Associate Professor Harri Antikainen<sup>1</sup>

<sup>1</sup>University of Oulu, The Geography Research Unit, Oulu, Finland, <sup>2</sup>Department of Sports and Exercise Medicine, Oulu Deaconess Institute Foundation sr., Oulu, Finland, <sup>3</sup>Kerttu Saalasti Institute, University of Oulu, Oulu, Finland, <sup>4</sup>Research Unit of Population Health, Faculty of Medicine, University of Oulu, Oulu, Finland, <sup>5</sup>Medical Research Center Oulu, Oulu University Hospital and University of Oulu, Oulu, Finland

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** N. Other

**Purpose:** The aim of this study is to create spatially, and temporally accurate mobility indicators by differentiating between walking, biking, public transport, and private car-based mobility in urban environments based on mobile phone tracking data. We will develop a methodology to examine the modes of transport and the changes in mobility patterns over time utilizing mobile phone tracking data from four Finnish cities, Oulu, Rovaniemi, Kuopio and Helsinki, each located in a different part of the country.

**Methods:** The study is mainly based on Geographic Information Systems, statistics and information science, and in particular on network analytical frameworks, spatial-statistical modelling, and data management. We will analyse the movement of the population at the level of the urban structure and, based on optimal route selection in different mobilities, we will distinguish the share of the trips made by different modes of transport. The data will be analysed at multi-scale resolutions between 500x500 m and 16x16 km, and both weekday and weekend mobility dynamics will be studied. Particular attention will be paid to identification of the main changes in mobility before and during COVID-19.

**Results:** Approximate share of different active transport and motorised transport trips is distinguished from the mobile phone tracking data. From the data, we will identify those urban areas where mobility and mobility changes occurred before and during COVID-19. The information gained can later be connected to information on new investments in pedestrian, bicycle and public transport infrastructure as well as other urban environmental characteristics, and population-based Northern Finland Birth cohorts with extensive information on individual-level physical activity, physical and mental health, wellbeing and immunological health.

**Conclusions:** Mobility patterns have been reported to be changing partly due to the effects of remote working and education associated with COVID-19, as well as platform economies related to ridesharing, e-scooters, city bikes and e-bikes. By recognising the changes towards active mobility patterns, we can promote the design of more sustainable, equal and healthier urban structures. The transition to sustainable mobility should be supported by urban, regional and transport system planning.



# Evaluation of a Physical Activity Promotion Intervention for Community-Dwelling Manual Wheelchair Users: A single-case experimental design study.

**Dr. Kati Karinharju**<sup>1</sup>, Associate Professor Sean Tweedy<sup>2</sup>, Dr. Kelly Clanchy<sup>3</sup>, Dr. Sjaan Gomersall<sup>4</sup>

<sup>1</sup>Satakunta University of Applied Sciences, Pori, Finland, <sup>2</sup>University of Queensland, Human Movement and Nutrition Sciences, Brisbane, Australia, <sup>3</sup>Griffith University, School of Allied Health Sciences, Gold Coast, Australia, <sup>4</sup>University of Queensland. School of Health and Rehabilitation Sciences, Brisbane, Australia

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

Compared with the general population, manual wheelchair users (MWU) are profoundly inactive and at disproportionately greater risk of diseases of inactivity. The Adapted Physical Activity Program (APAP) is a community-based lifestyle PA intervention that is effective in ambulant people with brain impairment. This study aimed to evaluate whether APAP may also be effective for increasing habitual PA in MWU with spinal cord injury (SCI).

A multiple-baseline single case experimental design (SCED) study (A-B-maintenance) with replication was used to evaluate intervention effectiveness. Six community-dwelling MWU with SCI who were insufficiently active were randomised into two groups. Group 1 participants (n= 3) were randomised to complete either a 5, 7 or 9-week baseline period, prior to completing a 16-week intervention and a 16-week maintenance phase. Group 2 (N=3) completed a contemporaneous systematic replication of this trial. Three measures of the target behavior – daily habitual PA – were obtained : 1) daily upper body accelerations, measured using a wrist worn accelerometer; 2) daily manual wheelchair self-propulsion time, derived from accelerometer output and 3) daily manual wheelchair movement distance measured with a gyroscope-based device.

Kruskal-Wallis test indicated significant ( $p < 0.05$ ) increases for five out of six participants in at least one of the three outcomes of daily habitual PA across the intervention program. For upper body acceleration, the increase was significant ( $p \leq 0.05$ ) in five out of six, for daily self-propulsion time in two out of six, and for daily wheelchair movement distance in two out of six participants.

Findings provide sound evidence that APAP effectively promotes the adoption and maintenance of PA among MWU with SCI. This study used device-based measures as PA outcome measures, that have found to provide an acceptable estimate of habitual PA in MWU which is likely to be superior to self-report measurements alone which has been a limitation of the previous research in this area. However the most appropriate measure of PA varied depending on each individual's preferred PA mode and pattern of manual wheelchair use and future studies should use SCED designs to evaluate the APAP model of intervention using individually tailored PA measures.

# The Association between Parent–Child Nature Visits and Children’s Screen Time in Finnish 3–6-Year-Olds

**Miss Henna Launistola**<sup>1</sup>, Dr. Reetta Lehto<sup>1,2</sup>, Dr. Elina Engberg<sup>1,3</sup>, Ms. Josefine Bjorkqvist<sup>1,4</sup>, Miss Jenna Rahkola<sup>1</sup>, Prof. Carola Ray<sup>1,2</sup>

<sup>1</sup>Folkhälsan Research Center, Helsinki, Finland, <sup>2</sup>Department of Food and Nutrition, University of Helsinki, Helsinki, Finland, <sup>3</sup>Department of Psychology and Logopedics, University of Helsinki, Helsinki, Finland,

<sup>4</sup>Institute of Applied Health Sciences, University of Aberdeen, Aberdeen, United Kingdom

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Spending time in front of screens is a common sedentary behaviour among children. However, visiting nature and being outdoors are associated with higher physical activity levels and other positive health effects. Whether the frequency of visiting natural environments, such as forests, is associated with screen time is less studied in young children. The aim of this study was to examine the association between parent-child nature visits and children’s screen time (ST) in Finnish preschoolers.

**Methods:** The data was collected from children aged 3-6 years (n=801) who took part in baseline measurements of the DAGIS intervention study in preschools in 2017. Children’s ST was assessed with a parent-reported screen time diary. Average weekday, weekend day and weighted weekly ST (min/day) were calculated where data was available from at least 3 weekdays and 1 weekend day. Parents reported frequency of parent-child nature visits during the last month with five response options ranging from “not once” to “daily”, and the responses were transformed into median values (times/week) of each category and used as a continuous variable. Association between parent-child nature visits and children’s ST was examined by linear regression analysis adjusted with children’s age and gender, and parental education level.

**Results:** Mean age of the children was 5.19 years ( $\pm 1.05$ ) and 46.8 % of them were girls. After adjusting for background factors, more frequent parent-child nature visits were associated with less weekday ST ( $\beta=-0.096$ ,  $p=0.011$ ) and weekly ST ( $\beta=-0.076$ ,  $p=0.050$ ) but not with weekend ST ( $\beta=-0.027$ ,  $p=0.488$ ) among the children. The models explained 6.3 % of the variation in children’s weekday ST and 7.0 % in weekly ST.

**Conclusions:** The results suggest that frequency of parent-child nature visits might have a role in young children’s weekday and weekly ST but not in weekend ST. Using screens and visiting nature with parents might be competing activities for children, especially during weekdays. Promoting frequent parent-child nature visits could be a way of decreasing young children’s ST. Future studies should examine the length and purpose of nature visits associated with less ST in young children.

# Understanding Mechanisms of School-Based Preventive Intervention Implementation: A Systems Perspective on the Norwegian School Fruit Scheme—Insights from the FRESKO Project

**Ms. Mahshid Zolfaghari<sup>1</sup>**, Ms. Caroline Løvik Brandvik<sup>1</sup>, Dr. Biljana Meshkovska<sup>1</sup>, Prof. Knut Inge Klepp<sup>1</sup>, Prof. Birgit Kopainsky<sup>2</sup>, Associate Professor Hanne Cathrine Lie<sup>3</sup>, Prof. Nanna Lien<sup>1</sup>

<sup>1</sup>Department of Nutrition, University of Oslo, Oslo, Norway, <sup>2</sup>Department of Geography, System Dynamics Group, University of Bergen, Bergen, Norway, <sup>3</sup>Department of Behavioral Medicine, University of Oslo, Oslo, Norway

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** Previous research has identified implementation determinants for nutrition interventions in schools, but a deeper understanding of their interplay within a system is needed. This study investigates the implementation of school-based health behavior change interventions from a systems perspective, using the Norwegian School Fruit Scheme (SFS) as a case.

**Methods:** We used Group Model Building (GMB), a participatory approach to develop and analyze system maps, to investigate the interplay between implementation determinants of SFS. We invited six schools from low and high socioeconomic neighborhoods in Oslo and rural areas, with varying degrees of SFS implementation. The implementation degree is defined as the proportion of pupils for whom schools order fruit. Two GMB sessions were held at each school between February and April 2023. With help of a facilitator, school personnel and pupils discussed the interconnectedness of various determinants and together we mapped these relationships. Each first session resulted in a system map, which was refined using audio recordings and notes before second sessions. In second sessions, the map was presented and reviewed, and participants discussed ways to reduce implementation barriers. We will compile a unified system map based on the individual school's map and evaluate it against implementation frameworks and empirical studies.

**Results:** Preliminary results from the first three schools shed light on three key mechanisms: As pupils eat fruit provided by SFS, school staff see how it improves students' school days and adjust the fruit order, resulting in more consistent fruit consumption than before the intervention. Ordering more fruit may not increase pupils' fruit consumption, since consumption is constrained by fruit quality and presentation. When pupils' expectations for fruit quality and presentation are not met, fruit consumption decreases prompting schools to reduce fruit orders to prevent waste. Improving fruit quality and presentation necessitates more resources, such as funding and personnel, which are limited. Insufficient resources, keep fruit quality and presentation below pupils' expectation, resulting in a suboptimal system.

**Conclusions:** The resulting system map will show a dynamic hypothesis that can help us understand how implementation determinants of the SFS interact and affect each other over time.

# The impact of COVID-19 lockdown on physical activity and sedentary behaviour in secondary school teachers: a prospective cohort study

**Assistant Professor Tom Deliens<sup>1</sup>**, Ms. Yanni Verhavert<sup>1</sup>, Dr. Lara Stas<sup>1</sup>, Associate Professor Elke Van Hoof<sup>1</sup>, Prof. Benedicte Deforche<sup>2</sup>, Assistant Professor Dirk Aerenhouts<sup>1</sup>, Prof. Peter Clarys<sup>1</sup>, Prof. Evert Zinzen<sup>1</sup>, Prof. Kristine De Martelaer<sup>1</sup>

<sup>1</sup>Vrije Universiteit Brussel, Brussels, Belgium, <sup>2</sup>Ghent University, Ghent, Belgium

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** N. Other

**Purpose:** Mid-March 2020, Belgium went in lockdown to combat the COVID-19 pandemic, which resulted in drastic changes in people's work and lifestyle. Having to provide school-based day care as well as adapt to online teaching, secondary school teachers have been affected considerably, with a possible impact on their physical activity (PA) and sedentary behaviour (SB). This study investigates the impact of the first Belgian lockdown on PA and SB in Flemish secondary school teachers.

**Methods:** This prospective cohort study is part of a larger longitudinal study, assessing PA and SB levels of Flemish secondary school teachers throughout the 2019-2020 school year, which allowed us to compare one of our measurements conducted between March 23 and April 7, 2020 (five days after the installation of the lockdown measures) with a pre-lockdown (baseline) measurement, conducted between January 27 and February 11, 2020. Two other pre-lockdown measurements (September/October and November/December) and one other during-lockdown measurement (May/June) allowed us to control for confounding. Validated questionnaires were used to assess participants' PA and SB. Generalized linear mixed models were applied in R to evaluate the impact of the lockdown on PA and SB.

**Results:** Six hundred twenty four participants were included in the study. Significant increases were observed for total PA (+108 min/week;  $p=0.047$ ), moderate PA (+217 min/week;  $p=0.001$ ), domestic and garden PA (+301 min/week;  $p<0.0001$ ) and leisure-time PA (+130 min/week;  $p<0.0001$ ), whereas decreases were found for work-related PA (-275 min/week;  $p<0.0001$ ) and active transportation (-36 min/week;  $p<0.0001$ ). No differences over time were observed for walking ( $p=1.0$ ) and vigorous PA ( $p=0.570$ ). Significant increases were found for total SB (+972 min/week;  $p<0.0001$ ), work-related SB (+687 min/week;  $p<0.0001$ ) and leisure-time SB (+624 min/week;  $p<0.0001$ ), whereas a decrease was observed for transport-related SB (-290 min/week;  $p<0.0001$ ).

**Conclusions:** During the lockdown period, Flemish secondary school teachers showed increases in SB that were nine times as high as their PA increase. As a government, education network or school, it is crucial to sensitize, promote, and facilitate sufficient PA, but likewise to discourage SB, even in such difficult times of pandemic-induced lockdown measures.

# Motivation for Physical Activity in the Jordanian military: Correlates of physical activity in male and female recruits

**Mr. Ahmad Malkawi**<sup>1</sup>, Prof. Ree Meertens<sup>1</sup>, Prof. Stef Kremers<sup>1</sup>

<sup>1</sup>Maastricht University, Maastricht, Netherlands

Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM

**SIG - Primary Choice:** B. Motivation and behavior change

**Introduction:** It is important to understand the correlates of physical activity among Jordanian males and females' military recruits to guide intervention development. Given the obligatory nature of physical fitness training in the military, it is especially an interesting question what kind of motivation recruits have. This study aims to assess the motivational correlates as suggested by self-determination theory in addition to other correlates such as screen time, BMI, exercise benefits and barriers and exercise self-efficacy.

**Methods:** The cross-sectional study included 216 (Median age = 19 years) military recruits during their basic training at two medical military colleges in Jordan. Physical activity and lifestyle behaviors were measured using the Arab Teens Lifestyle Study (ATLS). Psychosocial variables were assessed using the Exercise Self-Efficacy Scale (ESE), Behavioral Regulation Exercise Scale (BREQ-2) and Exercise Benefits/Barriers Scale (EBBS). The ethical approval was obtained from the Royal Medical Services in Jordan (3/2022).

**Results:** Recruits demonstrated good physical activity levels by achieving a median of around 2900 METs/week among males and 3100 METs/week among females. Males performed a total of around 210 minutes of moderate to vigorous activity per week, which was significantly more than females who performed around 160 minutes/week. Bivariate analysis revealed that the identified self-regulation, introjected regulation and exercise self-efficacy scores were positively associated with the total minutes/week of physical activity among the overall sample. The identified regulation, introjected regulation and exercise self-efficacy scores were associated with higher total METs/week among male recruits. Among females, only introjected regulation was associated with the total METs/week. Multivariate regression analyses showed that being a male was associated with higher minutes of physical activity among the overall sample (adjusted  $R^2 = 0.056$ ) and none of the motivational factors were significant contributors to the explained variance of the model. The identified self-regulation was only associated with total METs/week among male recruits (adjusted  $R^2 = 0.13$ ).

**Conclusions:** Results showed that identified regulation, introjected regulation and exercise self-efficacy are correlates of physical activity among males, while introjected regulation was a correlate among females. Interventions are advised to increase autonomous forms of motivation and exercise self-efficacy through structured enjoyable physical fitness programs.

# Promoting appetite awareness and eating regulation skills in preschools: Implementation outcomes and determinants from a pilot trial of the Appetite Toolbox in Singapore.

**Assistant Professor Keri McCrickerd**<sup>1,2</sup>, Dr. Kristy Lee<sup>2</sup>, Ms. Val Tan<sup>1</sup>, Ms. Nazihah Binte Mohamad Pauzi<sup>2</sup>, Ms. Stephanie Leo<sup>2</sup>, Ms. Esther Goh<sup>2,3</sup>, Dr. Cheryl Seah<sup>2,3</sup>, Prof. Bryce McLeod<sup>2,4</sup>, Prof. Robyn Mildon<sup>2,3</sup>  
<sup>1</sup>Singapore Institute for Clinical Sciences, Agency for Science, Technology and Research, Singapore, Singapore, <sup>2</sup>Yong Loo Lin School of Medicine, National University of Singapore, Singapore, Singapore, <sup>3</sup>Centre for Evidence and Implementation, Singapore, Singapore, <sup>4</sup>Virginia Commonwealth University, Richmond, USA

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** Variations in children's eating self-regulation skills are shaped by their early environment. This study describes the pilot implementation of a teacher-led intervention – the Appetite Toolbox (ATB) – comprising books, classroom activities, and mealtime practices designed to promote appetite awareness and eating regulation among children attending preschool childcare in Singapore.

**Methods:** Implementation outcomes and determinants were assessed as part of a pilot effectiveness-implementation trial with teachers of 3–6-year-old children across six childcare centres run by a single central operator. Twenty teachers delivered the ATB to over 300 children across six weeks either as part of a study group ( $n=11$ ) or a waitlist control ( $n=9$ ). The teachers identified as female, were aged 22 to 60 years old, and had 2 to > 10 years of teaching experience. Using established scales (Weiner et al. 2017), teachers self-reported ATB Acceptability, Appropriateness, and Feasibility immediately after a training workshop and again after delivery. Self-efficacy and intention to use the ATB were assessed at the same timepoints, and fidelity was assessed through logbooks and classroom observations. Implementation determinants were explored in group discussions at the end of the intervention and mapped to constructs from the Consolidated Framework for Implementation Research (CFIR).

**Results:** After implementing the ATB, all teachers either 'agreed' or 'completely agreed' that it was acceptable, appropriate, and feasible in their context. They also reported improvements in their perceived ability to promote appetite awareness and eating regulation skills in their classrooms. All of the teachers intended to continue with at least some of the ATB materials after delivery. However, ATB fidelity varied across classrooms, particularly for mealtime practices. Analysis of the group discussions supported implementation outcomes. Themes emphasised that teachers viewed the ATB as high quality, adaptable, and not too complex. A perceived need for the ATB over existing resources and practices, prioritisation from leadership, and alignment to the central curriculum and individual teaching values motivated staff to overcome implementation barriers, including time and space constraints.

**Conclusions:** High acceptability, appropriateness, and feasibility support the ATB in preschool childcare. Understanding implementation determinants will inform future implementation and evaluation efforts in Singapore's largest preschool operator.



# Health screening results of primary school first grade students and parents' views on health screening

**Assistant Professor Ayşegül ILGAZ**, Prof. Sebahat GÖZÜM

<sup>1</sup>Akdeniz University, Antalya, Turkey

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** It was aimed to explore the results of health screening performed on primary school first grade students and the views of parents on health screening.

**Methods:** In the descriptive study, the sample consisted of 227 primary school first grade students and 43 parents. Obesity screening, vision and hearing screening, hypertension and passive exposure to tobacco smoke were performed on the students. After the health screening, the parents of the children at risk were informed and the results were followed by being directed to the health institutions. The status of getting a diagnosis from the doctor was monitored post-doctor diagnosis status were followed.

**Results:** It was determined that 14.5% of the students were obese and 12% were overweight. It was determined that 5.3% of the students had vision problems in their right eye, 4.8% in their left eye and 5.3% in both eyes. Hearing problem was detected in only one student (0.4%). Some students had high systolic (14.1%) and high diastolic (14.9%) blood pressure. 27.3% of family members smoke and 25.6% of children are exposed to cigarette smoke.

Parents of children who were determined as risky according to health screening results were directed to health institutions, 65.1% of them (n=28) went to the doctors. Of the children referred for obesity, 14 students were evaluated as obese by the doctor. Obese children were referred to a dietitian and a pediatric endocrinologist. Seven of the students who went to the doctor because of vision problems were diagnosed as myopia. These children were given glasses. One student was diagnosed with otitis media and her treatment was started. Four students who went to the doctor were determined to have high blood pressure and follow-up was recommended.

**Conclusions:** The most common health problems in children are obesity and high blood pressure. It is recommended to conduct periodic health screenings, to raise awareness of parents, to direct them to health institutions, and to monitor the results. It is thought that there is a need for qualitative studies with parents whose health problems are determined and who do not go to the doctor.

# Adolescents' participation in school physical activity before and during COVID-19 pandemic

**Prof. Josef Mitáš<sup>1</sup>**, Prof. Karel Frömel<sup>1,2</sup>, Associate Professor Dorota Groffik<sup>2</sup>

<sup>1</sup>Palacký University Olomouc, Faculty of Physical Culture, Olomouc, Czech Republic, <sup>2</sup>The Jerzy Kukuczka Academy of Physical Education in Katowice, Katowice, Poland

Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM

**SIG - Primary Choice:** N. Other

**Background:** High schools educate most adolescents, so they have the potential to deliver a significant proportion of their physical activity (PA), health-related fitness and sufficient physical literacy. To achieve these and other functions in high schools is dependent especially on the level of physical education (PE), comprehensive school PA programs, and schools' cooperation with sports clubs and parents.

**Aim:** The aim of this study was to identify the differences in PA and in meeting PA guidelines in a structure of weekly PA of adolescents with varying degrees of participation in school PA and different types of motivation for PA in habitual education before the pandemic and in distance education during the COVID-19 pandemic.

**Methods:** PA was assessed using the IPAQ-long form and motivation by using the MPAM-R questionnaire. Participants (N = 1,257) were divided into groups involved and not involved in school PA.

**Results:** During pandemic, the greatest decrease was observed in vigorous and moderate PA in boys (H = 98.52,  $p < 0.001$ ,  $\eta^2 = 0.179$ ) and girls (H = 56.86,  $p < 0.001$ ,  $\eta^2 = 0.075$ ) involved in school PA and in boys involved and not involved in school PA and in transportation PA.

**Conclusions:** PE teachers should focus on promoting vigorous PA and home PA for boys and girls in the post-pandemic period. One of the most important requirements is to increase the participation of boys and girls in PE classes and other forms of school PA. Student participation in school PA and an increase in overall PA should be supported through distance PE, which should be a mandatory part of PE programs and comprehensive school PA programs in high schools. Distance PE should focus on adolescents who are not involved in PE or school PA and encourage them to participate.

# Cost-consequence analysis of a mHealth obesity prevention intervention in Swedish primary child health care: the MINISTOP 2.0 trial

**Mrs. Christina Alexandrou**<sup>1,2</sup>, Prof. Marie Löf<sup>2</sup>, Dr. Victoria Brown<sup>3</sup>, Associate Professor Christine Delisle Nyström<sup>2</sup>

<sup>1</sup>Linköping University, Linköping, Sweden, <sup>2</sup>Karolinska Institutet, Stockholm, Sweden, <sup>3</sup>Deakin University, Melbourne, Australia

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Background:** The MINISTOP 2.0 parent-oriented app-based intervention promoting healthy lifestyle behaviors has previously been evaluated in a real-world effectiveness trial with positive statistically significant results on children's health behaviors. One major strength of the app is that it is available in Swedish, Somali, Arabic, and English, facilitating reach and inclusiveness, which is important for delivery at scale. However, first an economic evaluation of the intervention should also be conducted.

**Aim:** To evaluate the costs and effectiveness of the MINISTOP 2.0 intervention when delivered through Swedish child health care by means of a cost-consequence analysis.

**Methods:** A retrospective approach was utilized to collect data on all costs related to the MINISTOP 2.0 intervention, including costs for app and interface upkeep as well salary costs for introduction and dissemination of the app by child health care nurses. Costs were valued in Swedish krona 2022 and compared with previously published consequences (intake of fruits and vegetables, sweet and savory snacks, and sweet drinks (g/day); as well as physical activity and screen time (min/day)), estimated using linear regression.

**Results:** The total intervention cost was 437 439 SEK and the cost per participating family was 1 579 SEK. The cost for child health care nurses introducing and registering families for the app represented 9% of the total cost per family.

**Discussion:** The total cost for the MINISTOP 2.0 intervention was low in comparison to other similar childhood obesity interventions, particularly in terms of salary costs for staff. When scaling up interventions with high costs for salaries, the costs for many children will be very high. However, when scaling up the MINISTOP 2.0 intervention, where the major costs will be related to app and interface upkeep, the cost per child will likely be much lower when divided over a larger population.

**Conclusion:** Together with the positive results on children's health behaviors from the effectiveness evaluation, the MINISTOP app has the potential to be an affordable and effective primary preventive effort for promoting healthy lifestyle behaviors on a population level at scale.

# What do Stakeholders and Policymakers Think of Active Travel in Sao Paulo City, Brazil? Results of the ISA-Physical Activity and Environment Study

**Prof. Alex Antonio Florindo<sup>1,2,4</sup>**, Mr. Italo Vinicius Floriano Italo Vinicius Floriano de Paula<sup>1,4</sup>, Prof. Douglas Roque Andrade<sup>1,4</sup>, Prof. Leandro Martin Totaro Garcia<sup>3,4</sup>

<sup>1</sup>School of Arts, Sciences and Humanities - University of Sao Paulo, Sao Paulo, Brazil, <sup>2</sup>School of Public Health - University of Sao Paulo, Sao Paulo, Brazil, <sup>3</sup>Centre for Public Health; Queen's University Belfast, Belfast, United Kingdom, <sup>4</sup>Physical Activity Epidemiology Group - University of Sao Paulo, Sao Paulo, Brazil

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** To investigate the opinions of Stakeholders and Policymakers about possible actions to increase active travel in Sao Paulo city, Brazil.

**Methods:** This survey is part of the ISA-Physical Activity and Environment cohort study, which follows a cohort of adults from Sao Paulo city, Brazil. The study is followed by a group of Stakeholders and Policymakers who voluntarily registered as “observers”. In 2022 we conducted an online survey to examine their opinions about ways to promote walking or bicycle for transportation in the city with 3 questions: which actions they believe would be most effective (Question 1) and more feasible/easier to implement (Question 2) to increase active travel levels in the city of São Paulo, and what actions they would like to see tested in a simulation model to have more information on what to do to change active travel levels (Question 3). The same list of 13 actions was presented in all questions, and respondents could choose up to 3 options in each question. We invited for the survey 45 people whose work was more closely related to active transportation promotion. Descriptive analysis was conducted.

**Results:** 18/45 (40%) Stakeholders and Policymakers completed the survey, 13 women (72%), with mean age of 47 years (sd = 11). Reducing motor vehicles speed was the most cited action in all questions. In Question 2, improving the distribution of jobs across the city bringing them closer to homes, and increasing the quantity and quality of sidewalks and bikepaths were the next most cited actions. In Question 3, increasing restrictions on individual motorized vehicles in the city center, with congestion charges at peak times, and increasing the quantity and the quality of bikepaths were also highly cited actions.

**Conclusions:** Stricter control of motor vehicles (speed and restriction in downtown), and increased and improved sidewalks and bikepaths were actions considered important to promote active travel in Sao Paulo city by Stakeholders and Policymakers.

**Funding:** FAPESP: 2017/17049-3.

# Using citizen science to promote physical activity in a low-SES neighborhood

**Dr. Berry van Holland<sup>1</sup>**, Miss Nikki Jepkema<sup>1</sup>, Dr. Johan de Jong<sup>1</sup>, Prof. Abby King<sup>2</sup>, Dr. Ann Banchoff<sup>2</sup>

<sup>1</sup>Hanze University of Applied Sciences, Groningen, Netherlands, <sup>2</sup>Stanford University School of Medicine, Stanford, CA, USA

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** H. Policies and environments

One neighborhood in Groningen, the Netherlands, is a neighborhood housing about 12,000 citizens with on average a low-SES background, showing a less healthy and active lifestyle. In the past, initiatives have been undertaken to promote active lifestyle by implementing outdoor facilities stimulating physical activity. However, use of facilities was poor due to lack of citizen involvement. Aim of this project was to engage citizens in the overall process of capturing, plan making and prototyping of concepts for an exercise-friendly physical and social environment.

From January 2020 till present day a Living Lab was run following the “Our Voice” citizen science method. Participatory citizen science was applied in which a community of stakeholders (public and private parties) and citizens was built. The community addressed the problem by creating more insight in promoting/degrading features in the neighborhood concerning an active lifestyle. Citizens used the Stanford Neighborhood Discovery Tool, which allowed for systematic observations of the physical environment. Additionally, emergent research walks gave extra information on neighborhood barriers/facilitators next to Discovery Tool data. Collected data allowed citizens to brainstorm on possible solutions in sessions facilitated by the researchers. Solutions were presented to local government and further developed for implementation and realization. Based on all data, new ideas were generated for improving exercise-friendliness. One idea was a walking route along art objects in the neighborhood. Furthermore, a citizens work group was formed which discussed this route, and other ideas and prototypes, with local government. This group was also involved in realization of prototypes. The route has been implemented and has been activated by several stakeholders and promotional activities.

Our project resulted in a citizen science approach which can be transferred to other neighborhoods. Use of Discovery Tool showed many benefits for neighborhood plan making. Early and continuous involvement of citizens has lead to more sustainable engagement and is a powerful method to create engagement around societal problems and social innovation in the field of health enhancing physical activity. Key feature in our method was integration of design thinking, citizen engagement, and use of digital tools.

# Acceptability of a 6-months exercise program including high intensity interval training in stroke patients: a qualitative study

Mrs. Thalia Lapointe<sup>1</sup>, Prof. François Trudeau<sup>1</sup>, Mrs. Amélie Bélanger<sup>1,2</sup>, **Prof. Julie Houle<sup>1,2</sup>**

<sup>1</sup>Université du Québec à Trois-Rivières (UQTR), Trois-Rivières, Canada, <sup>2</sup>Centre intégré universitaire de santé et services sociaux de la Mauricie et du Centre-du-Québec (CIUSSS MCQ), Trois-Rivières, Canada

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** This project aimed to describe the acceptability of the participation to a 6-month exercise program combining high intensity interval training (HIIT) and moderate intensity continuous training (MICT) in stroke patients. To implement such interventions, it is relevant to consider patient's acceptability. Previously, we conducted a project that demonstrated the effectiveness of this exercise program to improve health and cardiorespiratory fitness in stroke patients (Lapointe et al., 2023). The main research question is "How is described acceptability of this exercise program by participants?" Especially, based on Theoretical framework of acceptability, we wanted to describe three components such as affective attitude, perceived effectiveness, and intervention coherence.

**Methods:** A descriptive qualitative study was conducted. A convenience sample of 10 participants (8 men and 2 women aged 72± 10 years) who completed a 6-month combined exercise program including HIIT and MICT were recruited. In-depth semi-structured face-to-face interviews were conducted among those participants. The interviews were transcribed verbatim and analysed using a general inductive approach. All transcripts were read several times to identify emerging themes. Segments of one interview text were coded independently by T.L. and A.B using NVivo 15 software. The two researchers met to compare the labels applied and agree on a set of codes for all subsequent transcripts.

**Results:** The main finding reveals positive and motivational experiences to their participation. Three well appreciated aspects emerged: the social support, the follow-up and monitoring of health condition as well as the structure provided by the appointments and schedule of the program. Participants also perceived benefits in their physical fitness, daily living activities and psychological well-being. Moreover, participants reported an increase in their level of physical activity ascribed to the program. However, several participants reported a decrease in their level of physical activity at program cessation. High intensity level of exercise was not mentioned as a barrier.

**Conclusion:** This qualitative study demonstrated a good acceptability of a combined exercise program including HIIT among patients with prior ischemic stroke or TIA. It provides information that may be used to enhance motivation and improve implementation of exercise program with this population as well as benefits associated.



# ISA-Physical Activity and Environment Study: Advances and Challenges in a Cohort in Sao Paulo city, Brazil

**Prof. Alex Antonio Florindo**<sup>1,2,3</sup>, Miss Bianca Mitie Onita<sup>2,3</sup>, Miss Elayne Silva de Oliveira<sup>2,3</sup>, Dr. Rildo de Souza Wanderley Junior<sup>1,3</sup>, Miss Margarethe Thaisi Garro Knebel<sup>2,3</sup>

<sup>1</sup>School of Arts, Sciences and Humanities - University of Sao Paulo, Sao Paulo, Brazil, <sup>2</sup>School of Public Health - University of Sao Paulo, Sao Paulo, Brazil, <sup>3</sup>Physical Activity Epidemiology Group - University of Sao Paulo, Sao Paulo, Brazil

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** To describe some results, advances and challenges of a cohort in Sao Paulo, Brazil to examine the relationship between built environment (BE) and physical activity (PA).

**Methods:** Sao Paulo Health Survey (ISA in Portuguese) that was conducted between 2014/2015 with n=4,042 participants with 12 years or more by face-to-face interview and was used like baseline for the ISA-Physical Activity and Environment cohort study. The aim is to examine the relationship between BE changes and leisure-time and transportation PA. The secondary outcomes are obesity, mental health, and cardiovascular diseases. The IPAQ long version was applied to evaluate PA. Participants reported chronic diseases. BE facilities were evaluated by geographical information system according to household address in 500m, 1 km, and 1.5 km with official dataset of government, and microenvironment was evaluated with MAPS online. Observers from the public and private sectors and Non-Governmental Organizations are participating.

**Results:** The second wave was conducted by telephone interview due to COVID-19 in 2020/2021 with possible 3,993 adults eligible. The response rate was 35.9% (n=1,434), with 5% of refusals, and the main loss source identified was people not located (39.2%). We found an increase in leisure-time walking (from 21.5 to 38.2; p<0.01), and in transportation walking (from 60.2 to 71.0; p<0.01), but also an increase in obesity (from 21.1% to 27.0%; p<0.001) and hypertension (from 26.2% to 35.5%; p<0.001). The prevalence of depression in second wave was 12%. We geocoded bike paths, green areas, train/subway stations, recreation centers and walkability index from 2015 to 2020, and 1,434 routes were evaluated by MAPS in 24 months. The crime indicators and socioeconomic index were created and geocoded according to household address. Furthermore, an online survey was conducted with Stakeholders and Policymakers about possible actions to increase active travel.

**Conclusion:** We found increases in PA and chronic diseases. The future challenges include examining relationships between BE, PA and diseases in the second wave, increase the sample in the third wave with face-to-face and telephone interviews include accelerometers, built an agent-based model for active travel, and conduct the cost-effectiveness analysis.

**Funding:** FAPESP: 2017/17049-3.

# The role of diet for the prevention of type 2 diabetes in non-obese adults: A systematic review

**Dr. Mandy Ho<sup>1</sup>**, Miss Lee Wing Yiu<sup>1</sup>, Mr. Yu Hongjie<sup>1</sup>, Miss Hau Cheuk Lam Trammy<sup>2</sup>

<sup>1</sup>School of Nursing, the University of Hong Kong, Hong Kong, Hong Kong, <sup>2</sup>School of Public Health, the University of Hong Kong, Hong Kong, Hong Kong

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose** Type 2 diabetes (T2DM) is a major health problem. Current diabetes prevention strategies mostly focus on individuals who are overweight/obese and target for weight loss. The role diet/nutrition on diabetes risk in those without obesity has not been systematically reviewed. The aim of this systematic review was to assess the current evidence on the role of diet/nutrition for the prevention of T2DM in non-obese adults.

**Methods** We conducted a search from PubMed, EMBASE, CINAHL and Cochrane Library in 2021 to identify randomized controlled trials (RCT) and prospective cohort studies that examined the role of diet/nutrition for diabetes prevention in non-obese adults. The primary outcome of the systematic review was the incidence of T2DM. Two independent reviewers assessed abstracts and articles, and critically appraised the study quality.

**Results** Among 15 eligible studies (3 RCTs and 12 prospective cohort studies), 2 RCTs and 1 cohort study have explored the role of macronutrient contents (low fat diet, diet with high monounsaturated content, and low carbohydrate diets, respectively) on T2DM risks. It reported that a low-carbohydrate, high animal protein and fat diet was associated with an increased risk of T2DM. Three cohort studies have assessed the association of glycemic index (GI) and glycemic load (GL) with T2DM incidence and reported that a diet high in GI could increase risk of T2DM. There are 3 prospective cohort studies investigated the relationship between different types of dietary protein and the risk of T2DM. Among which, 2 reported no significant association between the dairy, animal and plant protein intakes and T2DM risk, and 1 reported that a high dietary acid load was associated with an increased risk of T2DM among non-obese Japanese men. There were 3 prospective cohort studies assessed nut, coffee and egg consumption in relation to T2DM risk, respectively. These studies reported that nut and egg consumption may lower T2DM risk, whereas coffee consumption may increase the risk of T2DM.

**Conclusion** More studies are required to confirm the role of diet for diabetes prevention in non-obese adults and to facilitate development of dietary guidelines and effective strategies for reducing diabetes risk in this population.

# Associations between sleep patterns and cardiometabolic risk factors in 9-year-old Swedish children

**Ms. Ellinor Nilsson<sup>1</sup>**, Prof. Marie Löf<sup>1</sup>, Dr. Jairo Hidalgo Migueles<sup>1</sup>, Associate Professor Christine Delisle Nyström<sup>1</sup>

<sup>1</sup>Karolinska Institutet, Stockholm, Sweden

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Background and aim:** Sleep is important for children's health, and poor sleep habits may influence children's cardiometabolic health in the short and long term. The sleep guidelines for 9-year-olds include sleeping 9-11 hours and having consistent bedtimes; however, bedtimes are not defined. Therefore, the aim of this study was to examine associations of sleep timing and duration with cardiometabolic risk factors in 9-year-olds.

**Methods:** This is a cross-sectional study utilizing data from three studies' follow-ups, where identical measures for all outcomes were conducted between 2016-2020 in Swedish 9-year-old children ( $n = 402$ ). Outcomes included anthropometrics, blood pressure, waist circumference, total cholesterol, high- and low-density lipoprotein cholesterol, triglycerides, glucose and insulin. HOMA-IR and a cardiometabolic risk score (MetS score) were calculated. Sleep was assessed with wrist-worn accelerometers and sleep logs. Children were categorized into four groups based on sleep timing, i.e., having a bedtime earlier or later than the median (21:39) and meeting or not meeting the sleep recommendations. ANCOVA was used to investigate associations between sleep patterns and cardiometabolic risk factors and Bonferroni correction was applied to investigate mean differences between sleep pattern groups.

**Results:** The group of children who met the sleep guidelines and had an early bedtime had lower MetS score ( $-0.15$  vs.  $0.42$ ,  $p = 0.029$ ), HOMA-IR ( $0.30$  vs.  $0.60$ ,  $p = 0.025$ ) and insulin levels ( $6.80$  vs.  $8.87$ ,  $p = 0.034$ ), compared to children with poorest sleep pattern. When adjusting for total sleep time, there were still associations to MetS ( $-0.19$  vs.  $0.50$ ,  $p = 0.014$ ) and HOMA-IR ( $0.30$  vs.  $0.60$ ,  $p = 0.041$ ).

**Conclusions:** Children meeting sleep guidelines and going to bed early had better MetS score and HOMA-IR than children not meeting sleep guidelines and going to bed late, even when adjusting for total sleep time. This finding indicates that not only sleep duration, but also sleep timing, has an overall impact on children's cardiometabolic health.

# Associations between anxiety disorders and depression symptoms are related to 24-hour movement behaviors among Brazilian adolescents

**Dr. Diego Augusto Santos Silva<sup>1</sup>**, Dr. Markus Joseph Duncan<sup>2</sup>, Dr. Nicholas Kuzik<sup>2</sup>, Dr. Mark Tremblay<sup>2,3</sup>

<sup>1</sup>Federal University of Santa Catarina, Florianopolis, Brazil, <sup>2</sup>Children's Hospital of Eastern Ontario Research Institute, Ottawa, Canada, <sup>3</sup>Department of Pediatrics, University of Ottawa, Ottawa, Canada

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Background:** Anxiety and depression are mental health comorbidities. Discovering effect modifiers across these conditions in the pediatric population is a constant challenge. We tested whether 24-hour movement behaviors modified the effect of the association between anxiety disorders and depression symptoms among Brazilian adolescents.

**Method:** This cross-sectional study included 4,141 adolescents aged 15 to 19 years (50.0% females) across all Brazilian geographic regions. Data were collected using a self-administered questionnaire. Using self-reported data, 4.4% (n=180) reported having been diagnosed with anxiety disorders and 95.6% (n=3,961) reported not having been diagnosed with anxiety disorders. We used the Patient Health Questionnaire (PHQ-9) to evaluate depressive symptoms of the participants. Accruing moderate-vigorous physical activity during leisure time,  $\leq 2$ /hours/day of recreational screen time, and good sleep quality were the exposures investigated. We evaluated interactions between anxiety and 24-hour movement behaviors in the association with depression symptoms adjusted by covariates (sociodemographic aspects and lifestyle behaviours). Robust regression models were built to estimate the unstandardized regression coefficients ( $\beta$ ) and 95% confidence intervals (95%CI).

**Results/findings:** Adolescents diagnosed with anxiety who met two ( $\beta$ : -4.93; 95%CI: -6.43; -3.44) or three ( $\beta$ : -5.71; 95%CI: -7.85; -3.57), and adolescents without diagnosis of anxiety who met one ( $\beta$ : -6.97; 95%CI: -8.15; -5.79), two ( $\beta$ : -8.21; 95%CI: -9.38; -7.03), or three ( $\beta$ : -8.46; 95%CI: -9.66; -7.27) of the 24-hour movement behavior targets had lower PHQ-9 scores for depression symptoms than adolescents diagnosed with anxiety who did not meet any of the 24-hour movement behavior targets. There was a significant interaction ( $\beta$ : -1.89; 95%CI: -3.24; -0.55,  $p=0.006$ ) between anxiety disorders status and meeting the 24-hour movement behavior targets.

**Conclusions:** Variations in meeting 24-hour movement behaviors modified the effect of the association between anxiety disorders status and depressive symptoms, with favourable modifications seen in adolescents who met one, two or three of the 24-hour movement behavior targets. Promoting adherence to 24-hour movement behaviors may assist in possible reduction in depression symptoms among adolescents with/without anxiety disorders.

# Impact of a school-based health promotion intervention in adolescents: primary results of the SI! Program cluster-randomized trial

Dr. Gloria Santos-Beneit<sup>1,2</sup>, **Dr. Juan Miguel Fernández-Alvira<sup>3</sup>**, Dr. Anna Tresserra-Rimbau<sup>4,5</sup>, Miss Patricia Bodega<sup>1,3</sup>, Miss Amaya de Cos-Gandoy<sup>1,3</sup>, Ms. Mercedes de Miguel<sup>1,3</sup>, Miss Sonia Leticia Ramírez-Garza<sup>4</sup>, Dr. Emily Pilar Laveriano-Santos<sup>4,5</sup>, Miss Camila Arancibia-Riveros<sup>4</sup>, Dr. Vanessa Carral<sup>1</sup>, Dr. Xavier Orrit<sup>1</sup>, Ms. Carla Rodríguez<sup>1</sup>, Ms. Isabel Carvajal<sup>1</sup>, Mr. Domènec Haro<sup>1</sup>, Mr. Jesús Martínez-Gómez<sup>3</sup>, Dr. Ramón Estruch<sup>5,6</sup>, Dr. Rosa María Lamuela-Raventós<sup>4,5</sup>, Dr. Rodrigo Fernández-Jiménez<sup>1,7,8</sup>, Dr. Valentín Fuster<sup>1,2,3</sup>

<sup>1</sup>Foundation for Science, Health and Education (SHE), Barcelona, Spain, <sup>2</sup>The Zena and Michael A. Wiener Cardiovascular Institute, Icahn School of Medicine at Mount Sinai, New York, USA, <sup>3</sup>Centro Nacional de Investigaciones Cardiovasculares (CNIC), Madrid, Spain, <sup>4</sup>Departament de Nutrició, Ciències de l'Alimentació, Institut de Nutrició i Seguretat Alimentària (INSA-UB), Universitat de Barcelona, Barcelona, Spain, <sup>5</sup>Consorcio CIBER, M.P. Fisiopatología de la Obesidad y Nutrición (CIBEROBN), Instituto de Salud Carlos III (ISCIII), Madrid, Spain, <sup>6</sup>Department of Internal Medicine, Hospital Clinic, Institut d'investigacions Biomèdiques August Pi i Sunyer (IDIBAPS), Universitat de Barcelona, Barcelona, Spain, <sup>7</sup>Centro de Investigación Biomédica en Red en enfermedades Cardiovasculares (CIVERVC), Madrid, Spain, <sup>8</sup>Hospital Universitario Clínico San Carlos, Madrid, Spain

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose** The aim of this study was to assess the impact of two multicomponent school-based educational health promotion strategies of differing duration and intensity on adolescents' cardiovascular health (CVH).

**Methods** The SI! Program for Secondary Schools cluster-randomized controlled trial enrolled 24 schools and 1326 adolescents (48.4% girls, mean age 12.5 ± 0.4 years) from Barcelona and Madrid (Spain). Participants were randomized to receive a health promotion intervention (SI! Program) over the 4 secondary school years (long-term intervention (LTI), 8 schools, 403 adolescents) or over the first 2 secondary school years (short-term intervention (STI), 8 schools, 490 adolescents) with similar content but different intensities or to receive the standard curriculum (control, 8 schools, 433 adolescents). The primary endpoint was the between-group difference at 2 and 4 years in the change in an overall CVH score from baseline (range 0 to 14 points). Intervention effects were tested with multi-level mixed-effects models.

**Results/findings** After 2 years, at half way through the LTI and at the end of the STI, the difference in the CVH score change was 0.44 points (95%CI: 0.06, 0.83; p=0.02) between the LTI and control groups and 0.17 points (95%CI: -0.21, 0.55; p=0.38) between the STI and control groups. At 4 years, differences for the LTI and STI groups vs control were 0.12 points (95% CI: -0.15, 0.40; p=0.39) and 0.13 points (95% CI: -0.14, 0.40; p=0.35).

**Conclusions** A 4-year school-based health promotion intervention for adolescents had a beneficial impact on overall CVH at a time point half-way through implementation. In contrast, the shorter but more intense 2-year intervention had no significant effect. At later follow-up, no significant effects were observed in either group. However, the COVID-19 lockdown affected the implementation of the last two years of the LTI, and thus the effectiveness might have been reduced. Although our findings suggest that the less condensed intervention was more effective, further research is warranted into the efficacy of school-based health promotion programs with different intensities and re-intervention strategies.

# Exploring variation in the behavioural composition and temporal distribution of upright events in 4213 middle-aged adults

**Mr. Joshua Culverhouse<sup>1</sup>**, Associate Professor Melvyn Hillsdon<sup>1</sup>, Dr. Richard Pulsford<sup>1</sup>

<sup>1</sup>University of Exeter, Exeter, United Kingdom

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** Postural transitions, seated-to-upright and vice-versa, are associated with frailty, and the temporal distribution of transitions, such as interrupting sedentary time with upright events, with metabolic and vascular health. Upright events of a given duration can be qualitatively different, varying from sustained standing to sustained stepping or a combination of the two. Logically, the composition of upright events would be differentially associated with health outcomes, yet there is a paucity of evidence examining this. We present a novel characterisation of the composition and temporal distribution of these events.

**Methods:** Upright events were identified from accelerometer data (activPAL3) from 4213 participants of the 1970 British Cohort study. Metrics were computed to describe behavioural composition within events (intra-event characteristics) and between events (inter-event characteristics) of  $\geq 1$ -minute duration. Intra-event characteristics included: event duration, number of stepping bouts, stepping-to-standing ratio, steps-count, and weighted-mean cadence. Inter-event characteristics included: number of bouts, average durations, and metrics of temporal distribution of events including burstiness and active-to-sedentary transition probability (ASTP). We characterise the composition and temporal distribution of upright events for the whole cohort and population sub-groups.

**Results:** Both inter and intra-event characteristics varied significantly within and between participants. Participants averaged  $54.8 \pm 15.9$  (mean $\pm$ SD) upright events per day, with a median event duration of 4.7min [2.2, 11.0]. Median [IQR] stepping time per event was 1.3mins [0.7, 2.9]; with a stepping-to-standing ratio of 0.4 [0.2, 0.8]. Median number of steps per event was 90 [42, 206], with an average step-weighted mean cadence of  $75.4 \pm 19.7$  steps/min. Burstiness varied between ( $0.47 \pm 0.13$ ) and within ( $0.21 \pm 0.08$ ) participants; with considerable between ( $0.16 \pm 0.12$ ) and within ( $0.70 \pm 0.11$ ) variation also seen in ASTP. Importantly, variations in inter and intra-event characteristics were evident when frequency and duration of events were similar. Inter and intra-event characteristics differed according to demographic characteristics including sex and socioeconomic position.

**Conclusion:** We demonstrate considerable heterogeneity in composition (standing and stepping) and temporal distribution of upright events, which has implications for population surveillance, intervention design, and aetiological studies. Simply counting steps or the number of postural transitions may mask important associations between behaviour and health.



# Comparison of well-being perception between physical activity levels according with age in Luxembourg: Health Behavior in School-aged Children survey 2022

**Dr. Felipe G Mendes<sup>1</sup>**, Ms. Joana Lopes Ferreira<sup>1</sup>, Dr. Romain Brisson<sup>1</sup>, Dr. Caroline Residori<sup>1</sup>, Dr. Carolina Catunda<sup>1</sup>

<sup>1</sup>University of Luxembourg, Esch-sur-Alzette, Luxembourg

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** Youth is a key life phase, as the behaviors established during this phase will mostly continue during adult life. Mental health is a state of well-being (WB) in which individuals realize their own abilities, can cope with the usual stresses of life, can work productively, and is able to contribute to their community. Physical activity (PA) is associated with the improvement of physical, cognitive, and mental health. This study aimed to analyze adolescents' state of WB in levels of PA across age, by gender in Luxembourg.

**Methods:** A representative sample of 8117 adolescents (11-to-18-years-old) took part in the Health Behavior in School Aged Children (HBSC) Luxembourg 2022 survey. WB was measured using the WHO-5 Well-being Index, and levels of PA were determined according to the time spend on and frequency of moderate-vigorous and vigorous PA (Highly active, Active, Low active and Not active). A two-way ANOVA stratified by gender was performed to analyze differences of the WB mean for PA levels and age group.

**Results:** For both girls and boys, those Highly active reported better WB than those Not active, in all age groups ( $p < 0.01$ , all age groups). For the intermediary levels of PA, different gender and age patterns were observed for the WB. While differences were observed between intermediary levels of PA among young girls, no statistically significant difference in mean WB was observed between intermediary levels of PA for girls aged 17 to 18 (highly active (mean=12.9, CI95%11.4-14.5), active (mean=12.4, CI95%11.8-12.9) and Low active (mean=11.80, CI95%11.3-13.2). In boys, only the age group 15-16 showed a difference between the highly active (mean=15.9, CI95%15.2-16.5) and active (mean=15.2, CI95%14.9-15.6) compared to the Low active (mean=13.3, CI95%12.8-13.9) and not active (mean=12.2, CI95%10.6-13.8).

**Conclusions:** Higher PA level is a protective factor for the WB of adolescents in Luxembourg in all ages. This study reinforces the importance of PA to maintain higher levels of well-being through adolescence in Luxembourg. To increase WB in Luxembourg future actions could be taken in order to reinforce the adherence to PA WHO recommendations in Luxembourg in younger ages and promote any level of PA for older ages.

# Involvement in the Carceral System and Dietary Risk: Results from a Scoping Review of the Literature

**Dr. Angela Odoms-Young<sup>1</sup>**

<sup>1</sup>Cornell University, Ithaca, USA

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** H. Policies and environments

With one of the highest incarceration rates in the world, over two million people are detained in jails, prisons, and detention centers in the United States (US) at any given time. People of color are disproportionately impacted by mass incarceration contributing to racial/ethnic disparities in individual, family, and community health. Dietary behaviors and conditions are key drivers of chronic disease morbidity and mortality and have significant implications for population health. Applying a liberation framework, we conducted a scoping review to examine the intersection between carceral system involvement and dietary outcomes in youth and adults. The review followed the procedures outlined in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) extension for scoping reviews. From 2018-2023, a librarian-facilitated database search was conducted to systematically map the research exploring relationships between incarceration and diet-related experiences, including dietary behaviors, food insecurity, and food access. The search was conducted across the following databases: PubMed, Google Scholar, PsycINFO, Social Services Abstracts, Web of Science, and Scopus. We adjusted vocabulary and syntax as necessary across the databases. Peer-reviewed articles (n=75) published from 1980-2023, written in English, involving human participants, environmental audits, or menu analysis, and conducted in the United States, Canada, the UK, or Australia were included in the review. The review found that carceral setting involvement was related to significant dietary disadvantage among adults and youth and their families. Studies were categorized based on their time relative to incarceration, including before incarceration (poor diet and food insecurity risk factors for incarceration by contributing to poverty and trauma); during incarceration (poor healthy food availability in correctional facilities and the role of parental incarceration on food insecurity in families); and after incarceration (the role of incarceration in increasing the risk of food insecurity and poor diet-related health outcomes). The review also included findings from studies that target interventions during each period, including interventions to improve dietary and food choice behaviors among people who are incarcerated and dietary supplementation to improve cognitive function in youth. Research gaps and implications for public health research, practice, and policy will be discussed

# The influence of walkability on walking for transportation during the COVID-19 pandemic in the city of São Paulo, Brazil: a cohort study.

**Dr. Rildo de Souza Wanderley Júnior<sup>1</sup>**, Ms. Bianca Mitie Onita<sup>2</sup>, Ms. Margarethe Thaisi Garro Knebel<sup>2</sup>, Miss Elaynne Silva de Oliveira<sup>2</sup>, Prof. Alex Antonio Florindo<sup>1</sup>

<sup>1</sup>School of Arts, Sciences and Humanities-University of Sao Paulo, Sao Paulo, Brazil, <sup>2</sup>School of Public Health-University of Sao Paulo, Sao Paulo, Brazil

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** The aim was to analyze the influence of walkability on walking for transportation in São Paulo residents in the periods 2014-2015 (baseline) and 2020-2021(2<sup>nd</sup> wave).

**Methods:** It was a cohort study (ISA-Physical Activity and Environment study) conducted with a sample of 1,434 individuals (35.5% of baseline) in São Paulo city, Brazil. At baseline information was collected by face-to-face interviews and at the 2<sup>nd</sup> wave by telephone interview. The outcomes analyzed were the weekly time spent on walking for transportation  $\geq 10$  minutes per week and  $\geq 150$  minutes per week, measured by the long version of the International Physical Activity Questionnaire (IPAQ). The walkability index was constructed using the variables net residential density, street connectivity, the mix of land use and slope, and then weighted by the percentage of the walkability value of the census sectors within the buffers network. The exposure was more walkable neighborhoods grouped into quartiles considering the walkability in the 500m and 1,000m network buffers. The covariates analyzed were sex, age group, and educational level. Multilevel mixed-effects logistic regressions were performed considering three models: 1) crude; 2) adjusted for time; and 3) adjusted for time, sex, age groups, and educational level.

**Results:** There was a significant increase in subjects who did not walk in the baseline and started walking in the 2<sup>nd</sup> wave  $\geq 10$  minutes per week (62.7; CI95%: 58.6-66.7;  $p < 0.01$ ) and  $\geq 150$  minutes per week (21.3; CI95%: 19.0-23.8;  $p = 0.02$ ). The multilevel models showed that subjects who were in more walkable neighborhoods in the 1,000m buffer were more likely to walk  $\geq 10$  minutes per week (OR=1.46; CI95%:1.10-1.93) and  $\geq 150$  minutes per week (OR=1.38; CI95%:1.08-1.76) for transportation, regardless of the covariates.

**Conclusions:** Living in more walkable neighborhoods can positively influence walking for transportation even in adverse scenarios such as the COVID-19 pandemic. It is important for health professionals to participate in the development of public policies for urban mobility.

**Funding:** São Paulo Research Foundation (FAPESP: 2017/17049-3; 2022/00692-9).

# Online grocery platform interventions and food-related behaviors: a scoping review

**Ms. Gabby Headrick<sup>1</sup>**, Ms. Carolyn Bresnahan<sup>1</sup>, Ms. Iris van Damme<sup>2</sup>, Mr. Fangzhe Han<sup>1</sup>, Dr. Alyssa Moran<sup>1</sup>, Dr. Neha Khandpur<sup>2</sup>

<sup>1</sup>Johns Hopkins Bloomberg School of Public Health, Baltimore, USA, <sup>2</sup>Wageningen University, Wageningen, Netherlands

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Few studies have systematically documented the range and effectiveness of interventions supporting healthy food behaviors in online grocery platforms. This review aimed to: (1) identify and catalogue healthy eating interventions that have been tested in online grocery environments; and (2) summarize their effectiveness in influencing food selection and purchase.

**Methods:** The scoping review protocol was made publicly available on Open Science Framework. Seven databases were searched using keywords that captured the settings, interventions, and study designs of interest. Peer-reviewed articles published in English until May 2022 were eligible for inclusion if they: (1) included an intervention conducted in an online grocery store or a platform that simulates the online shopping experience; (2) randomly assigned participants to intervention arm(s) with a control group; and (3) measured some aspect of consumer dietary behavior. The Covidence platform was used for screening (title and abstracts, n = 68; full text, n = 49) and data extraction (eligible studies only, n = 35).

**Results:** Most studies were based in the UK (n=8, 22.8%), the US (n=8, 22.8%), and Singapore (n= 6, 17.1%), and published between 2011 and 2022. While 17.1% of the studies were implemented in a real online grocery retail website, the majority utilized a simulated online grocery website. Nutrition (n = 27, 77.2%) and environmental (n = 8, 22.8%) interventions focused on: Promotion (e.g., advertisements, food labelling, n = 16, 45.7%), Price (e.g., taxation, price manipulation, n = 7, 20%), Product (e.g., suggested swaps, product reformulation, education, n = 7, 20%), and Placement (e.g., sorting based on health, placing items in certain areas of the aisle, n = 5, 14.3%). Nearly half (16%, 45.7%) of the interventions tested multiple strategies. Most interventions positively influenced the healthiness of foods selected (n = 28, 80%), the environmental sustainability of foods selected (n = 6, 17.2%), both healthfulness and environmental sustainability of foods selected (n = 1, 2.9%), and willingness to pay (n = 1, 2.9%), with only 7 studies showing null results.

**Conclusions:** The online grocery shopping platform supports a diversity of interventions to promote both human and planetary health.

# App-Supported Lifestyle Interventions in Pregnancy to Manage Gestational Weight Gain and Prevent Gestational Diabetes – A Scoping Review

**Mrs. Roxana Raab<sup>1</sup>**, Mrs. Kristina Geyer<sup>1</sup>, Prof. Hans Hauner<sup>1</sup>

<sup>1</sup>Institute of Nutritional Medicine, Else Kröner-Fresenius-Centre for Nutritional Medicine, School of Medicine, Technical University of Munich, Munich, Germany

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** There exists a large gap in implementing pregnancy lifestyle interventions into clinical practice. App-supported interventions might be able to overcome implementation barriers. To examine the current state of research in the field, this scoping review aimed to identify planned, ongoing and completed studies on eHealth and mHealth app-supported lifestyle interventions in pregnancy to manage gestational weight gain (GWG) and prevent gestational diabetes mellitus (GDM). The review assesses the breadth of literature in the field, identifies population, intervention, control, outcome, and study design (PICOS) characteristics of included studies and describes app functionalities.

**Methods:** The scoping review was conducted according to a pre-registered protocol (<https://osf.io/hjdc8/>) and followed the frameworks of Arksey and O'Malley, Levac et al., and the Joanna Briggs Institute. Four databases and two clinical trial registers were systematically searched and complementary searches were conducted. Published and unpublished quantitative and qualitative reports of app-supported lifestyle intervention studies in pregnancy were considered for inclusion. Eligible reports were included until June 2022. PICOS and app characteristics were extracted using a standardized, pre-tested template. Data was summarized in descriptive analysis and presented in narrative, tabular and graphical format.

**Results:** This review included qualitative and quantitative data of 43 lifestyle intervention studies. The number of published reports almost continuously increased in recent years, 40% of which accounted for trial register entries. Included studies varied in their PICOS characteristics. Studies were mostly conducted in high income countries, included women with overweight or obesity, delivered multicomponent interventions during pregnancy only, and focused on diet and physical activity. Eleven effectiveness and seven pilot trials had published results on GWG, of which six effectiveness trials observed significant intervention effects. None of the five trials reporting GDM results observed effects on GDM. Apps used were mostly mHealth apps, connected with physical activity and weight tracking devices and involved self-monitoring, goal setting, prompts, feedback and educational content.

**Conclusions:** Research in the field is emerging, while effectiveness and implementability of interventions has yet to be determined. Gaps in research exist on vulnerable groups, risk-adapted interventions involving social surrounding and mental health aspects, starting early and spanning from preconception to postpartum period.

# Neighborhood violence and adult obesity in Sao Paulo city, Brazil: a longitudinal study

**Ms. Bianca Mitie Onita**<sup>1,2</sup>, Ms. Margarethe Thaisi Garro Knebel<sup>1,2</sup>, Dr. Rildo de Souza Wanderley Júnior<sup>1</sup>, Dr. Marcelo Batista Nery<sup>3</sup>, Ms. Beatriz Oliveira de Carvalho<sup>3</sup>, Prof. Alex Antonio Florindo<sup>1</sup>

<sup>1</sup>Physical Activity Epidemiology Group (GEPAF) – School of Arts, Sciences and Humanities, University of Sao Paulo, Sao Paulo, Brazil, <sup>2</sup>Graduate Course in Nutrition in Public Health – School of Public Health, University of Sao Paulo, Sao Paulo, Brazil, <sup>3</sup>Center for the Study of Violence (NEV), University of Sao Paulo, Sao Paulo, Brazil

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** To assess the relationship between neighborhood violence and obesity incidence in adults from Sao Paulo, a megalopolis city in Brazil.

**Methods:** Prospective longitudinal study with data from ISA: Physical Activity and Environment. The sample had 929 adults aged 18 and over without obesity at baseline (2014/2015) that participated in the second wave of the study (2020/2021). The outcome was obesity incidence (yes, no) assessed through body mass index, calculated from self-reported height and weight, with cutoffs applied accordingly to age groups. The independent variables were terciles of violent crime records in 2019 (included vehicle, pedestrian and within public transportation theft, and intentional homicide) within 500m, 1000m and 1500m linear buffers (neighborhoods) from each participant residence at second wave (1<sup>st</sup> tercile as reference with less violent crime records), with official government dataset from the Center for the Study of Violence. Chi-square tests were used for bivariate analysis and applied multilevel logistic regression models, with individual and health administrative areas (central, north, east, west, southeast, south) as levels, with the associated independent variables – model1: crude analysis; model2: adjusted for age, sex, skin color, educational level; model3: model2 added perceived violence of neighborhood (very safe, fairly safe, somewhat violent, very violent) from the baseline questionnaire. Wald test was used to verify variables association in the models.

**Results:** Central area of Sao Paulo had higher proportions of violent crime across all buffers, and western area had the lower proportions. Obesity incidence was 15.1% in the period, and it was associated with living in neighborhoods with violent crimes at second wave within 1500m ( $p=0.021$ ) and 1000m ( $p=0.040$ ). The relationship remained significant in model3 for both neighborhoods, and people living in the higher tercile of violent crimes within 1000m had higher chances to develop obesity ( $OR=1.76$ ;  $CI95\%=1.11-2.78$ ;  $p\text{-value for trend}=0.015$ ).

**Conclusions:** This study showed that people exposed to a more violent neighborhood are also in higher risk to develop obesity, highlighting the importance of etiology beyond behaviors factors, like physical activity and diet, and its inclusion in prevention plans and actions such as neighborhood-level public policies.

**Funding:** Sao Paulo Research Foundation (FAPESP: 2017/17049-3; 2021/03277-0).



# UK caregiver attitudes to risky child play: differences by child and adult gender

**Dr. Andrea Smith<sup>1</sup>**, Dr. Esther van Sluijs<sup>1</sup>  
<sup>1</sup>MRC Epidemiology Unit, Cambridge, United Kingdom

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** G. Children and families

**Background:** Risky play is a natural aspect of children's development, fun, rewarding, and can motivate children to be active. Some parents are more permissive of risky play than others and this impacts on children's play opportunities. This study explores gender differences in parental attitudes towards risky play to understand the perceived barriers which may constrain this type of play for 5-11-year-old children in the UK.

**Methods:** Cross-sectional analyses of the nationally-representative British Child Play Survey of caregivers with primary-school-aged children. Self-reported tolerance for risk in play was collected using the 31-item Tolerance for Risk in Play scale (TRiPS; scored 0-184) and the Risk Engagement and Protection Survey (REPS; scored 6-42). REPS captures caregiver 'Protection from Injury' (PIF) and 'Engagement with Risk' (EWR; scored 6-42) attitudes in relation to child play. Multiple linear regression was applied to compare caregiver gender differences for REPS and TRiPS, with parental and child sex as the independent variables and total scores of TRiPS, REPS PIF and REPS EWR as dependent variables, respectively.

**Results:** Participating caregivers (n=1919) were mostly female (54%), white (91%) and high/medium SES (59%). There were no caregiver gender differences in mean TRiPS (M=83.60, p=.64), REPS EWR (M=30.84, p=.66) and REPS PFI (M=26.05, p=.32). There were significant differences in the proportion of caregivers that tolerated individual TRiPS risky play activities (15/31 activities). Of these 15 activities, 10 were more tolerated by female caregivers (e.g., chasing other children) than males (e.g., allowing the child to play in the forest alone). Parent gender was not significantly associated with total TRiPS ( $\beta=.25$ (SE=1.75),  $p<.89$ ), REPS PFI ( $\beta=-.25$ (SE=0.25),  $p<.32$ ) or REPS EWR ( $\beta=.17$ (SE=0.24),  $p<.47$ ). However, caregivers of boys demonstrated greater tolerance of risk (TRiPS score ( $\beta=-4.5$ (SE=1.74),  $p<.01$ ), REPS PFI ( $\beta=-.33$ (SE=.25),  $p<.01$ ) and REPS EWR ( $\beta=-.62$ (SE=.23),  $p<.01$ )).

**Conclusions:** Gender-specific differences in tolerance were found to be targeted towards specific types of risks and were more frequently tolerated by female caregivers. Caregivers of boys showed more permissive attitudes and tolerance of risky play, irrespective of their own gender. These insights will aid the development of interventions to support caregivers in making informed decisions on how to encourage children's risky play.

# Children's Objectively Measured Physical Activity Pre/Post Covid-19: A Structured Days Approach.

**Dr. Ethan Hunt**<sup>1</sup>, Dr. Keith Brazendale<sup>2</sup>, Dr. Augusto Cesar De Moraes<sup>1</sup>, Mr. Raja Malkani<sup>1</sup>, Dr. Deanna Hoelscher<sup>1</sup>

<sup>1</sup>University of Texas Health Science Center School of Public Health Austin , Austin , USA, <sup>2</sup>University of Central Florida Department of Health Sciences, Orlando , USA

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** G. Children and families

**Background:** The Structured Days Hypothesis (SDH) posits that children's physical activity is more favorable on days that contain more structure. With the closure of schools during COVID-19, we believe, the compounding impact of less structure from shutdowns and summer will negatively impact objectively measured physical activity among youth. The purpose of this study was to compare children's objective physical activity on school weekdays prior to COVID-19 restrictions versus during COVID-19 restrictions, and summer weekdays prior to COVID-19 restrictions versus during COVID-19 restrictions.

**Methods:** Data were received from the Adolescent Brain Cognitive Development (ABCD) study database in November of 2022. For this cross-sectional analysis, we pulled Fitbit data from the year-2 follow-up cohort of the ABCD study. Fitbits were employed to a sub-sample during this period for twenty-one days encompassing weekdays and weekends. Time-stamped Fitbit data allowed us to roughly differentiate pre-COVID-19 shutdowns, as well as the school year and summer months. Linear and Logistic Mixed effects models accounting for the nested nature of the data (i.e., days within children) assessed MVPA and steps per day, by group, adjusted for, sex, race/ethnicity, household income, and site location.

**Results:** Our final analytic sample included 7,371 children (48% female, 48% non-White, 11.6 yrs.). After controlling for demographic and site location variables, during COVID-19 restrictions, children engaged in significantly less daily average steps (Coef. -2,488 95%CI 2,647, 2,328) during school weekdays compared to school weekdays before COVID restrictions. During COVID-19 restrictions, children engaged in significantly less daily average steps (Coef. -1,592 95%CI 1,828, 1,355) during summer weekdays compared to summer weekdays before COVID restrictions. During COVID-19 restrictions, children were significantly less likely to meet MVPA recommendations (OR 0.54 95%CI 0.48, 0.60) during school weekdays compared to school weekdays before COVID restrictions. During COVID-19 restrictions, children were significantly less likely to meet MVPA recommendations (OR 0.68 95%CI 0.58, 0.81) during summer weekdays compared to summer weekdays before COVID restrictions.

**Discussion:** Children's MVPA and steps both declined significantly during periods of less structure. Further, it appears that the COVID-19 epidemic significantly exacerbated these findings. These findings will help better prepare youth-serving programs for the next epidemic.

# Adaptation and implementation of a tele-nutrition education intervention for Native American caregivers of young children living in remote rural communities

**Dr. Mical Shilts<sup>1</sup>, Dr. Lenna Ontai<sup>2</sup>**, Ms. Sonia Rodriguez<sup>3</sup>, Ms. Vicki Shively<sup>4</sup>, Ms. Jona Pressman<sup>3</sup>, Dr. Dennis Styne<sup>5</sup>, Dr. Dorina Espinoza<sup>6</sup>, **Dr. Karina Diaz Rios<sup>7</sup>**

<sup>1</sup>California State University, Sacramento, Sacramento, CA, USA, <sup>2</sup>University of California, Davis, Davis, CA, USA, <sup>3</sup>University of California Cooperative Extension, Oroville, CA, USA, <sup>4</sup>Round Valley Indian Health Center, Covelo, CA, USA, <sup>5</sup>University of California Davis Medical Center, Sacramento, CA, USA, <sup>6</sup>University of California Agriculture and Natural Resources, Eureka, CA, USA, <sup>7</sup>University of California, Merced, Merced, CA, USA

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** To adapt a nutrition education intervention for tele-nutrition delivery and relevance to Native American caregivers of young children living in remote rural communities, and to evaluate its acceptability.

**Methods:** Community-engaged dissemination and implementation science principles were applied in the adaptation and implementation of Healthy Kids Tele-Nutrition. This program consists of 7-weekly classes delivered remotely by a Cooperative Extension community nutrition educator. Consultation with a community advisory board of tribal members guided program adaptations for cultural relevance. An environmental scan was conducted to harmonize the class content—including food demonstrations—with food resources available in the community. Acceptability of the content and tele-nutrition delivery were explored via surveys completed by participants after each class. Class surveys were triangulated with a focus group conducted after the last session of the series. Validated tools were used to measure the intervention's limited efficacy in improving food-related behaviors and parenting practices at home.

**Results/findings:** The first series of classes was delivered in the Fall of 2022; one class was canceled due to a conflicting community event. Of the 22 women enrolled, 17 attended at least 4 classes; the majority identified as Native American (n=12). Unstable internet connectivity and audiovisual equipment issues that occurred throughout the series were troubleshooted by the onsite implementation partner team. Across class surveys, most participants indicated the nutrition topics (96%), parenting topics (98%), and goal-setting activities (95%) were useful; and agreed that they learned new information (95%), will apply what learned at home (94%), felt comfortable participating (96%), and that the tele-nutrition delivery was effective (93%). Preliminary qualitative and limited efficacy results indicate participants found the classes valuable to improve eating practices at home and appreciated the delivery format and class dynamics. Initial findings informed adaptations to the intervention.

**Conclusions:** Access to tele-nutrition resources can help mitigate nutrition disparities faced by residents of remote rural communities. Healthy Kids Tele-Nutrition appears to be an acceptable and promising approach to improve food-related behaviors and parenting practices in rural Native American homes. The updated intervention is being offered in the same community, and new partnerships are being explored for additional remote community delivery.

# The effects of interrupting sedentary behaviour with different frequencies of physical activity on cardiometabolic risk factors in healthy adults

**Mrs. Melina Meyer Magulas<sup>1</sup>**, Prof. Ulf Ekelund<sup>1</sup>, Prof. Jostein Steene-Johannessen<sup>1</sup>

<sup>1</sup>Norwegian School of Sports Sciences, Oslo, Norway

Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose** From both a public health and clinical perspective it is important with early interventions affecting the modifiable risk factors that can contribute to prevent premature development of and death caused by cardiometabolic risk factors. Breaking up sitting with bouts of physical activity is associated with improved cardiometabolic profile in clinical populations. However, whether this extends to healthy adults is unclear. Thus, the aim was to examine whether breaking up sitting with different frequencies of PA bouts improves cardiometabolic profile in healthy adults compared to prolonged sitting.

**Methods** In this crossover study, 20 sedentary adults (9 men,  $33.4 \pm 4.7$  years, BMI  $25.8 \pm 3.4$ ,  $VO_{2max}$   $47 \pm 9.2$  ml/kg/min) were randomly assigned to the following conditions (7hr): 1) prolonged sitting (SIT), 2)  $\approx 5$  min of walking/jogging every 60 min (PA-60). 3) 3 min of walking/jogging every 30 min (PA-30) 4.)  $\approx 30$  min PA followed by sitting (PA-SIT). All PA bouts were conducted at 65% of  $VO_{2max}$ . Trial conditions were iso-caloric and the test meals had an average macronutrient content of  $34.4 \pm 1\%$  fat,  $46 \pm 4.5\%$  carbohydrates and  $20 \pm 1.7\%$  protein, respectively Fasting blood samples were drawn from the antecubital vein at baseline ( -1 hr and 1 hr), and then every 30 minutes over the remaining 6 hrs.

**Results: Data analysis plan** This study is currently ongoing and complete datasets will be included in due time for the annual meeting. Total area under the curve and positive incremental area under the curve for glucose, insulin, c-peptide and triglycerides will be calculated by the trapezoidal rule. Normality for the data will be checked. One-way ANOVA will assess between condition effects. Cohen's d effect sizes of 0.2 (small), 0.5 (medium) and 0.8 (large) will be calculated to describe the magnitude of differences between conditions. Data will be presented as mean (95 % CI). Significance accepted is  $<0.05$ .

**Discussion/Conclusion** The present study may add new evidence on the effects of different frequencies of interrupting sedentary behavior with PA on cardiometabolic risk factors in young, healthy adults, and thus contribute to shape quantitative advice on how to limit sedentary behavior.

# Development and validation of a screening questionnaire for early identification of pregnant women at risk for excessive gestational weight gain

**Mrs. Kristina Geyer<sup>1</sup>**, Mrs. Roxana Raab<sup>1</sup>, Prof. Hans Hauner<sup>1</sup>

<sup>1</sup>Institute of Nutritional Medicine, Else Kröner-Fresenius-Centre for Nutritional Medicine, School of Medicine, Technical University of Munich, Munich, Germany

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose** Excessive gestational weight gain (GWG) is associated with negative consequences for the health of mother and child. Lifestyle interventions to prevent excessive GWG in pregnancy should consider individual risk factors of expectant mothers. The aim of this study is to develop and validate a non-invasive screening questionnaire to identify a woman's risk of excessive GWG already at the beginning of pregnancy.

**Methods** The cohort of the German "Healthy Living in Pregnancy" (GeliS) trial was used for the development of a score predicting the risk of excessive GWG. Maternal data on socio-demographics, anthropometrics, smoking behaviour and mental health were collected before the 12<sup>th</sup> week of gestation. The calculation of GWG was based on the last and first weight measured during routine antenatal care. The data was randomly divided into a training and validation data set. The training data set was used to perform a multivariate logistic regression model with stepwise backward elimination. Based on the calculated  $\beta$ -coefficients, a score value was assigned to the final variables. The risk score was validated using the test dataset and an external dataset.

**Results** 1790 women were included in the analysis. Of these, 45.6% showed excessive GWG. A high pre-pregnancy body-mass-index, intermediate educational level, signs of depressive disorder, primiparity, smoking and being born in a foreign country were identified as risk factors for excessive GWG. The risk score ranged from 0-15 and categorised women's risk for excessive GWG into low (0-5), moderate (6-10) and high (11-15). Cross-validation and external validation revealed a moderate predictive power of the score with an area under the curve of 0.709 and 0.738, respectively.

**Conclusions** Our screening questionnaire is a simple, assistive, and validated tool for early identification of pregnant women at risk of excessive GWG, enabling targeted primary prevention lifestyle support. It addresses the current demand for translation of research findings into clinical practice in pregnant women.

# Associations of the daily and hourly variability of physical activity accumulation on indices of vascular function; evidence from the Maastricht study.

**Miss Rebecca Lear**<sup>1</sup>, Prof. Melvyn Hillsdon<sup>1</sup>, Dr. Brad Metcalf<sup>1</sup>, Dr. Bert Bond<sup>1</sup>, Prof. Hans Saveberg<sup>2</sup>, Dr. Bastiaan E. de Galan<sup>2</sup>, Dr. Tos Berendschot<sup>2</sup>, Dr. Carol Webers<sup>2</sup>, Associate Professor Alfons Houben<sup>2</sup>, Dr. Jeroen Kooman<sup>2</sup>, Dr. Coen D.A. Stehouwer<sup>2</sup>, Dr. Abraham A Kroon<sup>2</sup>, Prof. Hans Bosma<sup>2</sup>, Dr. Simone J.P.M. Eussen<sup>2</sup>, Ms. Evelien Vandercappellen<sup>2</sup>, Associate Prof. Annemarie Koster<sup>2</sup>, Dr. Richard Pulsford<sup>1</sup>  
<sup>1</sup>University of Exeter, Exeter, United Kingdom, <sup>2</sup>Maastricht University, Maastricht, Netherlands

Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** The beneficial effects of physical activity (PA) on vascular function in the prevention of cardiovascular diseases are well characterised. However, existing studies focus on total or average volume/duration of daily moderate-vigorous PA (minutes). Little is known about how the daily and weekly PA patterns associate with vascular function.

**Methods:** Accelerometer-derived (activPAL3) 7-day stepping was analysed for 5199 participants in The Maastricht Study (50.4% women; 22.4% type 2 diabetes). Vascular function was assessed in the macrocirculation (cfPWV) and the microcirculation in the skin (heat-induced hyperaemia) and the eye (static and dynamic retinal vessel analysis). Multivariable regression models initially explored associations between stepping metrics; volume (step-count), duration (stepping time), and intensity (stepping time >and< 100 steps/min) with vascular function after adjustment for confounders and moderators. PA variability metrics (between-day and within-day variability, inter-daily stability, intra-daily variability, and the proportion of steps accumulated in the most active 2 days) were then added to the regression models to identify improvements in the prediction model ( $\Delta R^2$ ) beyond that of stepping metrics. Analyses were stratified by diabetes status if an interaction effect was present to explore effect modification by differences in metabolic health.

**Results:** All stepping metrics were significantly negatively associated with cfPWV, with a stronger association in those with type 2 diabetes (all  $P < 0.05$ ). Inter-daily stability was significantly associated with cfPWV ( $b = 0.504$  95%CI[0.028, 0.982]  $P = 0.038$ ,  $\Delta R^2 = 0.001$ ). In analyses of skin microcirculation there were significant positive associations with stepping metrics in those with diabetes, but interestingly a small negative association in those without diabetes ( $P_{\text{interaction}} < 0.001$ ). Inclusion of variability metrics did not significantly improve the prediction model. In analysis of retinal microvascular function there was no association with stepping metrics, however in static retinal analysis of venular diameters there were significant associations with between-day variability, within-day variability and inter-daily stability (all  $P < 0.05$ , overall  $\Delta R^2 = 0.009$ ).

**Conclusion:** Engaging in higher levels of PA is associated with improved macro- and some aspects of microvascular function, especially in those with diabetes. Daily or weekly patterns in which PA is accumulated may influence macro- and microvascular function, which may have implications for the prevention of disease.



# A Study of Body Image, Weight Stigma, and Disordered Eating Behaviors among LGBTQ+ Young Adults

Ms. Alexandra Hajek<sup>1</sup>, Ms. Jacey Poole<sup>2</sup>, Dr. Cassandra Johnson<sup>1</sup>, Dr. Jenifer Ross<sup>2</sup>, **Dr. Lauren Butler<sup>1</sup>**

<sup>1</sup>Texas State University, San Marcos, USA, <sup>2</sup>University of North Florida, Jacksonville, USA

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Background:** Structural and social inequalities contribute to higher prevalence of eating disorders among lesbian, gay, bisexual, transgender and queer (LGBTQ+) adults compared to heteronormative adults. Body image concerns, weight stigma, and disordered eating behaviors (e.g. vomiting after meals) are risk factors for eating disorder development. Little is known about eating disorder risk factors, particularly, weight stigma, among LGBTQ+ persons. This study aimed to determine differences in body image, weight stigma and disordered eating among LGBTQ+ persons compared to their heteronormative counterparts. Findings can support inclusive clinical practice and behavioral nutrition research.

**Methods:** This cross-sectional study used survey data from a sample of university students (18-35 years old) in Jacksonville, FL, USA (N=255). Measures included the Weight Self-Stigma Questionnaire (weight stigma) and Body Appreciation Scale (body image). The Eating Attitudes Test-26, a valid and reliable tool for eating disorder referral, was used to assess disordered eating behaviors. Analyses of covariance was used to determine means and differences in outcomes between LGBTQ+ community members and heteronormative persons. Multivariable linear regression models were used to determine differences between persons from LGBTQ+ subgroups (e.g., lesbian, bisexual) and the comparison group.

**Results:** Nearly half of surveyed students (45.5%) reported LGBTQ+ community membership. Most individuals reported cis-gender, heterosexual orientation (i.e., heteronormative identification) (58.24%), followed by bisexual (17.58%), queer (6.23%) and lesbian (5.49%) sexual orientations. Compared to the heteronormative group, LGBTQ+ persons reported lower body appreciation (BA) ( $3.08 \pm 0.09$ ;  $p < 0.01$ ), and weight stigma (WS) ( $30.54 \pm 0.83$ ;  $p < 0.01$ ) scores. Disordered eating behavior scores did not differ between LGBTQ+ and referent groups and were subclinical on average. WS scores were higher among those reporting bisexual ( $6.08 \pm 1.72$ ;  $p < 0.01$ ) and polysexual ( $5.89 \pm 2.77$ ;  $p = 0.03$ ) orientations. BA scores were lower among those reporting bisexual ( $-0.32 \pm 0.15$ ;  $p = 0.03$ ) and polysexual ( $-0.62 \pm 0.24$ ;  $p = 0.01$ ) orientations compared to the heteronormative group.

**Conclusion:** This study is one of the first to highlight weight stigma within the LGBTQ+ community. Disordered eating behaviors were commonly reported. Clinicians and researchers might consider including weight stigma assessment, along with body image and disordered eating, for the treatment and prevention of eating disorders.

# Identification of behavioral components in m-Health to optimize engagement with a Physical Activity app

**Associate Professor Tina Dalager**<sup>1,2</sup>, Mrs. Linnea Marie Sjöbjerg<sup>1,3</sup>, Prof. Gisela Sjøgaard<sup>1</sup>, Mrs. Anne Kathrine Overgaard<sup>3</sup>, Mr. Thomas Kaarsted<sup>3</sup>, Associate Professor Lotte Nygaard Andersen<sup>1</sup>, Mrs. Anne Faber Hansen<sup>4</sup>, Prof. Karen Søgaard<sup>1</sup>

<sup>1</sup>Department of Sports Science and Clinical Biomechanics, University of Southern Denmark, Odense, Denmark, <sup>2</sup>Department Clinical medicine, Aarhus University, Aarhus, Denmark, <sup>3</sup>Citizen Science Knowledge Center, University of Southern Denmark, Odense, Denmark, <sup>4</sup>Department of Research and Education, University Library, University of Southern Denmark, Odense, Denmark

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Strong epidemiological and clinical evidence demonstrates that physical exercise decreases the risk of more than 35 different disorders and should be prescribed as treatment for many chronic diseases. Yet, most adults are physically inactive. We have developed the Intelligent Physical Exercise Training (IPET) app, that designs individually tailored exercises based on information on work profile, physical capacity, musculoskeletal pain, and health. In more than 20 RCTs we demonstrated the effectiveness of IPET, but effect size is highly depending on the degree of adherence. Thus, the aim of this study is to identify and design behavioral components that integrated in IPET app potentially can increase engagement and adherence.

**Methods:** First part of the project, was to conduct a systematic literature search to identify relevant themes in optimizing use of m-Health. We performed the literature search in three scientific databases: Cinahl, Embase, and Scopus and structured it in 3 focus blocs; 1. describing user experience, engagement, or adherence; 2. describing m-health, smartphone applications or app designs; and 3. describing physical activity, training, or exercise.

Second part of the project is four co-creation workshops involving 70-110 participants (who beforehand have been introduced to the IPET app, and the themes identified in the systematic literature search) in fine-tuning the app with regards to motivation and daily use.

In the third part of the project the identified important behavioral components will be designed and implemented in the IPET app. For a period of 3 months, between 75-150 participants will pilot test the fine-tuned IPET app. It will be evaluated using questionnaire and focus group interviews.

**Results/findings:** The systematic literature search identified 1407 references, which after removal of duplicates left 929 references for title and abstract screening. Further analysis is ongoing. Second part of the project will take place in May, and pilot testing will run in autumn 2023.

**Conclusion:** We anticipate that 3-6 themes will emerge from the literature search, which the workshop participants will evaluate for importance in the design of the behavioral components in the IPET app. We hypothesizes that the fine-tuned IPET app will increase engagement and adherence, thus enhance health.

# An exploratory analysis of the extent to which Canadians correctly estimate their sodium intake

**Miss Alicia Tavares da Silva Gomes**<sup>1,2</sup>, Miss Shannon Brazel<sup>3</sup>, Miss Katherine Jefferson<sup>2</sup>, Mr. Noah Donaghy<sup>2</sup>, Mrs. Rola Al Ghali<sup>2</sup>, Dr. Beatriz Franco-Arellano<sup>2</sup>, Associate Professor JoAnne Arcand<sup>2</sup>

<sup>1</sup>University of São Paulo, São Paulo, Brazil, <sup>2</sup>Ontario Tech University, Oshawa, Canada, <sup>3</sup>St. Michael's Hospital, Toronto, Canada

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** A high sodium diet increases the risk of cardiovascular diseases. On average Canadians' sodium consumption is much higher than advised; and many people have misconceptions about the amount of sodium they consume. The purpose of this exploratory cross-sectional study among a select group of Canadians was to examine the extent to which people correctly estimated their sodium intake.

**Methods:** Participants in Durham (Ontario) were recruited from primary care clinics, a community centre and social media (2019-2022). Participants completed a questionnaire on sodium knowledge, attitudes and behaviors, where individuals ranked their sodium intake on a scale from "far too much" to "far too little" and "don't know". Participants who selected "far too much/too much" were classified as having "high" sodium intake self-perception; all others were considered as "low", except "don't know". Participants completed two 24-hour urine collections and were classified into a low ( $\leq 2300$  mg/day) or high ( $> 2300$  mg/day) sodium diet category. Fisher's exact and Kruskal-Wallis tests were used to compare groups.

**Results/findings:** Participants ( $n=92$ ) were 40-94 years old, 67% female, 97% Caucasian, and 3% had high blood pressure. There was no difference in the sodium intake among those that perceived their intake to be high (48%,  $2986 \pm 1086$  mg/day) versus low (42%,  $2737 \pm 1286$  mg/day) versus "don't know" (10%,  $2517 \pm 1055$  mg/day) ( $p=0.143$ ). Among participants who were following a high sodium diet (58%), 58% correctly classified their intake as high and 34% incorrectly classified as low. In contrast, 54% of participants who had a low sodium diet (42%) correctly classified their intake as low, 33% incorrectly classified as high. Self-perception and actual intake showed a significant association ( $p=0.049$ ). In comparing those who correctly and incorrectly assessed their intake as high, those who were actually following a high sodium diet were more likely to not be currently limiting their intake (55% vs 85%,  $p=0.089$ ) nor concerned about the amount of sodium they eat (81% vs. 85%,  $p=1$ ).

**Conclusions:** In this exploratory study, approximately one third of participants had an incorrect self-perception of their sodium intake. Further exploration in nationally representative sample is needed.

# Environmental and genetic contributions to device-based measures of physical activity in Swedish 9-year-olds

**Prof. Maria Ekblom**<sup>1,2</sup>, Prof. Örjan Ekblom<sup>1</sup>, Dr. Camilla Wiklund<sup>1,2</sup>, Associate Professor Rui Wang<sup>1,2</sup>

<sup>1</sup>The Swedish School of Sport and Health Sciences, GIH, Stockholm, Sweden, <sup>2</sup>Karolinska Institutet, Solna, Sweden

Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM

**SIG - Primary Choice:** G. Children and families

**Purpose** Physical activity (PA) levels among Swedish children are associated with familial socioeconomic status. However, it remains unclear what the driving determinant is: genes or environments. This study aimed to investigate environmental and genetic contributions to proportion of time spent in sedentary behaviour (SED) and PA at low medium and vigorous intensities (LPA, MPA and VPA) in children.

**Methods** We invited Swedish 9-year-old twins enrolled in the Swedish twin register to wear a GT3X accelerometer on their right hip for 7 days. A total of 465 twin pairs with known zygosity and 4-9 days of valid data were analysed. A univariate model was performed to estimate the relative contribution of genetic ( $a^2$ ), shared environment ( $c^2$ ), and unique environment ( $e^2$ ) factors contributing to the variation in % of awake time spent at different intensities. OpenMx was used to perform the analyses and we used Wald-type confidence intervals.

**Results** The twins spent on an average 63% of their awake time in SED, 9% in VPA, 7% in MPA and 20% in LPA. Boys spent a significantly higher % in VPA and MPA, but a lower % time in SED and LPA, compared to the girls. The contribution of genetic factors (heritability) was substantial (0.42 to 0.51) for all PA measures. *Table 1. Estimates and 95% confidence intervals 95% CI) of heritability ( $a^2$ ), shared ( $c^2$ ) and unique ( $e^2$ ) environment contribution to each PA measure.*

	%SED	%LPA	%MPA	%VPA
<b><math>a^2</math></b>	<b>0.48</b>	<b>0.51</b>	<b>0.42</b>	<b>0.51</b>
95% CI	(0.32, 0.64)	(0.33, 0.69)	(0.24, 0.60)	(0.35, 0.67)
<b><math>c^2</math></b>	<b>0.36</b>	<b>0.28</b>	<b>0.34</b>	<b>0.31</b>
95% CI	(0.20, 0.51)	(0.11-0.45)	(0.17, 0.50)	0.15, 0.46)
<b><math>e^2</math></b>	<b>0.17</b>	<b>0.21</b>	<b>0.24</b>	<b>0.18</b>
95% CI	(0.13, 0.20)	(0.17, 0.26)	(0.19, 0.29)	(0.14-0.22)

**Conclusion** Device-based measures of PA were explained to a substantial extent by genetic factors in the Swedish 9-year-olds. Interactions with sex and parental education will be further explored. Multi-level interventions may successfully increase average PA, but often fail to reduce variance. Our findings suggest that interventions aiming to reduce inequalities in PA in young children will have to overcome not only environmental but also substantial hereditary predictors of this modifiable lifestyle factor.

# Sleep and cardiovascular risk factors among workers of a public university

**Prof. Roberta Rodrigues<sup>1</sup>**, Dr. Carla Andrechuk<sup>1</sup>, Ms. Leila Pagamicce<sup>1</sup>, Ms. Mayza Neves<sup>1</sup>, Ms. Estefany Araujo<sup>1</sup>, Prof. Thais São-João<sup>2</sup>, Prof. Marilia Cornélio<sup>1</sup>, Dr. Maria Filomena Ceolim<sup>1</sup>

<sup>1</sup>University of Campinas, Campinas, Brazil, <sup>2</sup>University of Rhode Island, Kingston, USA

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** to describe the duration and quality of sleep and the severity of insomnia as a function of cardiovascular risk factors. The study's contribution is innovative because it focused on a healthy population that did not undergo a systematic health assessment and was not aware of the relationship between sleep and cardiovascular risk factors.

**Methods:** cross-sectional study, with partial data from 415 workers (professors, researchers and administrative technicians) of a public university in the state of São Paulo, aged between 20 and 59 years, who participated in a broader study that aimed to evaluate the eight metrics (Life's Essential 8) as a first step toward designing theory-based interventions to promote optimal cardiovascular health. Step 1: the Instrument for sociodemographic and clinical characterization, the Pittsburgh Sleep Quality Index (PSQI) and the Insomnia Severity Index (ISI), were completed in digital format (REDCap). Step 2: anthropometric data, blood pressure and blood sample were collected in person. Sleep duration and the scores obtained in the PSQI and ISI were compared as a function of the categorical variables using the Mann-Whitney test.

**Results/findings:** Regarding sleep characteristics, short sleep (less than seven hours) was more prevalent during the week (25.7%), when compared to the weekend (7.1%), with a difference of 56 minutes between days of week and weekends. Sleep duration was significantly longer for females. The mean PSQI score was 6.7 ( $\pm 3.4$ ) and the ISI 8.2 ( $\pm 5.3$ ). The prevalence of poor sleep quality and mild insomnia was 55.8% and 39.3%, respectively. The scores obtained in the PSQI were significantly higher for smokers/ex-smokers, workers with arterial hypertension and those with increased waist circumference. Smokers/ex-smokers and individuals with increased waist circumference presented higher scores in the ISI compared to those who had never smoked and those without increased waist circumference.

**Conclusion:** insomnia and poor sleep quality were frequent among the analyzed workers and had a negative impact on cardiovascular health, corroborating the importance of investigating sleep with a view to preventing future harm.

# Development of an intervention to promote fruit consumption by children: a Behaviour Change Wheel approach

Mrs. Samantha Carvalho, Mr. Daisuke Hayashi-Neto, Mrs. Milena Sia Perin, **Mrs. Marília Cornélio**

<sup>1</sup>University of Campinas, Campinas, Brazil

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** This study aimed at identifying the determinants of parents' choice to offer 2 portions of fruits per day to their children aged 2 to 5 years old and selecting the intervention functions of a smartphone-based intervention using the Behaviour Change Wheel (BCW) as a framework.

**Methods:** We conducted semi-structured interviews based on the Theoretical Domains Framework (TDF) to identify barriers and facilitators experienced by parents when aiming to offer 2 portions of fruits per day to their children. Transcripts of phone-based interviews were coded into behavioural determinants and separated into domains of the TDF by two independent coders using content analysis; based on the behavioural determinants, the intervention functions were selected applying the APEASE criteria with a committee of experts to evaluate the affordability, practicability, effectiveness and cost-effectiveness, acceptability, side effects/safety, and equity. Written informed consent was obtained from all subjects.

**Results/Findings:** We interviewed 16 parents until saturation of themes was reached. The following themes (domains of behavioural determinants) were identified and classified based on the COM-B model and the TDF: physical capability (knowledge), physical opportunity (environmental context and resources), and reflective motivation (beliefs about capabilities). We identified education, training, environmental restriction, enablement, persuasion and modelling as potential intervention functions. Following the analysis of the APEASE criteria, the team of experts identified education, training, enablement and persuasion as the recommended intervention functions.

**Conclusions:** Theory-based interventions are more successful in promoting long-lasting behaviour change. This study, which employed the BCW as a guide, identified the behavioral determinants and established the intervention functions which will guide the choice of appropriate behaviour change techniques in a future smartphone-based intervention to increase parents' frequency of offering fruit to their children aged 2 to 5.



# Describing the Process of Adapting a Family-Based Healthy Lifestyle Program from Web to Mobile Using a “No-Code” App Builder

**Miss Amanda Willms<sup>1</sup>**, Mr. Cameron Trim<sup>1</sup>, Miss Bianca DeSilva<sup>2</sup>, Miss Celine Yan<sup>1</sup>, Dr. Sam Liu<sup>1</sup>

<sup>1</sup>University of Victoria, Victoria, Canada, <sup>2</sup>Childhood Obesity Foundation, Victoria, Canada

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Background:** The Generation Health Program (GHP) is a hybrid 10-week family-based lifestyle program for families with at least one child aged 8-12 to promote and improve lifestyle behaviours. Previously, the GHP involved live sessions and an online self-guided web-portal composed of content, challenges, and additional resources. In response to the COVID-19 pandemic and to increase accessibility, the GHP web-portal has been adapted to a mobile app for families to access the content in the palm of their hands.

**Objectives:** To describe the process of adapting an online web-portal to a mobile app.

**Methods:** The research team (n=5) followed a three-step iterative process from May-August 2022 to adapt the content from the web-portal to the mobile app using Pathverse, a no-code app builder. Content evaluation was the first step, which involved examining how the content on the web was organized, compiling this information, and mapping out how to display the content on the mobile app. The second step was uploading content using Pathverse, a no-code app builder, to repurpose the existing GHP content for optimal mobile use. Content testing was the third stage, where the research team conducted internal usability heuristics testing to uncover potential system errors and assess the design.

**Results:** We examined 10 weeks of content and additional resources, including external links and videos, from the web-portal and created an outline to explain how to upload the content to the mobile app. This outline broke down pages of text to include icons and less than 200 characters per app screen, a value determined by previous usability testing with Pathverse for optimal user experience. The team efficiently uploaded app content (estimated 180 hours) to prepare for internal usability heuristics testing. During the usability heuristics testing (n=5), we found minimal system errors, however, noted some text and design errors which were efficiently changed.

**Conclusion:** Using no-code app builders, such as Pathverse, enabled the research team to efficiently adapt a 10-week web-based program to a mobile app over 4 months. Tools such as Pathverse can be both cost and time-effective tools for researchers to create healthy lifestyle apps iteratively and efficiently.

# Health information “on the way”: Provision of information of health behavior in daily chores

**Ms. Tabea Thomas<sup>1</sup>, Prof. Antje Risius<sup>1</sup>**

<sup>1</sup>Working group for nutrition, health and sustainability; Institute of health sciences, University of Education Schwäbisch Gmünd, Schwäbisch Gmünd, Germany

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** This research addresses whether and how health interventions can be integrated in daily chores to different actors and recipient groups. Specifically, it analyses, discusses and case-study-tests, whether prevention measures, like nutrition education, physical education programs and anthropometric treatment may be easier to implement ‘to go’, hence, specifically focusing the social-ecologic setting at forefront, while still taking individual habits and chores into account.

**Methods:** As part of an exploratory study in a university setting, observation and interview protocols were conducted in the “health kiosk”, designed like a simple daily shopping opportunity (“kiosk”) in combination with existing information offerings (both paper and digital). In addition, satisfaction and criticism were surveyed on site using small feedback forms. Subsequently, a questionnaire was sent out to the entire university on experiences with and interest in this type of offering. Further testing of the approach in other settings is planned.

**Results/findings:** 170 visits were recorded. A high level of satisfaction among 68 participants in the on-site survey and majority interest in the questionnaire, which was answered by 143, indicate a demand for this type of offering. The reasons given for using the offer (in the future) in all survey approaches were interest in and importance of health topics, need for health information, improvement of health, low-threshold, free offers and social interaction.

**Conclusions:** The research assesses the perception of socio-ecological interventions, which target population ‘on the go’, so during the daily chores. Interest and need are emerging. The coordination problem will therefore be targeted at first and rolled out to people of all life-circumstances. The proliferation of the information content is left to the individual leaving the highest level of (health) sovereignty, which may be more effective in the long run than dogmatic health surveillance approaches.

**Acknowledgments:** The project in which this contribution is based was carried out in a research-oriented teaching and learning environment with the collaboration of students from the master’s program in Health Promotion and Prevention at the University of Education Schwäbisch Gmünd. We thank the students for their support.

# Assessing the construct validity of full and abbreviated versions of a food literacy measure among postsecondary students

**Mr. Martin Holmes<sup>1</sup>**, Ms. Mona Qutub<sup>1</sup>, Ms. Sanaa Hussain<sup>1</sup>, Ms. Elsie Azevedo Perry<sup>2</sup>, Dr. Heather Thomas<sup>3</sup>, Ms. Lauren Kennedy<sup>4</sup>, Ms. H. Ruby Samra<sup>5</sup>, Ms. Shannon Edmonstone<sup>6</sup>, Ms. Lucy Valleau<sup>7</sup>, Dr. Edward A. Frongillo<sup>8</sup>, Dr. Heather H. Keller<sup>1</sup>, Dr. Helen A. Vidgen<sup>9</sup>, Dr. Sharon I. Kirkpatrick<sup>1</sup>

<sup>1</sup>University Of Waterloo - School of Public Health Sciences, Waterloo, Canada, <sup>2</sup>Haliburton, Kawartha, Pine Ridge District Health Unit, Haliburton, Canada, <sup>3</sup>Middlesex-London Health Unit, London, Canada,

<sup>4</sup>Peterborough Public Health, Peterborough, Canada, <sup>5</sup>City of Hamilton Public Health Services, Hamilton, Canada, <sup>6</sup>Huron Perth Public Health, Stratford, Canada, <sup>7</sup>The Regional Municipality of York - Public Health, Community and Health Services, Newmarket, Canada, <sup>8</sup>University of South Carolina - Arnold School of Public Health, Columbia, USA, <sup>9</sup>Queensland University of Technology - School of Exercise and Nutrition Sciences, Brisbane, Australia

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** There is a growing focus on food literacy—the knowledge, skills, and self-efficacy to navigate food environments—as a possible lever to support eating patterns consistent with human and planetary health. The objectives of this study were to evaluate the construct validity of a food literacy measure among postsecondary students, and to develop an abbreviated measure.

**Methods:** Students (n=442) enrolled in university and college programs in Ontario, Canada were recruited to complete an online survey. The survey included a 49-item food literacy measure developed by public health nutritionists for use with young adults, along with questions to assess demographic and health characteristics. Techniques using Item Response Theory evaluated the difficulty and discrimination characteristics of each item in the food literacy measure to inform three potential abbreviated measures. ANOVA assessed whether scores on the full and abbreviated measures were higher among students in food/nutrition programs (n=112) vs. those who were not (n=330), and whether mean scores differed in hypothesized directions by age, gender identity, self-rated general and mental health, and health literacy. Correlation coefficients between scores on the full measure and each of the abbreviated measures were calculated.

**Results:** The mean food literacy score was 42 (SD=4.7) of 49 possible points (range = 25 to 49). Higher mean scores on the full measure were observed among students in food and nutrition programs (45, SD=4.4) versus those not (41, SD=3.4) ( $p < 0.01$ ). Differences in mean scores on the full measure in hypothesized directions were observed by gender identity, general and mental health status, and health literacy (all  $p < 0.01$ ). Similar results were observed for the abbreviated measures. Correlation coefficients between scores on the full measure and each of the abbreviated measures ranged from 0.71 to 0.83.

**Conclusions:** The findings suggest the measure has reasonable construct validity for measuring food literacy among postsecondary students. The abbreviated measure will be finalized in collaboration with the public health nutritionists who developed the measure, supporting assessment of food literacy in a range of contexts.

# Lessons Learned from Co-Designing a Just-In-Time Adaptive Intervention for a Family-Based Physical Activity App

**Miss Amanda Willms<sup>1</sup>**, Dr. Anna Sui<sup>1</sup>, Dr. Ryan Rhodes<sup>1</sup>, Dr. Sam Liu<sup>1</sup>

<sup>1</sup>University of Victoria, Victoria, Canada

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Background:** Just-in-time adaptive interventions (JITAI) are tailored to an individual's changing needs by adjusting the support provided based on their behavioural and environmental context. Research suggests that JITAI could be a more engaging and effective solution for promoting family-based physical activity (PA) than traditional non-tailored self-guided interventions. However, there are limited studies describing the process of co-designing JITAI apps for family-based PA interventions.

**Purpose:** To describe the lessons learned from co-designing a JITAI app with family-based PA interventions.

**Methods:** This study was conducted from August 2022- February 2023 and involved two rounds of semi-structured interviews. Parents of children aged 8-12 years old who were not meeting the PA guidelines were recruited via Facebook. The first round of semi-structured interviews gathered information to determine app features, while the second round reviewed app content to ensure a minimum viable product for feasibility testing was developed. Following the semi-structured interviews, data were transcribed and coded.

**Results:** Six parents were recruited for feedback on app features and content suggestions, which were coded into themes relating to app feature preferences, physical activity preferences, and content suggestions. Examples of feedback included videos demonstrating behaviours, varying types of physical activities, and gamification elements to encourage adherence. Key lessons learned during this process were: (1) understanding the tailoring variables needed with developing a JITAI, as families presented different requirements to prioritize, (2) initial recruitment for focus groups was a challenge due to scheduling issues, special considerations need to be considered when working with families and their schedules, and (3) granting user data permission from wearable data to tailor JITAI was a challenge to work across mobile platforms (iOS, Android). Despite these challenges, we created a minimum viable family-based JITAI intervention.

**Conclusion:** Co-designing a JITAI app has taught us how to streamline the future development of JITAI apps and important considerations for these interventions. Based on these findings, we propose the following framework for developing JITAI: (1) determine target user and their needs, (2) determine tailoring variable (PA, questionnaire, GPS), (3) determine variable trigger (value) and access to third-party wearables to trigger, (4) set the notification for triggering variable.

# The LUNCHBOX-MONITOR project: co-creation of an objective, non-stigmatizing research methodology and solutions for unhealthy and empty lunchboxes in primary school children

**Ms. Nele Claes**<sup>1</sup>, Ms. Amber Bovijn<sup>1</sup>, Prof. Dienneke Van de Sompel<sup>1</sup>, Dr. Coosje Dijkstra<sup>2</sup>, Dr. Jolien Plaete<sup>3</sup>, Prof. Benedicte Deforche<sup>1</sup>, Prof. Liselot Hudders<sup>1</sup>, Ms. Naomi Dries<sup>4</sup>, Ms. Katrien Verbeke<sup>5</sup>, Prof. Wendy Van Lippevelde<sup>1</sup>

<sup>1</sup>Ghent University, Ghent, Belgium, <sup>2</sup>Vrije Universiteit Amsterdam, Amsterdam, Netherlands, <sup>3</sup>Flanders Institute for Healthy Living, Brussels, Belgium, <sup>4</sup>Rikolto Belgium, Leuven, Belgium, <sup>5</sup>Let Us, Destelbergen, Belgium

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose** A healthy diet is essential for the development, growth and academic performance of primary school children. Unlike other high-income countries, content analyses of lunchboxes to assess the nutritional quality and sustainability of what children bring to school for lunch and snacks have not yet been conducted in Flanders. Furthermore, official data on children's food insecurity in Flanders are lacking. The LUNCHBOXMONITOR project therefore aimed to develop a methodology via co-creation that can objectively register what children (9-12 years) bring in their lunchbox to school but also takes into account the sensitivity and stigmatisation that comes with measuring lunchboxes from children with a lower socio-economic background.

**Methods** Four primary schools were recruited by convenience sampling through the researchers' network. Third grade pupils (n= 90), parents (n=30) and school actors (n=30) co-created through brainstorming the circumstances in which a validated objective research methodology (digital photo method and weighing) can take place in respectively four, two and two co-creation sessions, delivered over a 8- week period (February-March 2023). Socio-demographic characteristics were obtained through a questionnaire. To evaluate the co-creation sessions, process evaluations were conducted at the end of each session through survey and interviews.

**Results** Preliminary results indicate that children accept the validated digital photo method and weighing of their home-brought food items. Special effects such as sounds while weighing or decorating the room would make the measurement more enjoyable. The children would like to investigate the contents of their lunchboxes themselves in the canteen. They experience the use of a checklist as complicated. Furthermore, the pupils do not wish to receive any comments from the researchers on what they bring to school to eat, nor that the research team touches their food. In addition, they underline discretion. Parents and school actors agree with the objective methodology and circumstances stated by the children in terms of feasibility and acceptability.

**Conclusions** We expect that the co-created context in which an objective measurement of what children bring in their lunchbox will allow us to get insight into the number of unhealthy and empty bread boxes in Flanders in a second phase of the project.

# Efficacy of individualized sensory-based mHealth interventions to improve distress coping in healthcare professionals: A Multi-Arm Parallel-Group randomized controlled trial

**Mr. Hannes Baumann<sup>1,2,3</sup>**, Mr. Luis Heuel<sup>3</sup>, Prof. Bettina Wollesen<sup>2</sup>

<sup>1</sup>Medical School Hamburg, Hamburg, Germany, <sup>2</sup>University of Hamburg, Hamburg, Germany, <sup>3</sup>Technical University Berlin, Berlin, Germany

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** D. e- & mHealth

The adverse impacts of prolonged distress on healthcare professionals are well established. However, the implementation and assessment of efficient interventions that target coping mechanisms for distress remain insufficient due to complex requirements in the healthcare sector. A promising approach involves individualized mHealth interventions utilizing sensory feedback to initiate sustainable health behavior change stage transitions. The primary objective of this research is to examine the effectiveness of individualized, sensor-based mHealth interventions, focussing on mindfulness and physical activity improving distress coping among healthcare-professionals with a specific emphasis on health-action-process-approach stage transitions. We utilized a multi-arm, parallel-group randomized controlled trial design to compare the outcomes of five intervention groups with varying levels of individualization (1: web-based-training only, 2: need-oriented web-based-training, 3: need-oriented web-based-training with telephone-coaching, 4: individualized app-based-training with biofeedback, 5: individualized app-based-training with biofeedback and health-report), to a control group. The study collected both self-reported questionnaire data (HAPA stages and Demographics) as well as sensory data from electrocardiography (RMSSD, SDNN, LF/HF, Beavsky-Index) and accelerometry (Step-counts, MVPA, Inactivity, Inactive-period disruption counts) at baseline and post-intervention (after eight weeks).

Of the 995 eligible participants, 170 (26%) completed the post-intervention measurement (1: N = 21; 2: N = 23; 3: N = 7; 4: N = 34; 5: N = 16; Control Group: N = 69). MANOVA results indicated small to moderate time-by-group interaction effects for physical activity-related outcomes, including moderate to vigorous physical activity ( $F(1,5) = 5.8$ ,  $p = \leq 0.001$ ,  $\eta^2p = 0.057$ ) and inactivity disruption ( $F(1,5) = 11.2$ ,  $p = < 0.001$ ,  $\eta^2p = 0.100$ ), in the app-based intervention groups, but not for step counts and inactivity and only very few stage transitions. No changes were observed in stress-related heart rate variability parameters over time.

Despite the sophisticated and high-quality study design, and numerous strategies implemented to enhance adherence, the attrition rate was substantial. Nonetheless, the individualized app-based interventions exhibited favorable initial effects on physical activity. Nonetheless, no noteworthy alterations in stress-related outcomes are very few stage transitions were apparent, implying that the duration of the intervention was inadequate to elicit physiological adaptations that could lead to improved coping with distress.



# Toward a national-level framework for food and nutrition surveillance in Canada: An umbrella review and environmental scan of indicators to monitor food environments and food systems

**Dr. Kirsten M. Lee**<sup>1</sup>, Ms. Julie Bates<sup>2</sup>, Ms. Karen C. Roberts<sup>2</sup>, Dr. Marisol Betancourt<sup>2</sup>, Ms. Michelle Hooper<sup>3</sup>, Ms. Sylvie St-Pierre<sup>3</sup>, Ms. Isabelle Massarelli<sup>4</sup>, Ms. Veronique Dorais<sup>4</sup>, Dr. Tarra L. Penney<sup>1</sup>

<sup>1</sup>Global Food Systems and Policy Research, School of Global Health, York University, Toronto, Canada,

<sup>2</sup>Centre for Surveillance and Applied Research, Public Health Agency of Canada, Ottawa, Canada, <sup>3</sup>Office of Nutrition Policy and Promotion, Health Canada, Ottawa, Canada, <sup>4</sup>Food Directorate, Health Canada, Ottawa, Canada

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Food and nutrition surveillance is a federal government priority in Canada, however, there is a critical need to advance current approaches by identifying indicators to monitor food environments and food systems. Food environments are key intervention points to support healthy eating, while food system activities influence the nutritional quality of the food supply. In partnership with the Public Health Agency of Canada and Health Canada, this project aims to develop a surveillance framework of indicators to monitor the impact of food environments and food systems on eating patterns and practices among Canadians.

**Methods:** An umbrella review (scoping review of reviews) was conducted to determine the scope of available food and nutrition indicators. Search strategies for MEDLINE, CINAHL, EMBASE, and Cochrane Database of Systematic Reviews were developed using keywords for eating patterns and practices, food environments, food systems, and surveillance. Two independent reviewers screened peer-reviewed literature published between 2000-2022. Reviews were included if a relationship between a food- and nutrition-related indicator and a chronic disease and health promotion outcome was reported. Quality of the review was assessed using the Joanna Briggs Institute Checklist for Systematic Reviews and Research Syntheses. Data on indicators and their definitions, measures to populate indicators, and gaps were extracted and summarized narratively. An environmental scan of national-level datasets was also conducted to determine feasibility of populating the indicators.

**Results:** A total of 352 articles were included in the umbrella review. Most articles (n=198) were focused on indicators of eating patterns and practices, with emphasis on consumption by food groups. Articles focused on food environments (n=120) included a wide array of indicators to monitor food environment determinants, such as the availability and affordability of healthy food in retail outlets and density of fast-food chains in urban settings. The smaller body of literature on indicators of food system determinants (n=34) was primarily focused on the environmental impact of food supply chain activities.

**Impact:** The findings of this review will inform the development of a conceptual surveillance framework to provide timely, reliable, and relevant evidence for policy and program development on chronic disease prevention and health promotion in Canada.

# A World of Difference: Effects of a World Foods College Course on Food Familiarity and Diet Quality

**Miss Marissa McKeague**<sup>1</sup>, Dr. Sarah Colby<sup>1</sup>, Mr. Michael O'Neil<sup>1</sup>, Ph.D., R.D.N Rahel Mathews<sup>2</sup>, Ph.D., R.D. Melissa Olfert<sup>3</sup>

<sup>1</sup>University of Tennessee, Knoxville, USA, <sup>2</sup>Mississippi State University, , USA, <sup>3</sup>West Virginia University, , USA

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** College is a time of changing food patterns and often establishes lifelong habits associated with chronic diseases; thus, there is a need to identify intervention strategies to improve students' dietary quality to promote health.

**Methods:** Undergraduate students in a World Foods nutrition course about foods from around the world (NUTR 216, n=410), a general nutrition course (NUTR 100, n=171), and an introduction to public health course (PUBH 201, n=166) at a Land Grant University in the Southeast United States completed online surveys at the beginning and end of the Spring 2022 semester. Surveys assessed diet quality using the short Healthy Eating Index and food familiarity using Likert scale questions about foods from around the world. An ANOVA was conducted to determine differences in diet quality scores and food familiarity scores between and within the three groups.

**Results/findings:** Across classes, pre to post, there were mean increases in diet quality scores ( $p=.002$ ,  $M=48.5\pm9.8$  vs.  $M=49.6\pm9.4$ ) and in familiarity scores ( $p<.001$ ,  $M=160.6\pm45.2$  vs.  $M=194.5\pm56.7$ ). Pairwise comparisons, pre to post, revealed a significant mean increase in diet quality in NUTR 100 ( $p=.031$ ,  $M=47.7\pm10.4$  vs.  $M=49.2\pm9.5$ ) and NUTR 216 ( $p=.008$ ,  $M=48.8\pm9.6$  vs.  $M=50.0\pm9.5$ ) and in familiarity in NUTR 100 ( $p<.001$ ,  $M=159.3\pm42.8$  vs.  $M=172.9\pm50.8$ ) and NUTR 216 ( $p<.001$ ,  $M=155.0\pm42.0$  vs.  $M=210.1\pm55.4$ ). PUBH 201 showed no significant change from pre to post in diet quality or food familiarity score ( $p=.308$ ,  $M=48.6\pm9.6$  vs.  $M=49.3\pm8.9$ ;  $p=.670$ ,  $M=176.7\pm51.3$  vs.  $M=178.3\pm54.0$ , respectively).

**Conclusions:** Having college students take either a World Foods or a general nutrition course can improve students' dietary quality. The World Foods class having no focus on individual dietary behavior indicates that a course focused on increasing familiarity to foods from around the world appears to be an effective strategy to improve diet quality among college students.

# Arenas for healthy and sustainable food system transformation – consumer perspectives

**Associate Professor Marianne S. Morseth**<sup>1</sup>, Mrs. Anne Lene Løvhaug<sup>1</sup>, Associate Professor Laura Terragni<sup>1</sup>, Miss Siri Bjerkheim<sup>2</sup>, Mrs. Ellen Bjørkum<sup>2</sup>, Mrs. Kaja Lund Iversen<sup>3</sup>

<sup>1</sup>Oslo Metropolitan University, Oslo, Norway, <sup>2</sup>The Consumer Council of Norway, Oslo, Norway, <sup>3</sup>Institute of Public Health, Oslo, Norway

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Successful transformation towards more sustainable food systems should consider consumer perspectives. Nutrient and sustainability profiling systems are tools that indicate the nutritional value and the environmental and social impact of foods. These can underpin interventions that may change food production and consumption patterns, including food labelling. To increase our understanding of where and how such profiling systems may be relevant for consumers, we conducted a survey to assess in which arenas consumers were concerned with sustainability when making food choices and further, how consumers prefer to see a potential label presented on products.

**Methods:** A cross-sectional web-based survey was conducted among a nationally representative sample (n=1004, 18-90 years) in Norway in February 2023, by YouGov for the Norwegian Consumer Council as part of the NewTools project.

**Results:** The arenas where most consumers reported to be somewhat or very concerned with environmental sustainability (e.g. greenhouse gas emissions, pesticides) when making food choices were local markets (75%) and grocery stores (61%), compared to 38% both in restaurants and kiosks/gas stations. For social sustainability (e.g., working conditions, animal welfare), the arenas mentioned by most were local markets (69%), canteens (58%) and home delivery of groceries (56%). For healthy food (low in added sugars, salt and saturated fat), the most frequently mentioned arenas were grocery stores and local markets (both 81%) and canteens (77%), while the corresponding number for kiosks/gas stations was 55%.

One summary label on each product encompassing various dimensions of sustainability (e.g. health, environmental sustainability and animal welfare) was preferred by 23% of the sample, 18% preferred two separate labels (one for health and one for social and environmental sustainability), while 17% preferred separate labels for each dimension.

**Conclusions:** The arenas where most participants answered that they were concerned with sustainability when making food choices vary slightly depending on which dimension of sustainability is addressed. These findings can be used to explore applications of food profiling systems in different contexts and arenas with the aim to promote healthier and more sustainable food consumption. Future analysis will assess the associations between preferred arenas and sociodemographic factors.

# Health in the eyes of the beholder: A pilot study of consumer response to front-of-package food labeling in Israel

**Ms. Or Avishai<sup>1</sup>**, Ms. Ron Bromiker<sup>1</sup>, Mr. Ilan Hadad<sup>1</sup>, Prof. Eyal Ert<sup>2</sup>, Prof. Aron Troen<sup>1</sup>

<sup>1</sup>Department of Biochemistry, Food Science and Nutrition, The Hebrew University of Jerusalem, Rehovot, Israel, <sup>2</sup>Department of Environmental Economics and Management, The Hebrew University of Jerusalem, Rehovot, Israel

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Background** Front-of-package-nutrition-labeling (FOPNL) are meant to better inform consumers and influence their behavior at the point of purchase. They are promoted by the World Health Organization as part of the international effort to contend with the global obesity epidemic. In January 2020, Israel implemented 3 new mandatory FOPNLs, yet two years into the reform it was only evaluated by self-reported subjective surveys. This lack of objective studies evaluating consumers' attention to FOPNL is apparent worldwide. We therefore conducted a pilot field study using eye-tracking glasses technology, to develop a feasible method to measure consumer attention to the labels and utilize it for evaluating their effect on consumer decision-making in the supermarket.

**Objectives** Analyze consumer perception and visual attention to the FOPNLs, compare objective eye-tracking data with subjective self-reported attention, and with self-reported attitudes and preferences.

**Methods** A convenience sample of 20 participants was instructed to choose products in designated supermarket aisles, while wearing Tobii pro 3 eye-tracking glasses, which record their exact gaze. Following this shopping task, participants completed a self-report questionnaire regarding their attitudes and preferences, their memory of the labels, and the products they chose.

**Results** We found eye-tracking in the supermarket to be a useful method for understanding consumer response to Israel's front-of-package nutrition labeling (FOPNL): There was a substantial mismatch between actual and self-reported visual attention to labels, demonstrating the need for objective evaluation of the FOPNLs effectiveness and the inherent bias of self-report data. Less than half of the participants viewed the labels, viewing duration varied from 0.5 to 1.5 seconds. Only half of the participants who viewed the label remembered its type correctly, which suggests that the labels did not inform the choices of a substantial proportion of the participants.

**Conclusions** Our findings demonstrate that the approach we developed can be readily applied to evaluate whether the assumption that FOPLs inform choices at the point of purchase is true.

**Implementation** This research sets the stage for comprehensive eye-tracking field studies to understand the psychological mechanisms through which FOPLs influence healthy food choices, which will provide a sound evidence base for policy development and refinement.

# Validating an Online Methodology for Food Affordability Monitoring

**Ms. Liza Boyar (corresponding author)**<sup>1</sup>, Ms. Mary Ellen Prange<sup>2</sup>, Ms. Lauren Kennedy<sup>3</sup>, Mr. Ivan Ho<sup>4</sup>, Ms. Bridget King<sup>5</sup>, Dr. Rachel Prowse<sup>6</sup>

<sup>1</sup>University of Waterloo, Waterloo, Canada, <sup>2</sup>City of Hamilton Public Health Services, Hamilton, Canada, <sup>3</sup>Peterborough Public Health, Peterborough, Canada, <sup>4</sup>Thunder Bay District Health Unit, Thunder Bay, Canada, <sup>5</sup>Public Health Sudbury & Districts, Sudbury, Canada, <sup>6</sup>Memorial University of Newfoundland, St. John's, Canada

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** Price and affordability of food are key determinants of diet quality and nutrition-related population health. Globally, food cost is commonly monitored through “food baskets” which are made up of foods that represent a healthy diet and reflect the typical purchasing patterns of a population. In Canada, most provinces adapt the National Nutritious Food Basket to monitor regional food affordability and inform social and health policy and programming. Conventionally, local public health units collect food pricing information through annual in-store audits. Such an in-person approach is also common globally. With the advent of COVID-19 and the general high labour burden of food price data collection, practitioners and policymakers are becoming increasingly incentivized to consider novel pricing methods. Thus, the objective of this study was to evaluate the validity and reliability of an online methodology for monitoring food affordability in Ontario, Canada, using the adapted Ontario Nutritious Food Basket (ONFB).

**Methods:** Intra-/inter-rater reliability was tested using percent agreement and intra-class correlations (ICC) by pricing the ONFB online in 12 large multi-chain grocery stores. Afterward, the ONFB was priced in 28 stores both in-store and online to estimate food price differences using paired t-tests and Pearson's correlation for all (n=1708) and matched items (same product/brand and purchase unit) (n=1134).

**Results:** High intra-/inter-rater agreement (95.4%/81.6%; ICC = 0.972, F=69.9, p<0.001) was recorded. No significant differences were observed between the mean in-store and online prices for all items (t=0.504 p=0.614). Similarly, an almost perfect correlation was detected between mean prices in-store and online (fully matched: R=0.993 p<0.001; all items: R=0.967 p<0.001). On average, in-store prices were \$0.015 cheaper than online prices. The online monthly ONFB estimates for a family of four showed a strong correlation (R=0.937 p <0.001) with estimates calculated using in-store data.

**Conclusion:** The outcomes of an online food cost monitoring methodology were consistent with the gold-standard of in-person data collection. Online pricing is a reliable and valid method of food cost monitoring in large grocery chains located in the province of Ontario. Facilitating efficient data collection, this framework has the potential to modernize food affordability monitoring in Canada and internationally.

# Physical Activity and the Development of Declarative Memory and Hippocampal Volume in Early Childhood

**Dr. Christine St Laurent<sup>1</sup>**, Ms. Sanna Lokhandwala<sup>1</sup>, Ms. Tamara Allard<sup>2</sup>, Dr. Amanda Paluch<sup>1</sup>, Dr. Tracy Riggins<sup>2</sup>, Dr. Rebecca Spencer<sup>1</sup>

<sup>1</sup>University of Massachusetts Amherst, Amherst, USA, <sup>2</sup>University of Maryland College Park, College Park, USA

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** G. Children and families

Memory improves markedly across early childhood and is dependent on the hippocampus. Physical activity (PA) benefits memory in adults, but few studies have explored associations with forms of declarative memory in children. Moreover, adults appear to have increased or retained hippocampal volume in response to exercise training. Early childhood is a period of substantial neural and behavioral development and thus, habitual PA may influence memory and hippocampal development.

**Purpose:** To determine if PA was associated with memory performance and hippocampal volume development in preschool children over six months and one year, respectively.

**Methods:** Four-year old children (n=49; 55.1% female) repeated measurements at enrollment and then again 6- and 12-months later. Wrist-based 24-hour actigraphy was used to estimate PA (counts/min). Declarative memory was assessed with a visuo-spatial learning task in the late morning and again after an afternoon nap opportunity and the following morning. Variables included immediate test accuracy and change in performance (same day delayed – immediate; next day delayed - immediate). Hippocampal volumes adjusted for intracranial volume (mm<sup>3</sup>: total, left and right hemispheric) were derived from a T1 weighted image. Memory outcomes included all three time points. Due to missing data, the first two time points were used for hippocampal measures. Multilevel models for each memory and hippocampal outcome included time-varying within- and between-person PA and were stratified by sex.

**Results/findings:** When males increased their PA, this was associated with higher immediate memory performance over time (B = 16.35, 95% CI: 1.1 to 31.6). When females increased their PA, this was associated with better next day memory recall (B = 13.17, 95% CI: 3.0 to 23.3) and higher left hippocampal volume over time (B = 1.3, 95% CI: 2.3 to 2.4). Females that were more active had lower next day memory performance over time (B = -7.79, 95% CI: -13.2 to -2.4).

**Conclusions:** Preschool children's PA was related to memory and hippocampal development for some measures, but effect sizes were small. Our mixed findings are reflective of the limited studies in preadolescents. Exploring contexts of PA and the role of cardiorespiratory fitness in future studies may be warranted.



# Changes in sleep duration and guideline adherence among adolescents in Canada: Examining the impact of COVID-19 in worsening inequity

**Dr. Markus Duncan**<sup>1,8</sup>, Miss Jessica Mitchell<sup>1</sup>, Dr. Negin Riazzi<sup>1,10</sup>, Dr. Emily Belita<sup>2</sup>, Dr. Leigh Vanderloo<sup>3,4</sup>, Dr. Sarah Carsley<sup>5,6</sup>, Prof. Valerie Carson<sup>7</sup>, Dr. Jean-Philippe Chaput<sup>8,9</sup>, Prof. Guy Faulkner<sup>10</sup>, Dr. Scott Leatherdale<sup>11</sup>, Dr. Karen Patte<sup>1</sup>

<sup>1</sup>Brock University, St. Catharines, Canada, <sup>2</sup>McMaster University, Hamilton, Canada, <sup>3</sup>The Hospital for Sick Children, Toronto, Canada, <sup>4</sup>ParticipACTION, Toronto, Canada, <sup>5</sup>Public Health Ontario, Toronto, Canada, <sup>6</sup>University of Toronto, Toronto, Canada, <sup>7</sup>University of Alberta, Edmonton, Canada, <sup>8</sup>Children's Hospital of Eastern Ontario Research Institute, Ottawa, Canada, <sup>9</sup>University of Ottawa, Ottawa, Canada, <sup>10</sup>University of British Columbia, Vancouver, Canada, <sup>11</sup>University of Waterloo, Waterloo, Canada

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**SIG - Primary Choice:** G. Children and families

**Purpose:** The purpose of this study was to assess if adolescent sub-populations in Canada (i.e., based on race/ethnicity, sex/gender, socioeconomic status (SES), and urbanicity) experienced a larger change in sleep duration and adherence to the national sleep recommendation between 2019-2020 (pre-pandemic) and the 2020-2021 (mid-pandemic) school years.

**Methods:** Longitudinally-linked data from 2019-2020 (pre-pandemic) and 2020-2021 (mid-pandemic) of a prospective cohort study of secondary school students in Canada ( $M = 14.2$ ,  $SD = 1.3$  years,  $N = 8,209$ ) were used for analyses. Regression modelling tested the main effects of race/ethnicity, sex/gender, socioeconomic status, and urbanicity on changes in sleep duration as well as adherence to the sleep recommendation within the Canada's 24-hour Movement Guidelines (8-10 hours/night). Interactions between identity variables (race/ethnicity or sex/gender) and other main effect variables were subsequently tested.

**Results:** On average, females gained more sleep (mean [95% CI] = 4.5 [1.5, 7.5] min/day more) and had larger increases in recommendation adherence (OR = 1.16 [1.04, 1.30] compared to male. Adolescents who identified as Asian reported less sleep gain compared to those who identified as White (-10.1 [-19.4, -0.8]), but not recommendation adherence. Compared to rural, small, and medium urban areas, individuals in large urban areas gained less sleep and adhered less to the sleep recommendation (-21.4 [-38.5, -4.2] to -15.5 [-30.7, -0.2] min/day). Higher individual SES scores were associated with greater sleep gain (linear trend: 11.16 [1.2 – 21.1]). Discrepancies in sleep gain and guideline adherence between males and females were significantly modified by race/ethnicity and urbanicity.

**Discussion:** Increases in sleep duration may be one of the few benefits to adolescents during the COVID-19 pandemic but were not equally distributed across sub-populations. Efforts to promote better sleep adherence may need to account for sex/gender differences, especially in less urbanized areas and among certain racial/ethnic groups.

# Physical Activity and Recreational Screen Time Change Among Adolescents in Canada: Examining the Impact of COVID-19 in Worsening Inequity

**Dr. Markus Duncan**<sup>1,9</sup>, Dr. Negin Riazzi<sup>1,11</sup>, Dr. Emily Belita<sup>2</sup>, Miss Angelica Amores<sup>3</sup>, Dr. Leigh Vanderloo<sup>4,5</sup>, Dr. Sarah Carsley<sup>6,7</sup>, Dr. Valerie Carson<sup>8</sup>, Dr. Jean-Philippe Chaput<sup>9,10</sup>, Dr. Guy Faulkner<sup>11</sup>, Dr. Scott Leatherdale<sup>3</sup>, Dr. Karen Patte<sup>1</sup>

<sup>1</sup>Brock University, St. Catharines, Canada, <sup>2</sup>McMaster University, Hamilton, Canada, <sup>3</sup>University of Waterloo, Waterloo, Canada, <sup>4</sup>The Hospital for Sick Children, Toronto, Canada, <sup>5</sup>ParticipACTION, Toronto, Canada, <sup>6</sup>Public Health Ontario, Toronto, Canada, <sup>7</sup>University of Toronto, Toronto, Canada, <sup>8</sup>University of Alberta, Edmonton, Canada, <sup>9</sup>Children's Hospital of Eastern Ontario Research Institute, Ottawa, Canada, <sup>10</sup>University of Ottawa, Ottawa, Canada, <sup>11</sup>University of British Columbia, Vancouver, Canada

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** The purpose of this study was to assess if sub-populations of adolescents in Canada (i.e., race/ethnicity, sex/gender, socioeconomic status, and urbanicity groups) experienced a larger change in physical activity and recreational screen time between 2019-2020 (pre-pandemic) and the 2020-2021 (mid-pandemic) school years.

**Methods:** Longitudinally linked data from 2019-2020 (pre-pandemic) and 2020-2021 (mid-pandemic) of a prospective cohort study of secondary school students in Canada ( $n = 8,209$ ) were used for these analyses. Regression modelling tested the main effects of race/ethnicity, sex/gender, socioeconomic status (SES), and urbanicity on changes in moderate-to-vigorous physical activity (MVPA) and recreational screen time duration as well as adherence to Canada's 24-hour Movement Guidelines. Interactions between identity variables (race/ethnicity or sex/gender) and other main effect variables were subsequently tested.

**Results:** Male participants' MVPA time decreased less compared to their female counterparts (mean [95% CI] = -16.3 [-13.5, -19.2] min/day), but also reported greater increases in screen time compared to females (23.7 [14.7, 32.8] min/day) during the same time period. The male-female sex/gender gap for MVPA outcomes were further influenced by race/ethnicity and urbanicity of school location. MVPA in White identifying adolescents decreased less than Asian identifying participants (-10.7 [-19.5, -1.9] min/day) with a similar non-significant pattern observed in Black and Latin participants. Generally speaking, adolescents in higher SES categories fared better on adherence to MVPA (highest vs. lowest OR = 1.41 [0.97, 2.06]) and screen time recommendations (highest vs. lowest AOR = 3.13 [0.91, 11.11]). A quadratic trend was apparent in urbanicity where medium urban areas added more screen time than rural and large urban areas. Individuals in large urban areas were also less likely to meet the MVPA recommendation (ORs = 0.54 [0.38, 0.76] to 0.65 [0.50, 0.85]).

**Discussion:** Results support the hypothesis that existing inequitable sociodemographic differences in MVPA participation and recreational screen time have worsened throughout the pandemic. Resulting evidence will help create targeted interventions aiming to address observed inequities.

# Cross-sectional examination of 24 hour Movement Behaviours Among School Children in Indonesia Aged 10 - 14 Years to 24-hour Movement Guidelines

**Mr. Ahmad Thohir Hidayat**<sup>1</sup>, Dr. Helda Khusun<sup>1,2</sup>, Dr. Grace Wangge<sup>3</sup>, Mr. Aziz Jati Nur Ananda<sup>1</sup>

<sup>1</sup>SEAMEO RECFON, Jakarta, Indonesia, <sup>2</sup>Universitas Muhammadiyah Prof.Dr.Hamka, Jakarta, Indonesia,

<sup>3</sup>Monas University Indonesia, Tangerang, Indonesia

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**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Indonesia only has limited data on lifestyle behaviours, the lifestyle behaviours data is especially rare for school-aged children. To overcome this gap, we evaluate the lifestyle behaviour of school-age children using a web-based measurement tool called MEDAL and compare it with 24-hour movement guidelines.

**Methods:** working together with National University of Singapore (NUS) we utilise a validated web-based measurement tool called My E-Diary for Activities and Lifestyle (MEDAL). Children aged 10 to 14 years old are asked to self-report their daily activities on MEDAL over two weekdays and two weekend days. Median were calculated for daily moderate-to-vigorous physical activity (MVPA), screen-viewing and sleep duration. The median compared to the obedience to the Australian 24-hour movement guidelines which is defined as  $\geq 60$ min MVPA/day,  $\leq 2$ h screen-viewing/day, and 9–11h sleep/night. Socio-demographic and nutritional status variables and meeting of each activity guideline were examined for potential associations with guideline obedience using multivariable logistic regression.

**Results/findings:** Of 273 children, 244 children (89.3%) recorded two valid weekdays and two valid weekend days on MEDAL. Percentage of the children that engage MVPA, screen viewing and sleep recommendation according to the guidelines are 47.3%, 13.3% and 47% respectively. 6.5% met all the guidelines; and 31.2% did not meet any guidelines. Children who are from lower economic status were likely to meet the MVPA guideline. Children who did not meet the screen viewing guideline were less likely to meet the MVPA guideline and recommended sleep duration

**Conclusions:** The majority of children are at risk of poor growth outcomes due to their inability to meet the 24-hour movement guidelines. Our findings suggest that some groups are less likely to meet the guidelines, therefore a targeted intervention is required. Promotion of 24 h movement guidelines need to be established considering the unavailability of such guidelines for Indonesian children. Future interventions are needed to promote those guidelines, especially for screen-viewing, MVPA, and sleep duration among children of this age.

# Incorporating dental health into overweight and obesity prevention in early childhood: an integrative review of formula and bottle feeding interventions

**Ms. Heilok Cheng**<sup>1</sup>, Ms. Rebecca Chen<sup>1</sup>, Dr. Maxim Milosevic<sup>2</sup>, Ms. Chris Rossiter<sup>1</sup>, Associate Professor Amit Arora<sup>1,3</sup>, Prof. Elizabeth Denney-Wilson<sup>1</sup>

<sup>1</sup>The University of Sydney, Sydney, Australia, <sup>2</sup>Sydney Dental Hospital, Sydney, Australia, <sup>3</sup>Western Sydney University, Sydney, Australia

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Infant feeding behaviours with formula and bottles can cause overweight, obesity and early childhood caries (ECC). Such behaviours include non-responsive feeding for settling infants; overfeeding; exposure to cariogenic carbohydrate foods in bottles; and long-term bottle use. Bottle and formula cessation interventions currently exist in dental- and obesity-specific disciplinary silos. Carer beliefs about infant weight and baby teeth may be barriers to behaviour change. Combining ECC and obesity prevention messages may support an integrated approach to behaviour change. This integrative review aimed to identify interventions that support best-practice formula feeding or bottle cessation on feeding, oral health and weight outcomes.

**Methods:** Nine databases were searched in July-August 2020, for interventions that improved formula, bottle or caries-preventing practices, such as formula cessation or transition to cup use, with outcomes relating to feeding practice, infant anthropometry or carer knowledge. Studies were appraised with the Mixed Methods Appraisal Tool.

**Findings:** 27 studies (13 randomised controlled trials, 14 quasi-experimental studies) were included, with 18 involving populations at increased risk of overweight/obesity or ECC. Studies were heterogeneous for research design and outcomes. All studies used carer education. Seventeen studies distributed health-promoting resources. However, only six studies used behaviour change counselling, such as motivational interviewing; six used behaviour change theory in intervention design; and five described stakeholder engagement for program design. Study outcomes were mixed: 16 studies found short-term improvement or no significant change; eight found worse post-intervention outcomes. Only two studies reported longer term follow up, where cessation of program support or active intervention meant improvements were not sustained. Study quality was mixed, with high risk of bias in incomplete outcome data ( $\leq 80\%$  participant retention) and non-comparable study populations at baseline.

**Conclusion:** This integrative review found interventions that focused primarily on education and resource distribution. While studies were heterogeneous and unsuitable for meta-analysis, the findings indicate opportunities to strengthen intervention design; incorporate counselling to support behaviour change; engage stakeholders to develop strategies; and embed interventions into long-term clinical care. Interdisciplinary approaches to intervention design, such as distribution of drinking cups or nutrition to support healthy teeth and weight, can strengthen and focus preventative care.

# Epidemiological survey on adverse events and near-misses in public exercise facilities: a small prospective cohort study

**Mr. Akihiro Hrata**<sup>1,2</sup>, Dr. Yuko Oguma<sup>1,2</sup>, Dr. Yoshinobu Saito<sup>1,3</sup>, Mr. Tomoya Ito<sup>1,2</sup>, Mr. Keisuke Kondo<sup>4</sup>, Mr. Yoshiteru Takemoto<sup>4</sup>, Mr. Tatsunori Nishigaya<sup>4</sup>, Ms. Sachi Shiobara<sup>4</sup>

<sup>1</sup>Keio University Sports Medicine Research Center, Kanagawa, Japan, <sup>2</sup>Keio University Graduate School of Health Management, Kanagawa, Japan, <sup>3</sup>Nippon Sport Science University Faculty of Sport Management, Kanagawa, Japan, <sup>4</sup>Public Interest Incorporated Foundation for Mirai creation Fujisawa, Kanagawa, Japan

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**SIG - Primary Choice:** N. Other

**Objective:** This study aims to identify the demographics of new users of a training room in a public exercise facility in Fujisawa City, Kanagawa Prefecture, Japan, as well as determine the incidence and frequency of occurrence of adverse events and near-misses to users exercising in the training room.

**Methods:** This research involved a small prospective cohort study. The study period was from October 2021 to December 2022. The participants of the study were new users of training rooms in three public exercise facilities in Fujisawa City. A total of 1,235 subjects (739 men and 496 women) agreed to participate in the study and responded to the survey questionnaire. Assessment items included subject demographics (age, gender, height, weight, exercise habits, underlying medical conditions, and pre-workout health check created based on Physical Activity Readiness Questionnaire +: PAR-Q+), the frequency of use of training rooms, and the occurrence of adverse events and near-misses during exercise. Subject demographics were elicited at baseline using a questionnaire. Further, data on the frequency of use and adverse events/near-misses were reported by staff.

**Results:** The study found that 54.4% of male and 72.9% of female users of public exercise facilities did not have exercise habits. The proportion of individuals with underlying medical conditions and that of persons included in one of the categories in the seven-item pre-exercise health checkup were higher in older age groups compared to younger groups for both men and women. During the observation period, subjects did not experience any adverse events or near-misses. However, all training room users experienced a total of six adverse events, five of which were falls; among the five falls, four occurred in users aged 60 years or older.

**Funding:** This study was supported by the Japan Health Promotion and Fitness Foundation.

**Conclusion:** Among users of public training rooms, the percentages of those with underlying medical conditions and those who answered at least one question in the health check before exercise was higher in the older age groups for both men and women. The results suggest that older users may need to be considered when exercising.

# Nutrition questions of Texas WIC chatbot users: an exploratory content analysis

**Ms. Emily Stubblefield<sup>1</sup>**, Dr. Lesli Biediger-friedman<sup>1</sup>, Ms. Brittany Markides<sup>1,2</sup>

<sup>1</sup>Texas State University, San Marcos, USA, <sup>2</sup>Institute of Physical Activity and Nutrition, Deakin University, Melbourne, Australia

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Maya, the Texas WIC Chatbot, was developed to improve participant engagement and retention through increased clinic efficiencies. Launched in June 2020, Maya helps users ascertain WIC eligibility, begin applications, manage appointments, and more. Maya's question-and-answer (QnA) feature also allows users to ask questions and receive pre-programmed responses related to WIC programmatic access. Ongoing process evaluation of Maya suggests users may also be interested in using QnA to find nutrition information on the Texas WIC website. Creating engaging, usable technology requires deeply understanding users' needs. In this case, this includes gaining a better understanding of users' nutrition questions.

**Aim:** This exploratory study investigated whether users are currently seeking nutrition information from Maya and identified the nutrition-related topics of their questions through qualitative content analysis.

**Methods:** The starting dataset for this study included >62,000 questions posed to Maya's QnA between June 2020 and April 2022. Questions about nutrition were purposefully sampled in three steps: (1) Latent Dirichlet Allocation (LDA) organized questions into topic clusters; clusters defined by nutrition keywords were retained; (2) searches and filters were used to extract 200 potentially relevant questions; (3) these were manually reviewed for inclusion. Finally, questions underwent qualitative content analysis.

**Results:** LDA identified fifteen clusters, of which three were selected, yielding 6,212 questions. After filtering and searching, the manual review of step three yielded 71 questions seeking nutrition information. Content analysis revealed that questions mainly pertained to milk (n=32, 45%), introducing solid food (n=19, 27%), and breastfeeding (n=18, 25%). Other questions related to formula preparation, food safety, and allergies. Primary lines of inquiry were age-appropriateness of food (e.g., weaning or introducing solids or certain milk types) (n=27, 38%), breastmilk supply concerns (n=11, 15%), and how much milk or food their child needed (n=9, 13%).

## **Conclusions:**

This study highlighted specific nutrition topics of interest among Maya users, particularly milk, solid food, and breastfeeding. Although its exploratory nature has limitations, this study offers evidence that Maya chatbot users are currently seeking nutrition information, warranting further research to improve understanding of users' needs and develop appropriate nutrition-related content.



# Exercise and its impact on the mental health of Japanese community-dwelling older adults during the COVID-19 pandemic: a longitudinal study

**Ms. Natsue Doihara<sup>1</sup>**, Ms. Yuko Oguma<sup>1</sup>, Mr. Tomoya Ito<sup>1</sup>, Mr. Yoshinobu Saito<sup>2</sup>

<sup>1</sup>Keio University, Yokohama, Japan, <sup>2</sup>Nippon Sport Science University, Yokohama, Japan

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**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** The COVID-19 pandemic deeply impacted people's physical and mental health, especially the health of the older adult population. Since 2015, we have engaged in the 'Fujisawa +10 project', a community intervention project aimed at promoting physical activity among groups of older adults in Fujisawa City, Kanagawa, Japan. This study aimed to examine older adults' engagement in exercise by assessing their performance of the +10 Exercise program (+10-Exercise) before and during the COVID-19 pandemic, as well as the impact of exercise on their mental health.

**Methods:** This longitudinal study recruited 190 participants to partake in a survey that was conducted in 2019 (baseline). Of these, 76 (mean age, 77.8 years; standard deviation, 5.9 years; 47.4% men) responded to a similar questionnaire by mail (follow-up) in August 2020, namely, after the lifting of the first state of emergency regarding the pandemic in Japan. Their mental health status was assessed by the WHO-5 Well-Being Index (WHO-5). The respondents were also asked about whether they had performed +10-Exercise at follow-up. This 10-minute body weight exercise program that our project focused on, consists of dynamic and static stretching exercises, knee-ups, squatting or knee extensions, arm circle exercises, and body balance exercises in the standing or sitting positions. +10-Exercise was designed to be performed by a group of people who meet at least once a week, but could also be performed individually at home. WHO-5 scores were compared for the +10-Exercise implementation group and the non-implementation group, using t-test and multilevel regression analysis.

**Results:** Of the final sample 76, 81.6% engaged in +10-Exercise. In the +10-Exercise implementation group, the mean scores for the WHO-5 at baseline and follow-up were 71.7 and 73.8 ( $p=0.280$ ), respectively. In the non-implementation group, the mean scores were 79.1 and 65.4 ( $p=0.011$ ), respectively. The interaction effect of time and group on the score for the WHO-5 was significant ( $p=0.012$ ).

**Conclusions:** Exercise was associated with mental health, as while participants in the +10-Exercise implementation group maintained their scores regarding mental health, those in the group that was not exposed to the program showed a score decline.

# RE-AIM (Reach, Effectiveness, Adoption, Implementation, Maintenance) Framework to Evaluate the Western Cape on Wellness (WoW!) Health Promotion Initiative: Lesson Learned

**Prof. Estelle Lambert<sup>1</sup>**, Mr. Roger Woodruff<sup>1</sup>, Mrs. Joanna Pieterse<sup>2</sup>, Ms. Kelly Fortune<sup>2</sup>

<sup>1</sup>Research Centre for Health through Physical Activity, Lifestyle and Sport, University of Cape Town, Cape Town, South Africa, <sup>2</sup>Service Priorities Coordination Directorate Department of Health Western Cape Government, Cape Town, South Africa

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Background:** The Western Cape on Wellness (WoW!) programme, a health promotion initiative by the Western Cape Department of Health (DoH), engages volunteer “wellness champions” trained to support groups to activate or maintain healthy lifestyles, often in resource-challenged communities, workplaces, primary health care, and schools. DOH supports the programme through partnership meetings and telephonic, in-person, WhatsApp and social media communication with and from champions. WoW! used RE-AIM (Reach, Effectiveness, Adoption, Implementation, Maintenance) for ongoing evaluation as part of a continuous improvement model, and champions were asked to complete RE-AIM surveys quarterly.

**Aim:** We report on WoW! RE-AIM evaluation results for 2022 and lessons learned to improve programme implementation.

**Methods:** WoW! Champions from all registered groups (N>130) were invited to complete RE-AIM surveys over 2 quarters in 2022. Survey questionnaires administered online via Google Forms comprised Likert scales or similar devices, with some open-ended responses. Quantitative analysis of RE-AIM data was completed using non-parametric statistics.

**Results:** 81 wellness champions completed at least one survey (community=53%, worksite=33%), 20 of which completed for both quarters. Total number of respondents (N=81) completed 102 surveys. REACH: >50% of wellness groups had 10-30 members (NS between settings). EFFECTIVENESS: 55% of groups reported at least half of members underwent wellness screening (lowest uptake in worksites). >50% found that members reported adopting healthier eating and were regularly exercising. ADOPTION: At least 50% of groups reported wellness activities beyond their WoW! groups, and >55% introduced WoW! content or activities into existing programmes (mostly community settings). IMPLEMENTATION: Most WoW! groups planned to meet weekly (45%) or >once/month (24%), of which >50% reported being successful nearly all or at least half of the time. Most frequently offered group activities were group exercise or walks (75%). MAINTENANCE: Champions reported that training (68%), equipment (56%) and speakers for talks (50%) were needed to sustain their groups. Frequent challenges were change of circumstance (60%), lack of time (41%) and lack of a venue (37%).

**Conclusion:** Results suggest that the programme showed, at least in part, fidelity. RE-AIM may guide programme implementation design and co-creation, however, more representativity and a richer narrative may be needed for a more complete understanding, sustainability and scale-up.

# The effect of time-restricted eating on body composition and glycolipid profile in physically active and sedentary adults

**Miss Zihan Dai<sup>1</sup>**, Dr. Chen Zheng<sup>1</sup>, Prof. Stephen Heung-Sang Wong<sup>1</sup>

<sup>1</sup>The Chinese University of Hong Kong, Hong Kong, China

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** Time-restricted eating (TRE) is a novel and popular intermittent fasting dietary pattern that confines the eating window to a specified number of hours per day. The effect of TRE has yet to be thoroughly investigated in physically active and sedentary adults. Thus, this meta-analysis aimed to evaluate the effect of TRE on body composition and glycolipid profile in physically active adults and compare the effectiveness with sedentary adults.

**Methods:** Web of Science, Medline, PubMed, Embase, SPORTDiscus, and the Cochrane Central Register of Controlled Trials electronic databases were searched for published studies of TRE on body composition and glycolipid profile in physically active and sedentary adults. Mean differences (MD) and Standardized MD (SMD) with 95% confidence intervals (CI) were calculated to analyze the total effect. Two reviewers independently extracted outcomes data on body composition and glycolipid profile, including body mass, fat mass, fat-free mass, fasting glucose, fasting insulin, HOMA-IR, triglycerides, LDL cholesterol, HDL cholesterol, and total cholesterol.

**Results:** The database search yielded 7785 articles, and 31 studies met the inclusion criteria. Thirteen studies focused on physically active adults, while the other 18 studies focused on sedentary adults. The overall effect of TRE determined greater weight loss and improved fasting glucose, fasting insulin, and HOMA-IR than control regimens. No difference in the lipid profile was found between TRE and the control group. The subgroup analysis showed that the fat-free mass remained unchanged in the physically active group while significantly decreased in the sedentary group (SMD: -0.93; 95%CI [-1.42, -0.44]). In the physically active group, LDL cholesterol significantly decreased after the TRE dietary pattern (SMD: -0.70; 95%CI [-1.37, -0.04]), while the sedentary group showed no difference.

**Conclusion:** TRE is an effective and promising nutrition plan for physically active and sedentary adults to lose body mass, fat mass and improve their glycolipid profile. Moreover, together with physical activity may help participants maintain fat-free mass and decrease LDL cholesterol. The current result provides practical information for promoting a healthy diet-activity lifestyle.

# How Czech Adolescents Perceive Their Physical Activity

**Dr. Ferdinand Salonna<sup>1</sup>**, Prof. Josef Mitáš<sup>1</sup>, Dr. Michal Vorlíček<sup>1</sup>

<sup>1</sup>Palacky University, Olomouc , Czech Republic

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

Adolescence is a critical stage in the development of an individual's physical activity habits and preferences. Adolescents' perceptions of physical activity can influence their motivation to engage in physical activity and, consequently, their overall level of physical activity.

Thus, our primary aim was to investigate whether Czech adolescents misperceive their peers' Moderate to Vigorous Physical Activity (MVPA) and Vigorous Physical Activity (VPA) and attitudes towards MVPA and VPA. Our dataset comprised cross-sectional data on 1586 adolescents aged 11–15 years. Basic descriptive statistics and correlation binomial regression models were used to analyze the data.

The results showed that most of the Czech adolescents misperceived the MVPA and VPA norms of their peers.

Our study points out that there is a discrepancy between the actual levels of MVPA and VPA and the perceived levels of peers' MVPA and VPA. Adolescents overestimate the prevalence of lack of sufficient MVPA and VPA, and thus perceived norms in MVPA and VPA are worse than objective norms. These findings indicate that there might be room for targeted intervention based on the social norms based approaches to increase the physical activity of adolescents or at least strengthen their actual positive behavior.

# Measurement properties of a short, web-based, daily physical activity questionnaire (PAQ24) for adults.

**Mr. Johannes Jaunig<sup>1</sup>**, Mr. Bernhard Novak<sup>1</sup>, Mr. Peter Holler<sup>2</sup>, Prof. Mireille N. M. van Poppel<sup>1</sup>, Dr. Matteo C. Sattler<sup>1</sup>

<sup>1</sup>University of Graz, Institute of Human Movement Science, Sport and Health, Graz, Austria, <sup>2</sup>FH Joanneum University of Applied Sciences, Institute of Health Management in Tourism, Bad Gleichenberg, Austria

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** To improve the feasibility and accuracy of physical activity (PA) self-reports, the combination of benefits of recalls, questionnaires and momentary ecological assessments (EMAs) may be warranted. The PAQ24 is a 6-item, web-based PA questionnaire, based on the International Physical Activity Questionnaire short-form, with a recall period of one day. This study aimed to investigate the feasibility and measurement properties of the instrument in healthy adults in Austria.

**Methods:** Of 63 invited individuals, a total of 59 (50.8% women, mean 34.9±11.1 years) had sufficient valid data points to be included. The participants completed the PAQ24 in the evening of 14 consecutive days while wearing a GENEActiv accelerometer for the first seven days on their non-dominant wrist. The Global Physical Activity Questionnaire (GPAQ) and six feedback items on the feasibility were completed online a week afterwards. Test-retest reliability for Total PA and sedentary behavior (SB) was assessed daily and weekly using intraclass correlation coefficients (ICC). Spearman correlation coefficients ( $\rho$ ) were calculated for relative agreement for daily and weekly variables. Bland-Altman plots were used for measurement error (limits of agreement).

**Results:** In the daily test-retest comparison, 93% of the PAQ24 variables showed ICC values of  $\geq 0.7$ . The weekly comparison showed high reliability for all variables (ICC=0.82–0.94). The Bland-Altman plots showed high measurement error. Daily relative agreements for PAQ24 and accelerometer ranged between  $\rho=0.30$ –0.56 for Total PA and  $\rho=0.36$ –0.69 for SB. The respective weekly relative agreement for Total PA was  $\rho=0.44$  and  $\rho=0.71$  for SB. Regarding PAQ24 and GPAQ, weekly relative agreements were  $\rho=0.41$  for Total PA and  $\rho=0.87$  for SB. Overall, daily and weekly absolute agreements were poor indicated in Bland-Altman plots by wide limits of agreement. Median completion time of the 824 PAQ24 assessments was 1:56 minutes.

**Conclusions:** The approach of combining the quick completion and intuitive usability of a web-based self-report may broaden the spectrum of previous day recalls and EMAs. With promising evidence for high reliability and moderate-to-high construct validity, the PAQ24 has the potential to evolve into app-based implementation and be combined with the fast-growing market of affordable motion sensors in smartphones or smartwatches.

# Contributions of changes in physical activity, sedentary time, diet and body weight to changes in cardiometabolic risk

**Prof. Eivind Andersen**, Prof. Eivind Andersen

<sup>1</sup>University of South-Eastern Norway, Åsgårdstrand, Norway

**Poster Session #3, June 17, 2023, 1:00 PM - 2:00 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Background:** Increased physical activity (PA), reduced time spent sedentary (SED), healthier diet and reduced body weight may all have a positive impact on cardiometabolic risk. The relative importance of change in each of these variables on cardiometabolic risk, however, is unclear. We therefore sought to investigate the relative contributions of changes in PA, SED, diet and body weight on cardiometabolic risk.

**Methods:** This is a secondary analysis of data collected from the EuroFIT RCT, which was a 12-week group-based lifestyle intervention for overweight middle-aged men delivered by coaches in football club stadia aiming to improve PA, SED, diet, and body weight. PA and SED were assessed by accelerometry, diet using the DINE. An overall cardiometabolic risk score was derived from combining z-scores for glucose, HbA1c, insulin, lipids and blood pressure. In total, 707 men with complete data for these variables at baseline and 12-month follow-up were included in the multivariable linear regression analyses.

**Results:** In multivariable analyses, change in number of steps (explaining 5.1% of  $R^2$ ) and dietary factors (together explaining 4.5% of  $R^2$ ), but not changes in standing time or SED, were significantly associated with change in body weight. Changes in number of steps ( $R^2 = 1.7\%$ ), fatty food score ( $R^2 = 2.4\%$ ), and sugary food score ( $R^2 = 0.4\%$ ) were significantly associated with change in cardiometabolic risk score in univariable models. However, in multivariable models which included changes in weight as well as changes in steps and dietary variables, change in weight explained a substantially larger proportion of the change in cardiometabolic risk score, explaining 14.1% of  $R^2$  (out of an overall model  $R^2$  of 19.0%). When baseline (as well as change) values were also included in the model, 38.8% of  $R^2$  for change in cardiometabolic risk score was explained overall, with 14.1% of  $R^2$  still explained by change in weight.

**Conclusion:** Change in body weight, together with baseline cardiometabolic risk explained most of the change in cardiometabolic risk. Thus, the benefits of increasing PA and improving diet on cardiometabolic risk appear to act largely via an effect on changes in body weight.



# Cardio-metabolic risk profiles of adult employees at eleven large worksites across india: findings from the india-works study

Shinu Koshy<sup>1, 2</sup>, **Dr. Harish Ranjani**<sup>3</sup>, Mary Beth Weber<sup>4</sup>, Alex Matthews<sup>1, 2</sup>, Elizabeth Rhodes<sup>4</sup>, Dr. Anjana Ranjit Mohan<sup>3</sup>, Mohammed, K Ali<sup>4</sup>, Viswanathan Mohan<sup>3</sup>, K.M. Venkat Narayan<sup>4</sup>, Dorairaj Prabhakaran<sup>2, 5</sup>, Jeemon Panniyammakal<sup>1, 2</sup>

<sup>1</sup>Achutha Menon Centre for Health Science Studies, Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum, India, <sup>2</sup>Public Health Foundation of India, New Delhi, India, <sup>3</sup>Madras Diabetes Research Center/Dr. Mohan's Diabetes Specialities Centre, Chennai, India, <sup>4</sup>Global Diabetes Research Center, Rollins School of Public Health, Emory University, Atlanta, USA, <sup>5</sup>Centre for Chronic Disease Control, New Delhi, India

## Poster Session #3, June 17, 2023, 1:00 PM – 2:00 PM

**Purpose:** Chronic diseases such as diabetes and cardiovascular disease are major causes of morbidity and mortality in India. The age of onset of these diseases are seen to be a decade earlier in Asian Indians compared to other ethnicities thereby disproportionately affecting the working age group. This abstract describes the health and cardio-metabolic risk profiles of adult employees at 11 worksites across India. .

**Methods:** Using The Integrating Diabetes Prevention in Workplaces (INDIA-WORKS, clinicaltrials.gov NCT02813668) program targeted a high-risk population across 11 large (2,000-40,000 employees) worksites in India to implement a peer led lifestyle education model focusing on weight-loss and improvements in diet and physical activity behaviours to prevent diabetes and CVD. Employees who voluntarily participated in the INDIA -WORKS program were screened before being recruited. Self-reported data was collected using a pre-structured questionnaire which included questions on basic demographics, health history, lifestyle habits, quality of life etc. Anthropometric and biochemical measures were also taken. Multimorbidity was defined as co-existence of two or more chronic conditions. Means and standard deviations were used to summarise the continuous variables while categorical variables were presented as counts and percentages. .

**Results:** More than three-fourths of participants (N: men=5073, women=1192, mean age 42 years (SD: 10.7 years) were either overweight or obese. Maximum employees (72%) reported they were sedentary or doing mild physical activity. 2320 (37%) individuals had hypertension, of which only 35% were aware of their condition and only 15% had it under control. Out of the 612 participants (14.9%) with a raised HbA1c:  $\geq 6.5\%$  only 4% were aware that they had diabetes. Based on the Indian Diabetes Risk Score (IDRS), 46.4% of employees were at high risk of diabetes, with a higher proportion of women. 1 in 2 people suffered from at least 1 morbidity. The prevalence of multimorbidity was 18.1%. .

**Conclusions:** The high prevalence of multimorbidity among employees across the 11 Indian worksites and disturbingly low level of awareness regarding their hypertension and diabetes status warrants prompt action. Given the time spent at worksites, programs that facilitate physical activity and adoption of healthy eating habits can help improve health of the young Indian workforce. .

## A novel methodology for the assessment of child eating behaviours: Applying the Rasch model on the Child Eating Behaviour Questionnaire (CEBQ) using samples from Australia and Sweden

**Dr. Maria Somaraki**<sup>1,2</sup>, Dr. Anna Ek<sup>3</sup>, Dr. Pernilla Sandvik<sup>1</sup>, Dr. Rebecca Byrne<sup>4</sup>, Prof. Paulina Nowicka<sup>1,3</sup>

<sup>1</sup>Department of Food Studies, Nutrition and Dietetics, Uppsala University, Uppsala, Sweden, <sup>2</sup>MOISA, Université de Montpellier, CIRAD, CIHEAM-IAMM, INRAE, IRD, Institut Agro, Montpellier, France, <sup>3</sup>Division of Paediatrics, Department of Clinical Science, Intervention and Technology, Karolinska Institutet, Stockholm, Sweden, <sup>4</sup>Centre for Children's Health Research, School of Exercise and Nutrition Sciences, Faculty of Health, Queensland University of Technology, Brisbane, Australia

**S.1.01. - Novel approaches for assessing and analysing child eating behaviours, UKK - Main Hall (Level 6), June 15, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Child eating behaviour is considered a key component of obesity-related behavioural profiles. Yet, changes in child eating behaviours during early obesity treatment are rarely evaluated. While the Child Eating Behaviour Questionnaire (CEBQ) has undergone extensive psychometric evaluation and validation using classical test theory, the application of Rasch may identify and remove redundant items and, therefore, reduce participant burden. The present analyses aim to provide insights into the use of the CEBQ using the Rasch model and to assess child eating behaviours after obesity treatment.

**Methods:** First, Rasch-based fit statistics were applied on the CEBQ items as reported by Australian and Swedish mothers (n=1724) for their children aged 4-6 years. Secondly, changes in preschoolers' eating behaviours were examined in the More and Less RCT for obesity treatment (n = 177), which compared a parenting programme (with and without boosters) to standard treatment. Parents completed the CEBQ at four time points over 12-months. Linear mixed models were applied to estimate treatment effects on the CEBQ, refined according to Rasch, over time.

**Results:** The validity of CEBQ was confirmed after removing 4 items (item fit statistics outside range 0.5–1.5), namely 'My child gets full up easily', 'My child refuses new foods at first', 'My child is interested in tasting foods s/he hasn't tasted before'(reversed), and 'My child decides that s/he doesn't like a food, even without tasting it'. The refined CEBQ was used in the RCT evaluation and no differences in parental reports of changes in children's eating behaviours were shown between the parenting programme and standard treatment (group-by-time interactions  $p > 0.05$ ). However, in the total sample food approach behaviours decreased while fussy eating behaviours increased ( $p < 0.05$ ).

**Conclusion:** The refined CEBQ proved to be a valid tool for examining parent-reported child eating behaviours. A shorter version of the CEBQ can facilitate routine assessments of child eating behaviours in research and/or clinical settings, which can inform tailored interventions for childhood obesity. Early obesity treatment may decrease eating behaviours associated with higher child weight. Future research should address the associations between changes in child weight status and eating behaviours.

# Characteristics of eating behavior profiles among preschoolers with low-income backgrounds: a person-centered analysis

**Prof. Jennifer Fisher<sup>1</sup>**, Prof. Sheryl Hughes<sup>2</sup>, Dr. Alison Miller<sup>3</sup>, Dr. Mildred Horodyski<sup>4</sup>, Dr. Holly Brophy-Herb<sup>4</sup>, Dr. Dawn Contreras<sup>5</sup>, Dr. Niko Kaciroti<sup>6</sup>, Dr. Karen Peterson<sup>3</sup>, Dr. Katherine Rosenblum<sup>6</sup>, Dr. Danielle Appugliese<sup>7</sup>, Dr. Julie Lumeng<sup>6</sup>

<sup>1</sup>Temple University, Philadelphia, USA, <sup>2</sup>USDA/ARS Children's Nutrition Research Center, Baylor College of Medicine, Houston, USA, <sup>3</sup>University of Michigan, Ann Arbor, USA, <sup>4</sup>Michigan State University, East Lansing, USA, <sup>5</sup>Michigan State University Extension, East Lansing, USA, <sup>6</sup>University of Michigan Medical School, Ann Arbor, USA, <sup>7</sup>Appugliese Professional Advisors, LLC, North Easton, USA

**S.1.01. - Novel approaches for assessing and analysing child eating behaviours, UKK - Main Hall (Level 6), June 15, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Individual differences in eating behaviors among young children are well-established, but the extent to which behaviors aggregate within individuals to form distinct eating behavior profiles remains unknown. Our objectives were to identify eating behavior profiles among preschool-aged children and evaluate associations with temperament and weight.

**Methods:** A secondary, cross-sectional analysis of baseline data from 2 cohort studies was conducted involving 1004 children aged 3-4 years and their parents with low-income backgrounds. Children's eating behaviors and temperament were assessed by parental report. Body mass index z-scores and weight status were calculated using measured heights and weights. Latent profile analysis (LPA) was used to generate profiles and bivariate analyses were used to evaluate associations with temperament and weight status.

**Results:** LPA revealed the presence of 3 eating behavior profiles among children. Children with High Food Approach profiles (21.2%) had lower temperamental inhibitory control and the highest percent of children with obesity relative to the other profiles. Children with High Food Avoidant profiles (35.6%) had lower temperamental impulsivity and lower BMI z-scores relative to the other profiles, whereas children with Moderate Eating profiles (intermediary levels of all behaviors; 43.2%) had higher temperamental inhibitory control and lower anger/frustration, than other profiles.

**Conclusions:** Young children's eating behaviors appear to aggregate within individuals to form empirically distinct profiles reflecting food approach, food avoidance, and moderate approaches to eating that are differentiated by aspects of temperament and weight. Future work should seek to understand the extent to which health promotion and obesity prevention approaches should be tailored to take into account children's fundamental dispositions towards eating.

# An epigenome-wide association study of child eating behaviours and DNA methylation

**Dr. Harris Holly**<sup>1, 2, 3</sup>, Dr. Pauline Jansen<sup>1, 2, 3</sup>, Dr. Janine Felix<sup>2, 4</sup>, Dr. Rosa Mulder<sup>2, 4</sup>

<sup>1</sup>Erasmus MC, University Medical Center, Department of Child & Adolescent Psychiatry/Psychology, Rotterdam, Netherlands, <sup>2</sup>Generation R Study Group, Erasmus MC, University Medical Center, Rotterdam, Netherlands, <sup>3</sup>Erasmus University Rotterdam, Department of Psychology, Education & Child Studies, Rotterdam, Netherlands, <sup>4</sup>Department of Pediatrics, Erasmus MC, University Medical Center Rotterdam, Rotterdam, Netherlands

**S.1.01. - Novel approaches for assessing and analysing child eating behaviours, UKK - Main Hall (Level 6), June 15, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Eating behaviours (or appetitive traits) are phenotypes expressed through complex gene-environment interactions and contribute to variability in weight-gain. Early-life epigenetic processes, such as DNA methylation, may be involved in the developmental programming of appetite regulation expressed in childhood. However, this is yet to be systematically explored. The current study is an epigenome-wide association study (EWAS) exploring associations between cord blood DNA methylation (DNAm) and child eating behaviours.

**Methods:** Data were from the population-based Generation R Study. Children with available cord blood DNAm and eating behaviour data at 4 years were included in the study ( $n=1086$ ). DNAm profiles of autosomal methylation sites were generated using the Illumina Infinium HumanMethylation450 BeadChip. Parents reported on their child's food responsiveness, emotional overeating, emotional undereating, satiety responsiveness and food fussiness using the Child Eating Behaviour Questionnaire. Multiple regression models were used to examine the association between DNAm (predictor) at the site- and regional- level and each eating behaviour (outcome), adjusting for covariates. Within each model, a Bonferroni-correction was applied based on the number of probes ( $p < 1.20 \times 10^{-7}$ ).

**Results:** Mothers were on average 32.5 ( $\pm 4.0$ ) years at study inclusion and most reported never smoking (80.5%). No associations were found between DNAm at the individual sites and any appetitive trait. Regional analysis showed DNAm at a region on chromosome 8 was associated with food responsiveness ( $p = 5.00 \times 10^{-08}$ ). This region encompasses three CpG sites, cg04943741, cg11402303, and cg27657489, located in the gene body of *VPS28*. Further replication and meta-analysis of results in two other studies is planned and will be presented.

**Conclusions:** This is the first EWAS examining DNAm in cord blood and associations with child eating behaviours. Findings from this study provide preliminary support for early programming via DNAm processes in children's expression of food responsiveness, which is consistently associated with higher weight status. In line with the Behavioural Susceptibility Theory, this finding provides some initial evidence for behaviorally-mediated mechanisms linking genetic risk and environmental exposure to weight gain. Investigating differential DNA methylation associated with eating behaviours could be an important first step in identifying biological pathways underlying the development of these behaviours.

# Mapping an urban food system, sector by sector, to identify transformative interventions benefiting human and planetary health: the Mandala programme

**Dr. Alexia Sawyer<sup>1</sup>**, Dr. Kelly Parsons<sup>1</sup>, Dr. Catrin Pedder Jones<sup>1</sup>, Prof. Martin White<sup>1</sup>

<sup>1</sup>MRC Epidemiology Unit, University of Cambridge, Cambridge, United Kingdom

**S.1.02 - The methodological challenges of understanding and transforming systems to promote healthier dietary and physical activity behaviours: lessons from the LIKE and Mandala programmes, UKK - Level 6 Foyer, June 15, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose** Food systems generate huge external costs, including for the environment (e.g. climate change impacts) and health (e.g. non-communicable disease risks). Transformative interventions are urgently needed to reduce these negative externalities. The Mandala consortium aims to systematically generate evidence on urban food system transformation by co-producing interventions with stakeholders and undertaking rigorous evaluations of system impacts. Here we aim to share the complex methodological and practical challenges, and achievements of an emergent research process.

**Methods** To identify interventions with transformative potential, we worked with food system actors in the city of Birmingham, UK. We used solution scanning to identify long-lists of potential food system interventions. We interviewed stakeholders to understand the opportunities and challenges of intervening in the food system. Working with stakeholders, we mapped food systems conceptually and generated a causal loop diagram (CLD), drawing on Group Model Building methods, for each food system sector, identifying leverage points and potential interventions. We developed and applied criteria to prioritise interventions with stakeholders, incorporating existing theory and evidence in our decision-making. We used qualitative methods to document processes and outcomes.

**Results** Interviews with stakeholders yielded rich insights, which informed subsequent stages. We developed a set of criteria to prioritise interventions, including the importance of population reach, impacts on health-related food supply, dietary changes and sustainability outcomes, including carbon emission, water depletion and biodiversity loss, and the policy coherence and viability of interventions for stakeholders. We developed five CLDs for supply chains, grocery, out of home, institutional catering and informal food sectors, and identified multiple leverage points for interventions within each CLD. We explored the overlaps and connections between the five CLDs, and identified and prioritised interventions for delivery, working iteratively with stakeholders.

**Conclusion** Understanding complex adaptive systems, such as urban food systems, and identifying and prioritising interventions for delivery demands close collaboration with stakeholders, interdisciplinary scientific inputs, and considerable time and resources. What seemed sensible in theory, did not necessarily work in practice. In particular, engaging commercial stakeholders in transformative interventions to promote health and sustainability is highly challenging, and demands a negotiated process that seeks common ground.

# Development of a dynamic action programme to promote healthy behaviour in adolescents: a system dynamics approach

**Ms. Angie Luna Pinzon<sup>1</sup>**, Dr. Karien Stronks<sup>1</sup>, Dr. Wilma Waterlander<sup>1</sup>

<sup>1</sup>Department of Public and Occupational Health, Amsterdam UMC, University of Amsterdam, Amsterdam, Netherlands

**S.1.02 - The methodological challenges of understanding and transforming systems to promote healthier dietary and physical activity behaviours: lessons from the LIKE and Mandala programmes, UKK - Level 6 Foyer, June 15, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose** There is growing recognition for the value of applying system dynamics approaches in public health research. To date, most of this research has focused on systems mapping. However, there is limited practical guidance available on what intervention programmes taking a system dynamics approach could or should look like as well as how system changes could be operationalised.

**Methods** Using the Lifestyle Innovation based on Youth Knowledge and Experience (LIKE) programme as a case study; we illustrate how a previously obtained understanding of the pre-existing system of obesity-related behaviours in adolescents was used to operationalise the identification of leverage points and subsequently develop a widely supported action programme within a system dynamics approach. This case study was set in ethnically diverse neighbourhoods in the city of Amsterdam, the Netherlands. The identification of system levers and action development process was conducted from a stakeholders-led approach (representing academia, policy and practice) and an adolescents-led approach.

**Results** In October 2022, the LIKE action programme consisted of a total of 26 actions. The action programme targeted a total of eleven leverage points which were roughly distributed over the different system levels ranging from system functioning (deeper levels of the system) to system structure (most visible levels of the system).

**Conclusion** This study illustrates how a system understanding can be translated and operationalized into identifying leverage points which can subsequently inform the development of an action programme. We achieved this by building upon the previously developed understanding and analysis of the pre-existing system of obesity-related behaviours in adolescents



# Evaluating a system dynamics obesity prevention programme: the application of Ripple Effects Mapping

Assistant Professor Wilma Waterlander<sup>1</sup>, Ms. Angie Luna Pinzon<sup>1</sup>, Prof. Karien Stronks<sup>1</sup>, Mrs. Jillian O'mara<sup>1</sup>

<sup>1</sup>Department of Public and Occupational Health, Amsterdam UMC, University of Amsterdam, Amsterdam, Netherlands

**S.1.02 - The methodological challenges of understanding and transforming systems to promote healthier dietary and physical activity behaviours: lessons from the LIKE and Mandala programmes, UKK - Level 6 Foyer, June 15, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose** Systems thinking embraces the complexity of public health problems and aids in understanding how factors are interrelated, and subsequently can be targeted to produce favourable changes in a system. There is a growing call for systems approaches in public health research, yet limited practical guidance is available on how to evaluate public health programmes within complex adaptive systems.

**Methods** Building on our previously published Evaluation of Programmes in Complex Adaptive Systems (ENCOMPASS) framework, we applied Ripple Effects Mapping (REM) methods to measure the intended and unintended effects of the Lifestyle Innovations Based on Youth Knowledge and Experience (LIKE) programme in the City of Amsterdam, the Netherlands. Three REM workshops were held in 2022; focusing on the overall LIKE programme and specifically focusing on the actions that were developed. Subsequently, in-depth interviews were held with involved stakeholders.

**Results** REM provided in-depth insight into how actions developed over time within a system dynamics action programme. For example, actions that were initially developed to co-create a healthier food environment within supermarkets, evolved into a lobbying initiative to achieve policy impact within the food environment. Similarly, actions targeting the physical activity environment evolved into developing methods for co-creation of public spaces with youth. In particular, REM data revealed the importance of involving the right stakeholders as well as barriers and opportunities in targeting deeper levels of the system.

**Conclusion** A dynamic action programme changes over time and it is difficult to measure its immediate impact. REM is a valuable method to identify intended and unintended consequences of such an action programme and thereby providing insight into its effectiveness as well as ways to further adapt the programme.

# Household food insecurity and the EU Farm to Fork strategy

**Dr. Wesley R. Dean<sup>1</sup>**, Dr. Lukar Thornton<sup>2</sup>

<sup>1</sup>Department of Food and Resource Economics, University of Copenhagen, Copenhagen, Denmark, <sup>2</sup>Food Purchasing and Environments, Department of Marketing, University of Antwerp, Antwerp, Belgium

**S.1.03 - Food insecurity in context: Capturing lived experiences and exploring implications for research and policy, UKK - Hall B (Level 3), June 15, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** The purpose of this study is to examine norms embedded in the concepts of food security and food insecurity, describe how socio-political context influences values, and identify implications for measurement and policy within the European Union (EU). Food insecurity is a multi-level concept that describes deficiencies in food supply, access, and affordability; food security “exists whenever the availability of nutritionally adequate and safe foods or the ability to acquire acceptable foods in socially acceptable ways is limited or uncertain (Anderson 1990).” Food insecurity is an explicitly normative concept. Normative language such as “availability”, “adequacy”, “safety”, and “acceptability” are embedded in concepts, and operationalization of the concepts in measurement constructs, and in policy implementation. For example, the long-standing measures of household food insecurity, used by FAO and USDA, define these norms as largely economic values. In turn, policies that employ these measures are framed to account for economic capabilities. Efforts to implement new measurements that are relevant to the EU context should account for values embedded in the EU policy framework, many which extend beyond accessibility defined in economic terms to include rights-based approaches. One place where these values are articulated is the European Commission’s *Farm to Fork Strategy* (F2F).

**Methods:** Critical discourse analysis was used to identify the values embedded in this system-oriented conceptualization of food (in)security within the F2F framework and the varying interpretations of values on food access in the EU context, based on the nascent research literature.

**Results:** Findings applied a contemporary lens to create a reimagined perspective on food (in)security and explored implications for the measurement of household food (in)security.

**Conclusions:** This presentation will detail how the F2F framework and affiliated literature define food (in)security at all levels as the necessary outcome of a sustainable food system. The F2F vision of food access is embedded in a model that integrates agricultural production, distribution, food acquisition, and consumption practices into a systems framework. These are guided by ecological, economic, and social values including equitable and fair outcomes for actors at all stages of the food system, that are currently not operationalized as measures in public health.

# Managing household food security in the U.S.: perspectives of heritage-diverse Latinx caregivers of children

**Dr. Amanda C. McClain<sup>1</sup>**, Dr. Cassandra M. Johnson<sup>2</sup>, Dr. Kate L. Dickin<sup>3</sup>

<sup>1</sup>School of Exercise and Nutritional Sciences, San Diego State University, San Diego, California, USA,

<sup>2</sup>Nutrition and Foods Program, Texas State University, San Marcos, Texas, USA, <sup>3</sup>Department of Public Health & Ecosystem Health, Cornell University, Ithaca, New York, USA

**S.1.03 - Food insecurity in context: Capturing lived experiences and exploring implications for research and policy, UKK - Hall B (Level 3), June 15, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** We aimed to elucidate the lived experiences of managing household food security among low-income, heritage-diverse Latinx caregivers of children ( $\leq 18$  years) in the U.S and identify possible future directions for measurement and policy.

**Methods:** We conducted in-depth exploratory cognitive interviews, based on the U.S. government food security survey instrument, via telephone or Zoom with 62 Latinx caregivers in rural, urban, and suburban areas of California, New York, and Texas. The multi-site research team recruited eligible caregivers through community partners and in-person events at partner sites. Verbatim transcripts were coded in NVivo to identify emergent themes related to food insecurity experiences, coping strategies, interpretation of the food security measure, and cultural perspectives.

**Results:** Participants identified as Mexican, Dominican, Puerto Rican, Ecuadoran, and Central/South American heritage, and 58% reported being born outside the U.S. Similarities and distinctions in food insecurity experiences and coping strategies emerged across sites and by nativity and heritage. Participants across sites described challenges in maintaining food security due to the COVID-19 pandemic and inflation, including inability to leave the house to access food (i.e., quarantine), limited availability of food at stores, and increasing food and gas prices. Across sites, participants described prioritizing their children's food security over their own and routinely relying on emergency food systems, such as food pantries, as a coping strategy even if they were unable to procure their preferred foods. As a result, many participants answered survey items as though their households were food secure, despite financial hardship and reliance on food assistance. Some participants described difficulties in qualifying and maintaining participation in government food assistance programs. Reliance on family members and desire to provide children with culturally-preferred foods appeared to vary by site and heritage.

**Conclusions:** Heritage-diverse U.S. Latinx caregivers of children demonstrated similarities and distinctions in their experiences managing household food security status. Many reported coping strategies appeared to be normalized such that caregivers did not perceive their households to be food insecure, despite their descriptions suggesting otherwise. Findings underscore the need to consider the socioecological context of Latinx households in the U.S. to more accurately measure and address food insecurity.

# **‘Politicians, stop putting people in survival mode!’ Preferred solutions to food insecurity identified by families with a lived experience**

**Dr. Sabine Baker**<sup>1</sup>, Dr. Danielle Gallegos<sup>1</sup>

<sup>1</sup>Woolworths Centre for Childhood Nutrition Research, Queensland University of Technology, Brisbane, Australia

**S.1.03 - Food insecurity in context: Capturing lived experiences and exploring implications for research and policy, UKK - Hall B (Level 3), June 15, 2023, 8:15 AM - 9:30 AM**

## **SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** This paper describes a portfolio of solutions that inform policy and service delivery as recommended by adult carers of children aged 0-12 who struggle to put food on the table.

**Methods:** Feeding Families in Tough Times (FFiTT) is a mixed-method program of research that aims to build a rich understanding of food insecurity in Australian families. Families were recruited primarily through food relief and community support organisations. 43 semi-structured interviews were carried out in person or via zoom. Interviews were informed by life narratives and the Family Adjustment and Adaptation model. Audio-recordings were transcribed and analysed using reflexive thematic analysis.

**Results:** Participants identified key barriers to food security as cost-of-living increases, unstable housing, precarious income, domestic and family violence, racism, adverse childhood experiences, disability and chronic health problems, as well as difficulty navigating government systems. Parents identified solutions that were aimed at reducing the impact of financial hardship, cognitive load and food insecurity, at the individual, family, community and policy level. Solutions could be themed as: income optimisation; system navigation; in-time place-based health care; and food availability/affordability.

**Conclusions:** The data provides insight into interactions with support networks and services and highlights policy level short falls and gaps in the Australian response to food insecurity. The interviews highlight the need for government-led action that addresses the underlying determinants of food insecurity. Solutions need to be multifaceted and should draw on the lived experience of families doing their absolute best to feed their families under extremely demanding circumstances.

# The Current State of Global Surveillance of Physical Activity Among Children and Adolescents

**Dr. Salome Aubert<sup>1</sup>**

<sup>1</sup>Active Healthy Kids Global Alliance, Avignon, France

**S.1.04 - The Quest for a Valid and Reliable Global Adolescent and Child Physical Activity Questionnaire – introducing the GAC-PAQ Project, UKK - Hall C (Level 3), June 15, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** The enhancement of data systems and capabilities at national levels to support regular population surveillance of physical activity (PA) was identified as a priority in the World Health Organization Global Action Plan on Physical Activity 2018–2030. We reviewed the existing major international studies/surveillance initiatives on PA for children and adolescent to (i) summarize global findings; (ii) identify methodological limitations and inconsistencies, surveillance, and research gaps; (iii) propose recommendations for improvement.

**Methods:** Intercontinental PA surveillance initiatives for children and adolescents were identified by experts and through non-systematic literature searches. Prevalence of meeting PA guidelines by country, gender, and age were extracted when available. Methods and prevalence meeting PA guidelines were compared across data/studies and against the methodological/validity/translation differences.

**Results:** Methods and PA definition inconsistencies were observed across and within PA international surveillance initiatives, resulting in different estimated national prevalence of meeting PA guidelines, and initiatives contradicting each other's cross-country comparisons. Three findings were consistent across international surveillance initiatives: insufficient level of PA of children and adolescents across the world; lower levels of PA among girls; and attenuation of PA levels with age. The dose (frequency, intensity, and duration) of children's and adolescents' PA domains (i.e., organized sport, active transportation, active play, physical education, chores and occupation) was generally not assessed. Resource-limited countries; younger children; and children and adolescents not attending school, with disability or chronic conditions, and from rural areas were generally under/not represented.

**Conclusions:** Substantial inconsistencies were observed across/within included initiatives, resulting in varying prevalence estimates of PA among children and adolescents at the global, regional, and national levels - questioning the validity of current PA surveillance systems. The development of a new PA measurement instrument that would be globally accepted and harmonized has become a global priority to help improve the validity and reliability of global surveillance and to inform the development of effective PA policies.

# The Global Adolescent and Child Physical Activity Questionnaire Development Project

**Dr. Richard Larouche**<sup>1</sup>, Prof. Mark Tremblay<sup>2,3</sup>

<sup>1</sup>University of Lethbridge, Lethbridge, Canada, <sup>2</sup>CHEO Research Institute, Ottawa, Canada, <sup>3</sup>University of Ottawa, Ottawa, Canada

**S.1.04 - The Quest for a Valid and Reliable Global Adolescent and Child Physical Activity Questionnaire – introducing the GAC-PAQ Project, UKK - Hall C (Level 3), June 15, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** Global efforts to address the physical inactivity crisis are limited by the use of questionnaires that do not capture all domains of physical activity (PA) and have not been sufficiently adapted to low- and middle-income countries (LMICs). This undermines between-country comparisons of PA indicators that could identify potential solutions to promote PA. In this context, we will develop and assess the reliability and validity of the new app-based Global Adolescent and Child Physical Activity Questionnaire (GAC-PAQ) among 5- to 17-year-olds and their parents from 14 low-, medium-, and high-income countries across 6 continents.

**Methods:** This ongoing project involves 8 successive stages in all 14 countries: 1) review of the content coverage, strengths, and limitations of existing PA instruments; 2) development of the first version of the GAC-PAQ by our team of >25 researchers and knowledge users; 3) assessment of the content validity of the GAC-PAQ with expert groups; 4) cognitive interviews with children and parents; 5) development of the app and a revised version of the GAC-PAQ in English; 6) translation in the official languages of the participating countries; 7) pilot-study with 10 child-parent dyads per country; and 8) main study with a sex-balanced sample of 500 children and youth per country, stratified by age and level of urbanization. In the main study, participants will be recruited in schools and other settings (e.g., community centres, faith places), and asked to complete the GAC-PAQ twice to assess 1-week test-retest reliability, and to wear an ActiGraph accelerometer for one week (as comparison measure).

**Results:** This presentation will provide a comprehensive overview of the GAC-PAQ methods. We developed an integrated knowledge translation plan to share study findings with researchers and knowledge users and facilitate its integration in PA surveillance studies.

**Conclusions:** The GAC-PAQ project will facilitate the comparison of PA indicators between and within countries, which can highlight novel solutions to address the physical inactivity crisis. It will also help develop capacity to strengthen the surveillance of PA, particularly in LMICs. We anticipate that the app-based format will facilitate completion of the questionnaire by younger children and people with lower literacy levels.



# Early Findings from the GAC-PAQ Project Across 14 Countries

**Prof. Olga Sarmiento**<sup>1</sup>, Dr. Richard Larouche<sup>2</sup>, Prof. Mark Tremblay<sup>3,4</sup>

<sup>1</sup>Universidad de los Andes, Bogota, Colombia, <sup>2</sup>University of Lethbridge, Lethbridge, Canada, <sup>3</sup>CHEO Research Institute, Ottawa, Canada, <sup>4</sup>University of Ottawa, Ottawa, Canada

**S.1.04 - The Quest for a Valid and Reliable Global Adolescent and Child Physical Activity Questionnaire – introducing the GAC-PAQ Project, UKK - Hall C (Level 3), June 15, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** The purpose of this presentation is to discuss preliminary findings from the Global Adolescent and Child Physical Activity Questionnaire (GAC-PAQ) project across 14 low-, medium-, and high-income countries from all continents.

**Methods:** We searched the literature to identify: 1) questionnaires employed in previous multi-country studies on PA in children and youth, and 2) systematic reviews on the psychometric properties of existing PA questionnaires. We extracted information about the location of individual studies, age group, validity, reliability, coverage of the domains of PA, and strengths and limitations.

**Results:** Our literature review revealed that the questionnaires used in previous multi-country studies did not capture all domains of PA. Furthermore, the majority of PA questionnaires have been developed in high-income countries, often with children in schools in urban samples, and tend to focus more extensively on the types of PA that are common in those countries (e.g., organized physical activity and sports, physical education, recess). Conversely, few questionnaires included items about active play, household-, and work-related PA. Previous reviews concluded that few questionnaires had good reliability and validity. The Physical Activity Questionnaire for Children was recommended in some previous reviews. Its format informed the initial structure of the GAC-PAQ, but the items were revised to enhance content coverage. The initial version of the GAC-PAQ was developed by our team of >25 researchers and knowledge users and will be shared for comment. Findings of the content validation with expert groups and the cognitive interviews (planned for the winter of 2023) will be presented at the symposium.

**Conclusions:** The sequential and collaborative development process will generate a questionnaire that provides broader coverage of all the domains of PA and better represents the types of PA that are common in LMICs. This will help increase the validity and usefulness of global comparisons of physical activity indicators, such as the Active Healthy Kids Global Alliance's Global Matrix project, as platforms to track changes over time in PA indicators and identify potential solutions to the childhood physical inactivity crisis.

# The effect of reallocating sedentary time with short bouts of physical activity: a compositional isothermal substitution analysis

**Mr. Jonah Thomas**<sup>1</sup>, Dr. James Sanders<sup>1</sup>, Dr. Dale Esliger<sup>1</sup>, Prof. Amanda Daley<sup>1</sup>

<sup>1</sup>Loughborough University, Loughborough, United Kingdom

**S.1.04 - The Quest for a Valid and Reliable Global Adolescent and Child Physical Activity Questionnaire – introducing the GAC-PAQ Project, UKK - Hall C (Level 3), June 15, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** Previous studies have shown that replacing sedentary time with moderate to vigorous intensity physical activity (MVPA) was positively associated with a range of cardiometabolic health markers including adiposity. However, it is unclear how replacing sedentary behaviour with different bout durations of MVPA impact cardiometabolic health markers. Therefore, this analysis aimed to predict the change in cardiometabolic health markers when accelerometer-measured physical behaviours were reallocated.

**Method:** Adults (n=8795) were included in the analysis from NHANES 2003-2004 and 2005-2006. Waist worn Actigraph data were re-analysed to determine sedentary time, light physical activity, minutes of MVPA accumulated in less than five minutes in duration (short bouts) and minutes of MVPA accumulated in bouts lasting longer than five minutes in duration (longer bouts). Isothermal substitution models were generated to estimate the predicted change in cardiometabolic health markers with a given reallocation of accelerometer measured daily time use.

**Results:** When examining measures of body composition, reallocating 20 minutes of sedentary time to 20 mins of MVPA accumulated in short bouts predicted a 1.44kg/m<sup>2</sup> [95% CI: -1.62, -1.27] decrease in BMI and a 4.86cm decrease in waist circumference [95% CI: -5.06, -4.11]. When examining blood pressure, systolic blood pressure was predicted to decrease by 2.71mmHg [95%CI: -3.19, -2.23] and a decrease in diastolic blood pressure of 2.49mmHg [95% CI: -2.92, -2.06]. A decrease in total cholesterol (-0.17 [ 95% CI: -0.20, -0.14]) and LDL cholesterol (-0.13 [95%CI: -0.17, -0.09]).

**Conclusion:** Replacing sedentary time with short bouts of physical activity may lead to improvements in cardiometabolic health markers. Short bouts of physical activity may be an appropriate intervention to promote improvements in cardiometabolic health markers.

# Differences in Objective and Subjective Sedentary Time among Working and Non-Working Adults

**Dr. Emily Erlenbach**<sup>1</sup>, Ms. Revati Malani<sup>1</sup>, Dr. Edward McAuley<sup>1</sup>, Dr. Neha Gothe<sup>1,2</sup>

<sup>1</sup>University of Illinois Urbana Champaign, Urbana, USA, <sup>2</sup>Northeastern University, Boston, USA

**S.1.05 - Measurement and Trends in Physical Activity and Sedentary Time Among Middle Aged and Older Adults in the US and CZ, UKK - Hall D (Level 2 - main floor), June 15, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Background:** As interest in studying adults' sedentary time (ST) has expanded, more objective and subjective tools have been developed to measure this behavior. While both types of measurement approaches have innate pros and cons, one important consideration when deciding which to use should be the population of interest's employment status. How ST is accumulated among working and non-working adults may vastly differ, affecting how it is recalled and thus the accuracy of self-report measures. We present data comparing objective- and subjective-measured ST among working and non-working adults to further the understanding of how to best measure ST among these groups.

**Methods:** Baseline data was combined from two physical activity-based trials (N=250). Objective ST was collected via Actigraph-GT3X accelerometers. Subjective ST was assessed via the Sedentary Behavior Questionnaire (SBQ), an 18-item survey asking participants to report the amount of time spent engaged in various sedentary activities on weekdays and weekend-days. A score of average minutes/day sedentary was then computed. Participants also reported their employment status, which was categorized into three groups: full-time, part-time and retired/non-working. Paired t-tests compared objective- and subjective minutes/day of ST among the three employment groups.

**Results:** Our sample consisted of 156 full-time ( $M_{age}=58.26$ ), 30 part-time ( $M_{age}=64.43$ ) and 64 retired/not working adults ( $M_{age}=65.67$ ). Paired samples t-test revealed retired/not working adults significantly *underestimated* their daily ST when self-reporting compared to objective measures ( $t(63)=2.513$ ,  $p=0.015$ ), as this population reported an average of 487.90 minutes/day of ST on the SBQ but recorded an average of 542.85 minutes/day on accelerometers. There were no significant differences of self-report and accelerometer-measured ST among full-time and part-time working adults.

**Discussion:** Our findings suggest the SBQ is valid tool used to assess ST among full-time and part-time working adults. Due to the nature of their work schedules, these populations may have more structured ST (i.e., sitting at a desk, commuting) that allow for easier recall on subjective measures. Retired/non-working adults likely have more fluidity in their daily schedules, making it harder to accurately recall ST on questionnaires. Thus, accelerometers may be the preferable way to measure ST among this population.

# Objective and Subjective Measures of Physical Activity related to Brain Health in Late Adulthood

**Dr. Audrey Collins<sup>1</sup>**, Dr. Kirk Erickson<sup>1</sup>

<sup>1</sup>AdventHealth, Orlando, USA

**S.1.05 - Measurement and Trends in Physical Activity and Sedentary Time Among Middle Aged and Older Adults in the US and CZ, UKK - Hall D (Level 2 - main floor), June 15, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Background:** Physical activity (PA) is one of the most promising approaches for preventing and attenuating age and disease-related declines in brain health outcomes. However, heterogeneity in PA measurement has limited conclusions on how this behavior may influence brain health. Preliminary baseline data from the Investigating Gains in Neurocognition in an Intervention Trial of Exercise (IGNITE) randomized clinical trial examining the impact of PA on brain health in older adults will be used to evaluate various methods for measuring PA and their relationship with cognitive function.

**Methods:** Baseline data were collected from participants across three sites within the United States (N=610, Age= 69.76±3.71 years, 70.50% Female, Years of education=16.30±2.21 years) prior to randomization. Objective PA was measured using the ActiGraph GT9X Link (average of minutes per day). Self-reported PA was measured using the Godin-Shephard Leisure-Time Physical Activity Questionnaire (GSLTPA) resulting in a calculated total leisure activity score. Cognitive processing speed was assessed using the total correct score of the Digit Symbol Substitution Test (DSST). Relationships between objective levels of PA and GSLTPA score were assessed with Spearman's correlations. Multiple linear regressions examined the association between PA using various methods and DSST performance controlling for age, sex, and years of education.

**Results:** Preliminary analyses show that on average, participants performed 822.04±101.97 minutes, 139.46±44.49 minutes, and 49.47±29.62 minutes of sedentary, light (LPA), and moderate-to-vigorous (MVPA) activities per day. The average GSLTPA score was 16.16±17.11, which reflects moderately active behaviors. Measures of LPA and MVPA were weakly correlated with GSLTPA score ( $r_s = 0.149$ ;  $r_s = 0.084$ ). Mean DSST total raw score was 47.30±9.44, with a higher score reflecting better processing speed. When controlling for age, sex, and education, greater amounts of LPA, MVPA, and GSLTPA score were all significantly associated with faster processing speed as measured by DSST performance ( $p<0.001$ ;  $p<0.001$ ;  $p<0.001$ ).

**Conclusions:** Although the current trial is ongoing and blinding to group assignment prevented the authors from conducting group-based or pre-post analyses, our findings suggest that both accelerometer and self-report measures of PA may provide meaningful information to support the link between PA and cognitive and brain health in late adulthood.

# Comparing Objective and Subjective Measures of Physical Activity in a Prospective Cohort of Czech Active Runners and Inactive Adults

**Ms. Lenka Knapova<sup>1</sup>**, Mr. Michal Sebera<sup>1</sup>, Ms. Barbora Kastovska<sup>1</sup>, Ms. Denisa Blaschova<sup>1</sup>, **Prof. Steriani Elavsky<sup>1</sup>**

<sup>1</sup>University of Ostrava, Ostrava, Czech Republic

**S.1.05 - Measurement and Trends in Physical Activity and Sedentary Time Among Middle Aged and Older Adults in the US and CZ, UKK - Hall D (Level 2 - main floor), June 15, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Background:** In large prospective cohort studies on the links between physical activity (PA) and health outcomes, it is often not feasible to utilize research-grade devices due to their high costs. Commercial devices offer a more affordable way to objectively capture behavior, albeit with lower accuracy. This study aimed to evaluate the alignment between Fitbit-derived measures and self-report measures of PA in a large cohort study and whether it differs by activity status, age, and gender.

**Methods:** The study uses data from participants in the 4HAIE study ( $N=1314$ , age 18-65) which involved prospective monitoring of PA using Fitbit Charge 3 monitors across 12 months and self-report measures (ACLS, LTEQ, LASA) of PA/SB at baseline, month 6 and 12 of the study. The data collection concluded at the end of September 2022.

**Results:** The sample ( $M_{age}=38.62\pm12.57$ ) consisted of 747 active runners, 567 inactive adults, 53.7 % were men. Preliminary analyses of baseline data indicate that the correlations between Fitbit-derived measures (steps, fairly and very active minutes) and ACLS scores for the entire sample were low ( $r_s=0.155-0.300$ ). Middle-aged (40+) had a significantly stronger correlation for steps than younger adults ( $r_s=.443$  versus  $.238$ ,  $p<.001$ ). No other significant differences were found by gender or age, with a stronger correlation for steps indicated for men ( $r_s=.347$  versus  $.265$ ,  $p=0.12$ ). Differences based on activity status, albeit not significant, were indicated for very active minutes (runners:  $r=0.135$ , inactive:  $r=0.054$ ,  $p=0.15$ ) and for steps (runners:  $r=0.193$ , inactive:  $r=0.093$ ,  $p=0.08$ ). The associations will be further evaluated for LTEQ, LASA, and for 6 and 12-month data.

**Discussion:** The low correspondence between Fitbit-derived measures of PA and ACLS suggests that they capture different aspects of activity and might be affected by biased self-reports. Older adults are supposedly better at self-reporting their stepping behaviors. Inactive participants might not be able to adequately evaluate their vigorous activity levels since they have less experience with engaging in such PA unlike runners. Also, low correlations at baseline might be due to the different time ranges evaluated in the questionnaire (past month prior to study start) and for Fitbit data (the first 2 weeks of the study).

# Methodological opportunities and adaptations in the measurement of the built and food environment in four African cities

**Dr. Yves Wasnyo<sup>1</sup>**, Dr. Tiago Canelas<sup>2</sup>, Dr. Louise Foley<sup>2</sup>, Dr. Tolu Oni<sup>2</sup>, Dr. Victor Onifade<sup>3,4</sup>, Miss Damilola Odekunle<sup>3</sup>, Dr. Taibat Lawanson<sup>3,4</sup>, Dr. Feyisayo A. Wayas<sup>5</sup>, Dr. Estelle Victoria Lambert<sup>5</sup>, Dr. Motlatso Godongwana<sup>6</sup>, Dr. Lisa Micklesfield<sup>6</sup>, Dr. Adalberto Aparecido dos Santos Lopes<sup>7</sup>, Dr. Larissa Lima<sup>7</sup>, Dr. Waleska Teixeira Caiaffa<sup>7</sup>, Dr. Felix Assah<sup>1</sup>

<sup>1</sup>Health of Populations in Transition Research Group (HoPiT), University of Yaoundé I, Yaoundé, Cameroon,

<sup>2</sup>Global Diet and Activity Research Group and Network (GDAR), MRC Epidemiology Unit, University of Cambridge, Cambridge, United Kingdom, <sup>3</sup>Department of Regional and Urban Planning, University of Lagos, Lagos, Nigeria, <sup>4</sup>Center for Housing and Sustainable Development, University of Lagos, Lagos, Nigeria,

<sup>5</sup>Research Centre for Health through Physical Activity, Lifestyle and Sport (HPALS), Cape Town, South Africa,

<sup>6</sup>Developmental Pathways for Health Research Unit (DPHRU), University of Witwatersrand, Johannesburg, South Africa, <sup>7</sup>Belo Horizonte Observatory for Urban Health (OSUBH), Federal University of Minas Gerais (UFMG), Belo Horizonte, Brazil

**S.1.06 - Measuring health-related features of the natural, built and food environments in low- and middle-income countries: a syndemic approach, UKK - K1 (+K2) (Level 3), June 15, 2023, 8:15 - 9:30 AM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** To describe and discuss the methodological and logistical opportunities and adaptations of applying existing audit tools to measure environmental features relevant to physical activity and diet in four African cities. Additionally, we reflect on the adaptations required to collect meaningful data in a context underrepresented in the literature.

**Methods:** Environmental audits of small areas (approx. 4km<sup>2</sup>) were conducted during August and October of 2022 in Yaoundé, Cameroon; Soweto and Cape Town, South Africa; and Lagos, Nigeria. We used the Microscale Audit of Pedestrian Streetscapes (MAPS-Global) and the Environmental Profile of a Community's Health Part 1 (EPOCH) to assess the built and food environments, respectively. Each site had one week of training and piloting in which local researchers discussed the adequacy, wording, and feasibility of each instrument. Data were collected using the REDCap mobile app. In the sampled small areas, 25% of the total street network was audited.

**Results:** For Yaoundé, MAPS-Global and EPOCH were translated for the first time into French. The instruments were successfully introduced into REDCap, but concurrent paper-based data collection was necessary. As we were using both MAPS-Global and EPOCH, we used the same routes for both, from households to local points of interest (~500m length), rather than sampling exclusively around commercial areas for EPOCH. Some redundant sections of the tools were combined to improve efficiency. Adaptations or changes were kept to a minimum, but were sometimes necessary in order to collect meaningful information. For example, local understanding of what constituted fast food differed by country, the tools did not adequately account for unpaved roads, and questions regarding cycle lanes were retained but these were not present at any site.

**Conclusions:** The four cities which have all grown rapidly in the last decade, are economical hubs and are larger cities in their country. However, there are noticeable differences between them that make collecting comparable data difficult. The instruments were validated but they required local knowledge to be applied in the African context.



# Spatial variation of environmental features relevant to physical activity and diet by area-level deprivation in four African cities

**Dr. Tiago Canelas**<sup>2</sup>, Dr. Louise Foley<sup>2</sup>, Dr. Victor Onifade<sup>3,4</sup>, Miss Damilola Odekunle<sup>3</sup>, Dr. Taibat Lawanson<sup>3,4</sup>, Dr. Feyisayo A. Wayas<sup>5</sup>, Dr. Estelle Victoria Lambert<sup>5</sup>, Dr. Motlatso Godongwana<sup>6</sup>, Dr. Lisa Micklesfield<sup>6</sup>, Dr. Adalberto Aparecido dos Santos Lopes<sup>7</sup>, Dr. Larissa Lima<sup>7</sup>, Dr. Waleska Teixeira Caiaffa<sup>7</sup>, Dr. Felix Assah<sup>1</sup>, Dr. Yves Wasnyo<sup>1</sup>, Dr. Tolu Oni<sup>2</sup>

<sup>1</sup>Health of Populations in Transition Research Group (HoPiT), University of Yaoundé I, Yaoundé, Cameroon,

<sup>2</sup>Global Diet and Activity Research Group and Network (GDAR), MRC Epidemiology Unit, University of Cambridge, Cambridge, United Kingdom, <sup>3</sup>Department of Regional and Urban Planning, University of Lagos, Lagos, Nigeria, <sup>4</sup>Center for Housing and Sustainable Development, University of Lagos, Lagos, Nigeria,

<sup>5</sup>Research Centre for Health through Physical Activity, Lifestyle and Sport (HPALS), Cape Town, South Africa,

<sup>6</sup>Developmental Pathways for Health Research Unit (DPHRU), University of Witwatersrand, Johannesburg, South Africa, <sup>7</sup>Belo Horizonte Observatory for Urban Health (OSUBH), Federal University of Minas Gerais (UFMG), Belo Horizonte, Brazil

**S.1.06 - Measuring health-related features of the natural, built and food environments in low- and middle-income countries: a syndemic approach, UKK - K1 (+K2) (Level 3), June 15, 2023, 8:15 - 9:30 AM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** To describe the features of the built and food environment relevant to unhealthy diets and physical inactivity at a small area level and their spatial heterogeneity by deprivation in four African cities.

**Methods:** Environmental audits conducted in small areas (approx. 4km<sup>2</sup>) were conducted during August and October 2022 in Yaoundé, Cameroon, Soweto and Cape Town, South Africa, and Lagos, Nigeria. We used the Microscale Audit of Pedestrian Streetscapes (MAPS-Global) and the Environmental Profile of a Community's Health (EPOCH) to assess the built and food environments, respectively. Each site categorised their city's small areas into different levels of deprivation and selected a few, preserving deprivation variation (higher vs lower). We sampled 25% of the street network within each small area. We created routes from households to local points of interest (~500m in length) and audited MAPS-Global and EPOCH on the same routes. Data were collected using REDCap, statistically analysed in R, and spatially analysed using QGIS. The MAPS-Global items were grouped into subscales and classified into positive and negative effects on PA. ANOVA was used to analyse the differences among small areas. Each route was assigned a score for the built and food environments and mapped.

**Results:** A total of 23 small areas, 680 routes and approximately 180000 data points were collected from the four cities. Each audit took between one and two hours depending on the accessibility of the small area, with the assessment of the grocery store taking the longest to collect. In preliminary results for MAPS-Global, the lack of parks in the small areas was noted. For example, in the ten small areas of Yaounde, only one park was recorded. Emerging findings suggest walkability features were less common in highly deprived small areas across cities. Restaurant data were collected only 50% of the time.

**Conclusions:** The data showed the spatial distribution of environmental features relevant to diet and physical activity behaviours, drawing attention to the inequalities faced by fast-growing cities. Representing large amounts of data in single maps could inform strategies of improving the environments to promote healthy diets and physical activity.

# Assessing the reliability of virtual assessment tools for measuring features of the built environment relevant to physical activity

**Dr. Motlatso Godongwana**<sup>6</sup>, Dr. Tiago Canelas<sup>2</sup>, Dr. Louise Foley<sup>2</sup>, Dr. Tolu Oni<sup>2</sup>, Dr. Victor Onifade<sup>3,4</sup>, Miss Damilola Odekunle<sup>3</sup>, Dr. Taibat Lawanson<sup>3,4</sup>, Dr. Feyisayo A. Wayas<sup>5</sup>, Dr. Estelle Victoria Lambert<sup>5</sup>, Dr. Adalberto Aparecido dos Santos Lopes<sup>7</sup>, Dr. Larissa Lima<sup>7</sup>, Dr. Waleska Teixeira Caiaffa<sup>7</sup>, Dr. Felix Assah<sup>1</sup>, Dr. Yves Wasnyo<sup>1</sup>, Dr. Lisa Micklesfield<sup>6</sup>, Muhammad Rabiul Balarabe<sup>2</sup>, Vongani Maluleke<sup>6</sup>, Khulu Gama<sup>6</sup>  
<sup>1</sup>Health of Populations in Transition Research Group (HoPiT), University of Yaoundé I, Yaoundé, Cameroon, <sup>2</sup>Global Diet and Activity Research Group and Network (GDAR), MRC Epidemiology Unit, University of Cambridge, Cambridge, United Kingdom, <sup>3</sup>Department of Regional and Urban Planning, University of Lagos, Lagos, Nigeria, <sup>4</sup>Center for Housing and Sustainable Development, University of Lagos, Lagos, Nigeria, <sup>5</sup>Research Centre for Health through Physical Activity, Lifestyle and Sport (HPALS), Cape Town, South Africa, <sup>6</sup>Developmental Pathways for Health Research Unit (DPHRU), University of Witwatersrand, Johannesburg, South Africa, <sup>7</sup>Belo Horizonte Observatory for Urban Health (OSUBH), Federal University of Minas Gerais (UFMG), Belo Horizonte, Brazil

**S.1.06 - Measuring health-related features of the natural, built and food environments in low- and middle-income countries: a syndemic approach, UKK - K1 (+K2) (Level 3), June 15, 2023, 8:15 - 9:30 AM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** Traditional methods of repeated field audits are resource intensive and virtual approaches are an alternative, particularly in resource-constrained settings. However, there is little evidence of the validity of virtual assessments of the built environment in LMICs, and existing studies are largely based on field audits. Valid and reliable virtual audit tools in these contexts would be a cost-efficient way to capture environmental changes.

**Methods:** Field and virtual audits were conducted in small areas of Soweto, South Africa, and Cambridge, UK. Each small area was classified as higher or lower deprivation, preserving the variation in deprivation. The first phase consisted of field auditing 25% of the street network in small areas. We created routes from households to local points of interest (~500m in length) and audited them using Microscale Audit of Pedestrian Streetscapes (MAPS-Global). For the second phase, we used aerial imagery and Google Street View imagery to virtually audit a fraction of the routes previously audited. We followed the same route as for the field audits. The intraclass correlation coefficient (ICC) statistic was used to quantify the level of consistency between the MAPS-Global scores derived from the virtual assessment and the field audit. To assess the importance of local knowledge in virtual audits, the raters that conducted the field audits will perform the virtual in the other city (Soweto - Cambridge), and the results were compared with the local rater.

**Results:** Virtual audits are currently in progress and study findings will be presented and reflected upon, with particular emphasis on the validity, according to area-level deprivation and by site.

**Conclusions:** Insights will be provided into the value of virtual audits as a cost-efficient method of understanding health related features of the built environment.

# “Take your brain for a walk”: a randomized controlled trial to evaluate the effectiveness of a cognitively enriched walking program for older adults

**Ms. Pauline Hotterbeex**<sup>1,2</sup>, Dr. Melanie Beeckman<sup>2</sup>, Prof. Greet Cardon<sup>2</sup>, Prof. sebastien Chastin<sup>2,3</sup>, Prof. Jannique Van Uffelen<sup>1</sup>

<sup>1</sup>Department of Movement Sciences, Research Group Physical Activity, Sports & Health, KU Leuven, Leuven, Belgium, <sup>2</sup>Department of Movement & Sports Sciences, Research Group Physical Activity & Health, Ghent University, Ghent, Belgium, <sup>3</sup>School of Health and Life Sciences, Glasgow Caledonian University, Glasgow, United Kingdom

**S.1.07 - Cognitively enriched physical activity interventions for healthy ageing, UKK - K3+4 (Level 3), June 15, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** Given the rising prevalence of dementia, developing preventive strategies to promote healthy cognitive ageing is considered a priority. Physical activity (PA) is a modifiable risk factor for dementia and experimental studies have demonstrated its effects on cognitive function. Interestingly, recent research has suggested that cognitive activity (CA) combined with PA can have even greater effects on cognitive functioning than PA alone. Studies of combined PA and CA have, however, mostly been conducted in controlled laboratory settings. There is thus a need for real-life, community-based interventions combining PA and CA. Therefore, we developed a cognitively enriched walking program for adults (65+ years) using co-creation. In a randomized controlled trial (RCT), we investigated the effectiveness of this program to boost cognitive functioning and mental wellbeing.

**Methods:** Cognitively and physically healthy older adults were recruited in two major cities in Belgium. Cognitive functioning (CANTAB test battery and Cognitive Failures Questionnaire), physical activity (accelerometer) and psychosocial wellbeing (questionnaires for depressive symptoms, positive wellbeing, social support and loneliness) were assessed at baseline, and three months, six months and twelve months follow-ups are planned. After the baseline measurements, participants were randomly assigned to one of three intervention arms: 1) cognitively enriched walking program (PA+CA), 2) walking program (PA only) or 3) passive control group. Both walking programs consist of bi-weekly supervised group-based walking sessions, for a duration of six months. Group session duration is one to one and a half hours in which distances of three to five kilometers are covered. Each PA+CA session includes two cognitive tasks targeting different cognitive functions. Participants in both the PA only and the PA+CA groups are additionally asked to complete one individual session a week.

**Results:** At baseline, 148 participants were included. The mean age of the participants was 70.18 and 71.8% was female. Preliminary results on the effectiveness of the program for cognitive function and wellbeing will be presented.

**Conclusions:** To our knowledge, this is the first real-life community based cognitively enriched walking program developed through a co-creation process. Findings will inform future programs simultaneously focusing on PA and CA for older adults in real-life settings.

# Effects of Physical and Cognitive Training on Gait Speed and Cognition in Older Adults: A Randomized Controlled Trial

**Prof. Sarianna Sipilä<sup>1</sup>**, Ms. Anna Tirkkonen<sup>1</sup>, Ms. Tiina Savikangas<sup>1</sup>, Dr. Tuomo Hänninen<sup>2</sup>, Dr. Pia Laukkanen<sup>1</sup>, Prof. Markku Alen<sup>3</sup>, Prof. Roger Fielding<sup>4</sup>, Prof. Miia Kivipelto<sup>5, 6, 7, 8</sup>, Associate Professor Jenni Kulmala<sup>5, 6, 9</sup>, Prof. Taina Rantanen<sup>1</sup>, Dr. Sanna Sihvonen<sup>10</sup>, Associate Professor Elina Sillanpää<sup>1</sup>, Prof. Anna Stigsdotter Neely<sup>11, 12</sup>, Dr. Timo Törmäkangas<sup>1</sup>

<sup>1</sup>Gerontology Research Center and Faculty of Sport and Health Sciences, University of Jyväskylä, Jyväskylä, Finland, <sup>2</sup>NeuroCenter, Neurology, Kuopio University Hospital, Kuopio, Finland, <sup>3</sup>Department of Medical Rehabilitation, Oulu University Hospital, Finland, Finland, <sup>4</sup>Nutrition, Exercise Physiology, and Sarcopenia Laboratory, Jean Mayer USDA Human Nutrition Research Center on Aging, Tufts University, Boston, USA, <sup>5</sup>Public Health Promotion Unit, Finnish Institute for Health and Welfare, Helsinki, Finland, <sup>6</sup>Division of Clinical Geriatrics, Center for Alzheimer Research, NVS, Karolinska Institutet, Stockholm, Sweden, <sup>7</sup>Institute of Clinical Medicine/Neurology, University of Eastern Finland, Kuopio, Finland, <sup>8</sup>Neuroepidemiology and Ageing Research Unit, School of Public Health, Imperial College London, London, United Kingdom, <sup>9</sup>Faculty of Social Sciences (Health Sciences) and Gerontology Research Centre (GEREC), Tampere University, Tampere, Finland, <sup>10</sup>School of Health and Social Studies, Jyväskylä, Finland, <sup>11</sup>Department of Social and Psychological Studies, Karlstad University, Karlstad, Sweden, <sup>12</sup>Engineering Psychology, Luleå University of Technology, Luleå, Sweden

**S.1.07 - Cognitively enriched physical activity interventions for healthy ageing, UKK - K3+4 (Level 3), June 15, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** Walking speed is a measure of health and functioning among older people. Physical and cognitive determinants of walking are amenable to interventions, but best practices remain still unclear. We investigated the effects of a 12-month physical and cognitive training (PTCT) intervention on walking speed, dual-task cost in walking speed, and executive functions (EFs) compared to physical training alone (PT) (ISRCTN52388040).

**Method:** Community-dwelling older adults aged 70 to 85 and who did not meet physical activity recommendations were recruited from the population register of the city of Jyväskylä (n=314). PT included supervised walking and dynamic balance (once weekly) as well as resistance and balance training (once weekly), home exercises (2-3 times weekly) and moderate aerobic activity 150 minutes/week in bouts of >10 minutes. PTCT included the PT and computer training (CT) targeting EFs 15-20 minutes, 3-4 times per week. The primary outcome was walking speed. Secondary outcomes were 6-minute walking distance, dual-task cost in walking speed, and EF (Stroop and Trail Making B-A).

**Results:** The mean age of the participants was 74.5 (SD3.8) and 60% were women. The trial was completed by 93% of the participants. Mean adherence to supervised sessions was 59-72% in PT and 62-77% in PTCT group. Home exercises and CT were performed on average 1.9 times per week. Weekly minutes spent in aerobic activities were 188 (median 169) in PT and 207 (median 180) in PTCT group. No significant interactions were observed for walking speed (PTCT-PT, 0.02; 95%CI -0.03, 0.08), walking distance (-3.8; 95%CI -16.9, 9.3) or dual-task cost (-0.22; 95%CI -1.74, 1.30). Stroop improvement was greater after PTCT than PT (-6.9; 95%CI -13.0, -0.8).

**Conclusions:** Complementing physical training with EFs training is not essential for promotion of gait speed. For executive functions, complementing physical training with targeted cognitive training provides additional benefit.

# Cognition interacts with physical fitness during aging: Evidence from COVEPIC trials investigating the effects of home-based physical exercise and cognitive training on cognitive and physical functions in older adults

**Dr. Emma Gabrielle Dupuy**<sup>1,2</sup>, Ms. Laura-Lee Girard<sup>1</sup>, Ms. Caroll-Ann Blanchette<sup>1</sup>, Ms. Kathia Saillant<sup>1,3</sup>, Mr. Florent Besnier<sup>1</sup>, Dr. Christine Gagnon<sup>1</sup>, Ms. Juliana Breton<sup>1</sup>, Mr. Thomas Vincent<sup>1</sup>, Ms. Catherine-Alexandra Grégoire<sup>1</sup>, Ms. Marie Payer<sup>1,3</sup>, Ms. Béatrice Bérubé<sup>1,3</sup>, Ms. Miloudza Olmand<sup>1,4</sup>, Ms. Marianne Levesque<sup>1,4</sup>, Ms. Catia Lecchino<sup>1,4</sup>, Dr. Nadia Bouabdallaoui<sup>1,2</sup>, Dr. Josep Iglésies Grau<sup>1,2</sup>, Prof. Marie-France Marin<sup>3,5</sup>, Prof. Sylvie Belleville<sup>1,6</sup>, Prof. Martin Juneau<sup>1,2</sup>, Prof. Paolo Vitali<sup>7</sup>, Prof. Mathieu Gayda<sup>1,2</sup>, Prof. Anil Nigam<sup>1</sup>, Prof. Louis Bherer<sup>1,2,6</sup>

<sup>1</sup>Centre ÉPIC and Research Center, Montreal Heart Institute, Montreal, Canada, <sup>2</sup>Department of Medicine, Université de Montréal, Montreal, Canada, <sup>3</sup>Department of Psychology, Université du Québec à Montréal, Montreal, Canada, <sup>4</sup>Department of Psychology, Université de Montréal, Montreal, Canada, <sup>5</sup>Research Center, Institut universitaire en santé mentale de Montréal, Montreal, Canada, <sup>6</sup>Research Center, Institut Universitaire de Gériatrie de Montréal, Montreal, Canada, <sup>7</sup>Department of Neurology and Neurosurgery, Faculty of Medicine, McGill University, Montreal, Canada

**S.1.07 - Cognitively enriched physical activity interventions for healthy ageing, UKK - K3+4 (Level 3), June 15, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** A. Ageing

**Purpose.** Confinement during the COVID-19 pandemic increased physical inactivity and a sedentary lifestyle, which are known to negatively affect physical and mental health, including cognition. Physical activity and cognitive training could help prevent these collateral impacts, especially when combined within the same intervention, due to their potential synergetic effect on brain functions. However, little is known about how the interaction of cognition and physical fitness affects functional aging. Also, the added benefits of cognitive training on physical exercise for cognitive functioning need to be further addressed.

This work aims to document 1/ whether the level of cardiorespiratory fitness moderates the age-related interdependence between functional mobility and cognition and 2/ the added benefits of a home-based intervention involving cognitive training and physical exercise on cognition compared to physical exercise alone.

**Methods.** All analyses were performed on data from COVEPIC (NCT04635462), and COVEPICARDIO (NCT04661189) registered studies. Each trial enrolled 122 older adults (>50 years old), with and without cardiac diseases, randomly assigned to take part in one of the two following arms (1:1): 1/ Combined physical and cognitive home-based training intervention or 2/ home-based physical training alone. Participants completed videoconference assessments of their cognitive and physical functioning prior to the intervention (T0), mid-intervention (T1) (3 months), post-intervention (T2) (6 months), and 6-month follow-up (T3).

**Results.** A three-way moderation analysis performed on baseline data demonstrated that cardiorespiratory fitness interacts with age to moderate the association between executive functioning and mobility. At lower levels of physical fitness (<19.16 ml/min/kg), executive functioning significantly influences the mobility of individuals more than 65 years old. Then, an ANOVA performed with follow-up data suggests that participants who completed the combined intervention showed larger improvements in dual-task performance, notably the task set cost between 0-3 months of training.

**Conclusions.** These results show that the interaction between physical fitness and cognition affects functional aging and demonstrate the complementarity of cognitive training and physical exercise intervention to improve specific aspects of cognition. Together, these observations suggest the added value of the multidomain

approach to prevent age-associated loss of autonomy and support the idea of personalizing the proposed intervention to individual needs.



# A bibliographic review of sustainability research output and research investment in physical activity and nutrition in the public health setting

Dr. Alix Hall<sup>1,2,3</sup>, Prof. Luke Wolfenden<sup>1,2,3</sup>, Mr. Adam Shoesmith<sup>1,2,3</sup>, Dr. Cassandra Lane<sup>1,2,3</sup>, Associate Professor Rachel C. Shelton<sup>4</sup>, Ms. Carly Gardner<sup>1,2</sup>, Dr. Tameka McFadyen<sup>1,2,3</sup>, Ms. Brydie McEvoy<sup>1,2</sup>, Mr. Daniel Chun Wei Lee<sup>1,2</sup>, Ms. Karly Austin<sup>1,2</sup>, **Dr. Nicole Nathan<sup>1,2,3</sup>**

<sup>1</sup>University of Newcastle, Callaghan, Australia, <sup>2</sup>Hunter New England Population Health, Wallsend, Australia,

<sup>3</sup>Hunter Medical Research Institute, New Lambton Heights, Australia, <sup>4</sup>Columbia University, New York, USA

**S.1.08 - Supporting sustainment of nutrition and physical activity interventions in schools, Clarion Hotel Gillet - Room Gillesalen, June 15, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** To explore the extent to which public health research, in particular studies focusing on PA and nutrition, assess sustainability and whether this has changed over time.

**Methods:** We undertook a repeat cross-sectional bibliographic review of research published within a purposive sample of leading public health journals across three time periods (2010, 2015 and 2020/2021). Studies were eligible if they were: a databased study or review article and published in one of the 10 selected journals in one of the three time periods. Each study was assessed for whether it focused on sustainability, which could include issues relating to the long-term benefits or delivery of an intervention. Type of research, study design, setting, and public health focus were extracted. Logistic regression was used to assess whether there was an association between time period and the proportion of studies that focused on sustainability.

**Results:** 10,588 databased articles were identified, of which 1.3% (n=136) focused on sustainability. The percentage of original research articles that focused on sustainability increased slightly over time: 0.3% (95% CI: 0.1%, 0.7%) in 2010, 1.4% (95% CI: 1.0%, 1.9%) in 2015 and 1.6% (95% CI: 1.3%, 1.9%) in 2020/2021, with a statistically significant association identified between time period and sustainability research (p=0.0007). PA was the most predominant public health issue addressed in the studies assessing sustainability (n=30, 22%), followed by child/youth health and wellbeing (n=28; 21%) and then nutrition (n=25; 18%). The percentage of sustainability research addressing PA and nutrition increased from the earliest time period 2010 (17% and 0%, respectively) to the most recent time periods where rates seem to stabilise (26% and 14% in 2015; and 20% and 22% in 2020/2021). No studies that focused on PA or nutrition assessed the effect of sustainability strategies.

**Conclusions:** These findings suggest only a small amount of research has been dedicated specifically to sustainability and the percentage specific to PA and nutrition interventions remains low. More public health research on the sustainability of PA and nutrition interventions, particularly on identifying strategies effective in sustaining their implementation is needed.

# Enhancing sustainability of school wellness initiatives: Lessons learned from ongoing dissemination

**Assistant Professor Gabriella M. McLoughlin**<sup>1,2</sup>, Ms. Laura Liechty<sup>3</sup>, Prof. Joey Lee<sup>4</sup>, Dr. Richard Rosenkranz<sup>5</sup>, Ms. Rachel Sweeney<sup>3</sup>, Prof. Greg Welk<sup>3</sup>

<sup>1</sup>Temple University, Philadelphia, USA, <sup>2</sup>Washington University, St. Louis, USA, <sup>3</sup>Iowa State University, Ames, USA, <sup>4</sup>University of Colorado Colorado Springs, Colorado Springs, USA, <sup>5</sup>Kansas State University, Manhattan, USA

**S.1.08 - Supporting sustainment of nutrition and physical activity interventions in schools, Clarion Hotel Gillet - Room Gillesalen, June 15, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** To provide two examples of how sustainability is being measured and evaluated in school wellness initiatives. Policies can be an effective way to enhance sustainability, but implementation of such policies is poorly understood, specifically the degree to which implementation disparities occur, posing implications for health equity.

**Methods:** For the empirical example, a mixed methods implementation study grounded in the Consolidated Framework for Implementation Research (CFIR) was conducted to evaluate key outcomes, determinants, and nuanced relationships between these factors among schools in the 2019–2020 cycle of SWITCH. Determinants were investigated through in-depth qualitative interviews and readiness surveys with implementation leaders. Evaluation approaches followed recommended data collection and analytic methodologies of the CFIR. The second example highlights how these steps are being integrated into a measures development study that aims to combine health equity with implementation science approaches in measurement of school wellness policy.

**Results:** Distinguishing factors between experienced and inexperienced schools were Readiness for Implementation (inner setting) and Self-efficacy (characteristics of the individuals) ( $p < 0.05$ ). Strategies found to enhance sustainability of SWITCH programming were increasing student awareness/advocacy, focusing on a small number of key elements, and integrating programming into school culture.

**Conclusions:** Findings provide specific insights related to SWITCH implementation and sustainability but more generalised insights about the type of support needed to help schools implement and sustain school wellness programming. Further research is needed to operationalise sustainment and test the relative effectiveness of different strategies to enhance the sustainability of capacity-building interventions such as SWITCH. Implications and next steps for measuring sustainability will be discussed by providing an overview of the measurement tool development protocol.

# Application of a theoretical framework to design strategies supporting schools' sustainment of a physical activity program

**Dr. Nicole Nathan**<sup>1,2,3</sup>, **Mr. Adam Shoesmith**<sup>1,2,3</sup>, Prof. Luke Wolfenden<sup>1,2,3</sup>, Mr. Edward Riley-Gibson<sup>1,2,3</sup>, Dr. Cassandra Lane<sup>1,2,3</sup>, Associate Professor Rachel C. Shelton<sup>4</sup>, Dr. Rachel Sutherland<sup>1,2,3</sup>, Ms. Nicole McCarthy<sup>1,2,3</sup>, Dr. Alix Hall<sup>1,2,3</sup>

<sup>1</sup>University of Newcastle, Callaghan, Australia, <sup>2</sup>Hunter New England Population Health, Wallsend, Australia,

<sup>3</sup>Hunter Medical Research Institute, New Lambton Heights, Australia, <sup>4</sup>Columbia University, New York, USA

**S.1.08 - Supporting sustainment of nutrition and physical activity interventions in schools, Clarion Hotel Gillet - Room Gillesalen, June 15, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** To describe factors that influence sustainment of a school PA program and the application of the Theoretical Domains Framework and Integrated Sustainability Framework (ISF) in the development of an intervention to sustain its implementation.

**Methods:** A multi-strategy intervention was co-developed with health and education policy makers and practitioners using the following steps:

1. Identification of barriers and facilitators to sustainment via: i) systematic reviews of the school staff barriers/facilitators to sustaining PA programs; ii) quantitative surveys with 240 classroom teachers; and iii) observations and interviews with school staff.
2. Identification of potential strategies: barriers were organised according to the ISF. Potential strategies to address these barriers were identified through surveys with over 200 teachers.
3. Strategies were then reviewed by key stakeholders to ensure their feasibility and acceptability to school communities. The final strategies were described according to the sustainment-explicit Expert Recommendations for Implementing Change (ERIC) glossary.

**Results:** The systematic review and surveys identified that the primary barriers to sustainment of the PA program were lack of organisational leadership and support, organisational readiness and resources, staff turnover, perceived policy alignment and workplace socio-cultural factors. Survey and interview data found strategies most accepted by teachers were: the provision of PA equipment packs that enable class time PA (85%); the provision of an information pack to upskill new staff (78%); and creating a whole school PA plan outlining the school's steps to ensure PA policy adherence (78%). Following theoretical mapping a multi-component intervention was developed which included: (i) centralized support; (ii) reminders; (iii) principal mandates; (iv) sharing local knowledge; (v) building coalitions to share resources (vi) distributing educational materials; and (vii) involving end-users. The feasibility and acceptability of the strategies were reviewed by an advisory group which resulted in minor modifications of strategies.

**Conclusions:** This will be one of the first studies to test the effectiveness of a multi-component intervention to support the sustainment of a school PA program, creating seminal evidence for the field of sustainability science.

# Event-based ecological momentary assessment to explore the environmental and social context of physical activity in older adults: results and lessons learned

**Ms. Julie Delobelle<sup>1,2</sup>**, Dr. Sofie Compennolle<sup>1,2</sup>, Dr. Tomas Vetrovsky<sup>3</sup>, Prof. Delfien Van Dyck<sup>1</sup>

<sup>1</sup>Ghent University, Gent, Belgium, <sup>2</sup>Research Foundation Flanders, Brussels, Belgium, <sup>3</sup>Charles University, Prague, Czech Republic

**S.1.09 - The need for and feasibility of using ecological momentary assessment and just-in-time adaptive interventions in vulnerable groups, Clarion Hotel Gillet - Room Akademien, June 15, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** D. e- & mHealth

**Background:** Event-based ecological momentary assessment (EMA) is an innovative data collection method to assess experiences, emotions and contexts during or following a specific event (e.g., short bout of PA). The purpose of this study was to explore associations between individual factors and the environmental and social contexts of PA, using event-based EMA. Since this data collection method is novel within this research domain, the most important learned lessons to conduct event-based EMA studies will be provided.

**Methods:** An observational event-based EMA study was conducted, using a convenience sample of 75 healthy older adults (65+). Each participant completed a questionnaire to assess socio-demographic variables. Participants were monitored using a Fitbit (i.e., Inspire 2 or Ionic), triggering a questionnaire on a smartphone application (i.e., Health React) after a short bout (5 consecutive minutes) of sustained walking ( $\geq 60$  steps/minute). During seven consecutive days, participants answered smartphone-based questions regarding the environmental and social context, emotions and physical complaints they experienced during/immediately after PA. A maximum of 6 prompts per day was set, with minimum 60 minutes between two prompts. Afterwards, a semi-structured interview was conducted to assess how the participants experienced the study, which will be analyzed using a deductive approach in NVivo. Moreover, descriptive and regression analyses will be conducted to explore associations between individual factors (e.g., age, sex, loneliness, social support, physical complaints) and the contexts of PA.

**Results:** Preliminary analyses (N=35) showed that 79.5% of the prompts were triggered outdoors (36.42% in a public green environment) and when being alone (60.3%). In addition, older adults who felt lonely performed more PA alone ( $p < 0.001$ ). Importantly, 20% of the participants were never prompted during the entire study (due to physical inactivity, Fitbit synchronization delays or noncompliance with the prompting rules). Further quantitative and qualitative analyses will be conducted and results will be presented at the conference.

**Conclusion:** This study provides practical considerations for future event-based EMA studies. In addition, gaining insight in the association between individual factors and contexts of PA will have important implications for just-in-time adaptive interventions to increase PA by initializing real-time supportive messages adapted to an individual's state.

# Predictive within-day associations of emotions, physical complaints, intention and self-efficacy with subsequent accelerometer-assessed physical activity in older adults: a time-based EMA study

**Miss Iris Maes**<sup>1</sup>, Dr. Lieze Mertens<sup>1</sup>, Dr. Louise Poppe<sup>1,2</sup>, Dr. Tomas Vetrovsky<sup>3</sup>, Prof. Geert Crombez<sup>1</sup>, Dr. Femke De Backere<sup>1</sup>, Prof. Delfien Van Dyck<sup>1</sup>

<sup>1</sup>Ghent University, Gent, Belgium, <sup>2</sup>Research Foundation Flanders, Brussels, Belgium, <sup>3</sup>Charles University, Prague, Czech Republic

**S.1.09 - The need for and feasibility of using ecological momentary assessment and just-in-time adaptive interventions in vulnerable groups, Clarion Hotel Gillet - Room Akademien, June 15, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose.** Health behavior change interventions often do not focus on contextual and time-varying determinants, which might limit their effectiveness. However, before dynamic tailoring of interventions can be developed, one should know which time-dependent determinants are associated with physical activity (PA) and how strong these associations are. In the research field of PA some research has been done to examine these associations, but research in older adults is limited. Therefore, the aim of the current study was to examine predictive within-day associations between multiple determinants of the COM-B framework assessed using ecological momentary assessment (EMA), and accelerometer assessed light physical activity (LPA), moderate-to-vigorous physical activity (MVPA), and total physical activity performed in the 15, 30, 60 and 120 minutes after the EMA trigger.

**Methods.** Observational data were collected in 64 older adults (56.3% men; mean age  $72.1 \pm 5.6$  years). Participants were asked to answer a time-based EMA questionnaire 6 times per day which assessed emotions (i.e., relaxation, satisfaction, irritation, feeling down), the physical complaint fatigue, intention, and self-efficacy. An Axivity AX3 was worn to objectively capture participants' PA. Multilevel regressions analyses in R were performed to examine these within-day associations.

**Results.** Satisfaction, irritation, feeling down, intention and self-efficacy were positively associated with subsequent LPA and/or MVPA in the 15, 30 and 60 minutes after the trigger, while relaxation and fatigue were negatively associated.

**Conclusions.** Multiple associations were found in the current study. This knowledge in combination with the time-dependency of the determinants is valuable information for future interventions, so that suggestions to be active can be provided when the older adult is most receptive.

# Implementation of a just-in-time adaptive intervention (JITAI) in patients with type 2 diabetes and prediabetes recruited in primary care: a process evaluation

**Mr. Jan Novak<sup>1</sup>**, Dr. Jitka Kuhnova<sup>2</sup>, Ms. Andrea Jaklova<sup>1</sup>, Dr. Marketa Pfeiferova<sup>1</sup>, Dr. Norbert Kral<sup>1</sup>, Dr. Richard Cimrner<sup>2</sup>, Prof. Tom Yates<sup>3,4</sup>, Ms. Charlotte Wahlich<sup>5</sup>, Prof. Tess Harris<sup>5</sup>, Prof. Bohumil Seifert<sup>1</sup>, Dr. Tomas Vetrovsky<sup>1</sup>

<sup>1</sup>Charles University, Prague, Czech Republic, <sup>2</sup>University of Hradec Kralove, Hradec Kralove, Czech Republic, <sup>3</sup>University of Leicester, Leicester, United Kingdom, <sup>4</sup>University Hospitals of Leicester NHS Trust and the University of Leicester, Leicester, United Kingdom, <sup>5</sup>St George's University of London, London, United Kingdom

**S.1.09 - The need for and feasibility of using ecological momentary assessment and just-in-time adaptive interventions in vulnerable groups, Clarion Hotel Gillet - Room Akademien, June 15, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Just-in-time adaptive interventions (JITAI) can potentially improve sedentary adults' physical activity levels. Whether JITAI can be successfully applied to patients with chronic conditions in healthcare settings is unknown. This study aimed to develop and evaluate the implementation of a JITAI to increase physical activity and reduce prolonged sitting in type 2 diabetes and prediabetes patients recruited in primary care.

**Methods:** The JITAI was developed with the involvement of pre/diabetes patients according to the mHealth development and evaluation framework. The resulting JITAI consisted of prompts to interrupt sitting after 30 mins of zero steps (sedentary prompts) and to increase walking pace after 5 mins of 60–100 steps (walking prompts). The prompts were triggered by the HealthReact system contingent on step count detected by the Fitbit tracker and delivered as text messages. The evaluation of the JITAI's implementation was informed by the Medical Research Council guidance for process evaluation of complex interventions and included the intervention's reach, fidelity, and dose.

**Results:** *Reach:* Of 335 patients randomly selected from among 18 general practices, 59 (18%) were ineligible due to not being mobile phone users, and 25 (7%) declined to wear the Fitbit tracker. *Fidelity:* In the reference 7-day period, of 52 patients assigned to the JITAI, 16 (31%) did not sync their Fitbit data, mainly due to internet access difficulties and technical issues. Of the remaining 36 patients, 29 (81%) triggered at least one sedentary prompt, and 16 (44%) triggered at least one walking prompt. Irregular sync due to a lack of a mobile data plan was the principal reason for not triggering any prompt. *Dose:* Among those who received at least one prompt, the median was 4 (IQR 1–4) sedentary and 2 (IQR 1–3) walking prompts per week.

**Conclusions:** In pre/diabetes patients recruited in primary care, the JITAI had reasonable reach, with only 1 in 4 patients unable or unwilling to participate. Lack of internet access and technical issues remained the main obstacles to desired intervention fidelity in this population. Further analyses will explore the proximal effect of the JITAI's prompts and patients' views of the intervention.



# Development of a healthcare provider screening tool to make patient-tailored referrals for exercise in cancer care, both during and after treatment

**Mrs. Renée Bultijnck**<sup>1,2</sup>, Mrs. Noëmi Borrey<sup>3</sup>, Mr. Johan De Munter<sup>4</sup>, Mrs. Marijke Quaghebeur<sup>4</sup>, Dr. Inge Bru<sup>3</sup>, Dr. Michael Saerens<sup>5</sup>, Prof. Karen Geboes<sup>4,5</sup>, Dr. Celine Jacobs<sup>5</sup>

<sup>1</sup>Ghent University, Faculty of Medicine and Health Science, Department of Human Structure and Repair, Ghent, Belgium, <sup>2</sup>Ghent University Hospital, Department of Radiation Oncology, Ghent, Belgium, <sup>3</sup> Ghent University Hospital; Department of Physical and Rehabilitation Medicine, Ghent, Belgium, <sup>4</sup>Ghent University Hospital, Cancer Center, Ghent, Belgium, <sup>5</sup>Ghent University Hospital, Department of Gastroenterology, Ghent, Belgium

**S.1.10 - Implementing exercise and lifestyle support in individuals living with and beyond cancer: a patient-centred approach, Clarion Hotel Gillet - Room Swedenborg, June 15, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** C. Cancer prevention and management

**Purpose** To develop a screening tool for healthcare providers (HCP) enabling them to refer patients during and after cancer treatment to the most appropriate exercise setting with patient tailored supervision.

**Methods** A step-wise approach with a two round Delphi method was employed for development of this tool. Twenty experts were recruited via our TACTIC (Tailored Activity during and after Treatment In Cancer patients) project consortium and research network. REDCap, a web application for managing surveys and databases was used for our Delphi surveys. First, a provisional list of screening items was constructed based on literature review and expert opinion of our research team. This list was used during the first round and items were scored based on their relevance. The second round captured the items to score measures and corresponding actions to take. Consensus about final scoring items and actions was reached during a last expert meeting. Finally, a pilot test was conducted. Eleven HCP used the tool and based on their feedback the tool was further adjusted and optimised.

**Results** Twenty experts participated in our Delphi survey: seven physical therapists, one psychologist, three specialist cancer nurses and nine physicians from different specialties. The final tool consists of nine items that HCP should score: patient performance status, tumour location and stability, lymphoedema, cardiovascular and respiratory morbidity, diabetes, weight, fall risk and osteoporosis, feelings of anxiety and depression. Patients are scored to one of three categories, according to a traffic light system: green, meaning exercise can safely be performed in a primary care setting, without specialized physiotherapist; orange, exercise is preferably started with guidance of a specialized physiotherapist (either in hospital or community setting) and can be done without supervision after a positive evaluation, or red, meaning a medical screening is recommended on one or more items (comorbidities) before start of an exercise program under supervision.

**Conclusion** We developed a nine-item screening tool for HCP to refer patients during and after cancer treatment to physical rehabilitation. It is a dynamic traffic light system to support HCP in patient suitability for exercise. After evaluation patients can shift towards another category.

# STart Exercising, keeP exercisiNg (STEP-IN): A toolkit for physiotherapists to support exercise maintenance among cancer survivors after supervised exercise interventions.

**Dr. Carla Agasi-Idenburg**<sup>1,2</sup>, Dr. Caroline Kampshoff<sup>3</sup>, Dr. Meeke Hoedjes<sup>4</sup>, Dr. Laurien Buffart<sup>5,6</sup>, Dr. Martijn Stuiver<sup>2,7</sup>

<sup>1</sup>Instituut voor Bewegingsstudies, Hogeschool Utrecht, Utrecht, Netherlands, <sup>2</sup>Center for Quality of Life and Division of Psychosocial Research and Epidemiology, Netherlands Cancer Institute, Amsterdam, Netherlands, <sup>3</sup>Nivel, Netherlands Institute for Health Services Research, Utrecht, Netherlands, <sup>4</sup>Center of Research on Psychological and Somatic disorders, Department of Medical and Clinical Psychology, Tilburg University, Tilburg, Netherlands, <sup>5</sup>Department of Physiology, Radboud Institute of Health Sciences, Radboud University Medical Center, Nijmegen, Netherlands, <sup>6</sup>Exercise Medicine Research Institute, Edith Cowan University, Perth, Australia, <sup>7</sup>Faculty of Health, Center of Expertise Urban Vitality, Amsterdam University of Applied Sciences, Amsterdam, Netherlands

**S.1.10 - Implementing exercise and lifestyle support in individuals living with and beyond cancer: a patient-centred approach, Clarion Hotel Gillet - Room Swedenborg, June 15, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** C. Cancer prevention and management

**Purpose:** Exercise has important health benefits for people living with or beyond cancer. Supervised exercise interventions are generally effective on short term outcomes. To maintain and further improve health benefits, physical activity behavior should be continued after the supervised program. Yet, cancer survivors experience difficulties to keep exercising after finishing supervised interventions. While current standards and professional guidelines for physiotherapists emphasize 'exercise maintenance' as a treatment goal, physiotherapists lack practical tools to guide patients in achieving this. Consequently, support of exercise maintenance is insufficient. STEP-IN aims to develop a toolkit for physical therapists, to support exercise maintenance of cancer survivors.

**Methods:** The STEP-IN project has a mixed-method design and is guided by intervention mapping methodology and the double diamond design process. STEP-IN started with a needs assessment, followed by a systematic review of the literature to identify targets for action and determinants of change, and selection of strategies to support exercise maintenance. Toolkit materials were then developed by the co-creation team. A key element is the active engagement of cancer survivors and physiotherapists as a 'co-creation team'. Furthermore, each development phase is supported by an expert advisory board.

**Results:** The main findings of the needs assessment indicated that physiotherapist typically lacked a strong theoretical basis related to behavior change techniques, and required practical support for integrating such techniques into their treatment. Also, physiotherapists valued easily accessible, reliable resources supporting behavioral change, for themselves and for their patients. The STEP-IN project has resulted in a ready-for-practice toolkit for physiotherapists to meet those needs. The cornerstone of this toolbox is a decision tool that aims to improve patient- therapist interaction for selecting (cognitive and/or behavioral) targets for treatment, which can be revisited and evaluated periodically.

**Conclusions:** The STEP-IN toolkit provides practical instruments and resources for physiotherapists to help them support exercise maintenance among cancer survivors, which is essential for high quality care. The toolkit will be made available in print and electronic form, and courses will be organized to train physiotherapists in its use.

# Co-designed weight management intervention for women recovering from primary breast cancer treatment

**Prof. John Saxton**<sup>1</sup>, Dr. Katie Pickering<sup>2</sup>, Dr. Sarah Wane<sup>3</sup>, Ms. Helen Humphreys<sup>4</sup>, Dr. Helen Crank<sup>4</sup>, Prof. Annie Anderson<sup>5</sup>, Mr. Henry Cain<sup>6</sup>, Dr. Judith Cohen<sup>7</sup>, Prof. Robert Copeland<sup>2</sup>, Prof. Joanne Gray<sup>8</sup>, Dr. Jackie Hargreaves<sup>9</sup>, Dr. Richard McNally<sup>10</sup>, Dr. Caroline Wilson<sup>11</sup>

<sup>1</sup>School of Sport, Exercise & Rehabilitation Sciences, University of Hull, Hull, United Kingdom, <sup>2</sup>Advanced Wellbeing Research Centre, Sheffield Hallam University, Sheffield, United Kingdom, <sup>3</sup>Department of Sport, Exercise & Rehabilitation, Northumbria University, Newcastle upon Tyne, United Kingdom, <sup>4</sup>Academy of Sport and Physical Activity, Sheffield Hallam University, Sheffield, United Kingdom, <sup>5</sup>Division of Population Health & Genomics, Ninewells Hospital and Medical School, University of Dundee, Dundee, United Kingdom, <sup>6</sup>Newcastle upon Tyne Hospitals NHS Foundation Trust, Newcastle upon Tyne, United Kingdom, <sup>7</sup>Hull Heath Trials Unit, Hull York Medical School, University of Hull, Hull, United Kingdom, <sup>8</sup>Department of Nursing, Midwifery & Health, Northumbria University, Newcastle upon Tyne, United Kingdom, <sup>9</sup>Carnegie School of Sport, Leeds Beckett University, Leeds, United Kingdom, <sup>10</sup>Population Health Sciences Institute, Newcastle University, Newcastle upon Tyne, United Kingdom, <sup>11</sup>Department of Oncology and Metabolism, The Medical School, University of Sheffield, Sheffield, United Kingdom

**S.1.10 - Implementing exercise and lifestyle support in individuals living with and beyond cancer: a patient-centred approach, Clarion Hotel Gillet - Room Swedenborg, June 15, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** C. Cancer prevention and management

**Background:** Weight gain is commonly observed during and after breast cancer treatment and is associated with poorer survival outcomes, particularly in women with oestrogen receptor-positive disease. The aim of this study was to co-design (with patients) a programme of tailored, personalized physical activity and dietary support to help female breast cancer patients (BCPs) develop the skills and confidence for sustainable weight loss.

## **Methods:**

Guided by the Behaviour Change Wheel, a theoretically-informed weight management intervention was developed on the basis of co-designed strategies to overcome physical and emotional barriers to physical activity and dietary behaviour change. A linked focus group study with BCPs (N=16) and healthcare professionals (HCPs; N=21) first explored the challenges of dietary and physical activity behaviour change during and beyond the breast cancer care pathway. Two groups of BCPs (N=4 and N=5) from different regions of the UK then participated in a two-stage co-design process. The stage 1 and stage 2 co-design workshops were held two weeks apart and were approximately 2 h in duration.

## **Results:**

Four overarching themes were identified from the focus group study: Treatment; Support for lifestyle behaviour change; Information availability for BCPs; Knowledge of current evidence amongst HCPs. Building onto these themes through the co-design process, BCPs were instrumental in developing all key features of the intervention, in terms of *Capability* (e.g., evidence-based information, peer-support and shared experiences), *Opportunity* (e.g., flexible approach to weight management based on core principles) and *Motivation* (e.g., appropriate use of goal-setting and high-quality resources, including motivational factsheets) for behaviour change.

**Conclusion:** This co-design approach enabled the development of a theoretically-informed intervention with a content, structure and delivery model that has the potential to address the weight management challenges faced by BCPs. Future research is required to evaluate the effectiveness of the intervention for eliciting clinically-important and sustainable weight loss in this population.

# Lessons learned to recruit Hispanic fathers for Papas Saludables, Niños Saludables Efficacy Trial

**Associate Professor Teresia M. O'Connor<sup>1</sup>**, Miss Alicia Beltran<sup>1</sup>, Miss Tatyana Garza<sup>1</sup>, Miss Oriana Perez<sup>1</sup>, Assistant Professor Erica G Soltero<sup>1</sup>, Prof. Elva M Arredondo<sup>2</sup>, Associate Professor Justin Zachariah<sup>3</sup>, Assistant Professor Jaime Rueda<sup>4</sup>, Associate Professor Salma M Musaad<sup>1</sup>, Prof. Tom Baranowski<sup>1</sup>, Dr. Anna Rayward<sup>5,6</sup>, Prof. Philip Morgan<sup>5,6</sup>

<sup>1</sup>USDA/ARS Children's Nutrition Research Center, Baylor College of Medicine Houston, Texas, USA, <sup>2</sup>Institute for Behavioral and Community Health, San Diego State University San Diego, California, USA, <sup>3</sup>Pediatrics – Cardiology, Baylor College of Medicine Houston., Texas, USA, <sup>4</sup>General Medicine, Baylor College of Medicine, Houston, Texas, USA, <sup>5</sup>University of Newcastle, Centre for Active Living and Learning, School of Education, College of Human and Social Futures, Callaghan, Australia, <sup>6</sup>Active Living Research Program, Hunter Medical Research Institute, New Lambton Heights, Australia

**S.1.11 - Adaptation of a healthy lifestyle program for fathers and their children (Healthy Dads Healthy Kids) across different countries, settings and cultures., UKK - Main Hall, June 15, 2023, 4:15 - 5:30 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** A culturally adapted version of Healthy Dads Healthy Kids for Hispanic fathers and children, Papas Saludables, Niños Saludables (PSNS), was found feasible among Hispanic families in Houston, Texas. Here we describe lessons learned on recruiting Hispanic fathers from the feasibility study and an ongoing efficacy trial.

**Methods:** The efficacy trial of PSNS plans to enroll 332 Hispanic father-figures and their children (5-11 years old) in eight waves across 3.5 years. The feasibility study and initial protocol for the efficacy trial included a partnership with Texas Children's Health Plan, a Medicaid and CHIP provider as the recruitment sample and potential site for future program delivery. At least one of the children from each family had to be a TCHP member. Process evaluations of the feasibility trial and the on-going efficacy trial tracked recruitment strategies to identify barriers and facilitators for recruiting Hispanic men and their children.

**Results:** As previously reported, the feasibility study enrolled 36 Hispanic fathers and children within a four-month period, 90% of target recruitment. In-person recruitment at a TCHP clinic and their health-fairs proved most successful. Hispanic men were typically recruited through the mothers who brought information about the study to the father. In the efficacy trial, TCHP deemed the research team functioned as "agents" of TCHP, and meant research staff had to follow Texas laws governing contacting TCHP members about TCHP sponsored programs. This prevented in-person recruitment at any of the pediatric clinics. These barriers resulted in only 10 Hispanic fathers and their children enrolling during wave 1 over five months, 24% of the planned enrollment for that wave. TCHP membership inclusion criteria was lifted for wave 2, allowing in-person recruitment at clinics and presence at community events to recruit any qualifying Hispanic father and their children. On-going process evaluation will continue to track recruitment in the efficacy trial.

**Conclusions:** Recruitment of Hispanic men to studies is challenging. Partnership with community entities, such as a Medicaid Health Plan, may provide opportunities for sustaining and disseminating interventions, but add unique barriers for recruitment based on state laws intended to protect families.

# Insights and preliminary pilot findings for adapting HDHK for fathers and children in the multicultural city of Bremen, Germany

Dr. Dorothea M I Schönbach<sup>1</sup>, **Dr. Heide Busse<sup>1</sup>**, Dr. Mirko Brandes<sup>1</sup>, Prof. Philip Morgan<sup>2,3</sup>, Dr. Tilman Brand<sup>1</sup>  
<sup>1</sup>Department of Prevention and Evaluation, Leibniz Institute for Prevention Research and Epidemiology – BIPS., Bremen, Germany, <sup>2</sup>University of Newcastle, Centre for Active Living and Learning, School of Education, College of Human and Social Futures, Callaghan, Australia, <sup>3</sup>Active Living Research Program, Hunter Medical Research Institute, New Lambton Heights, Australia

**S.1.11 - Adaptation of a healthy lifestyle program for fathers and their children (Healthy Dads Healthy Kids) across different countries, settings and cultures., UKK - Main Hall June 15, 2023, 4:15 - 5:30 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** In Germany, men and women are equally affected by adiposity but more men than women are overweight. Despite this gender difference, there are just a few programs targeting overweight men in particular and their participation in such programs is rather low. Besides, children are at high risk of becoming physically inactive and overweight when entering primary school. Therefore, the promising healthy lifestyle program Healthy Dads, Healthy Kids developed in Australia will be adapted, implemented and evaluated among a multicultural population in Northern Germany.

**Methods:** The adaptation process followed the ADAPT guidance (v1.0), which included the following components: (a) identification of the problem, (b) finding an appropriate intervention, (c) building a team of the target group and different stakeholders for adaptations (including focus groups), (d) adaptations of material, (e) recruitment, training, and support of implementers, and (f) conducting a nine-week pilot trial with ten families (including an effect and process evaluation).

**Results:** Focus groups will start end of 2022, followed by adaptations, and a pilot trial will be conducted early 2023. Preliminary results from this adaptation process will be presented at the conference.

**Conclusions:** This study provides insights into the comprehensive adaptation process of the Australian Healthy Dads, Healthy Kids intervention for fathers and primary school children in a multicultural city located in Northern Germany. The adaptation process is necessary for identifying needs of families in the German context, ensuring feasibility of the adapted intervention, and obtaining first indications on the intervention's effectiveness in order to conduct a main trial mid of 2023 and, in case of proven effectiveness, ensure sustainability.



# The cultural adaptation of Healthy Dads Healthy Kids (HDHK) for Aboriginal fathers and their children living on Darkinjung Country, Australia.

**Mr. Jake MacDonald**<sup>1</sup>, Associate Professor Kathleen Butler<sup>2</sup>, Dr. Myles Young<sup>3,4,5</sup>, Mr. Nathan Towney<sup>1</sup>, Dr. Lee Ashton<sup>4,5</sup>, Miss Briana Barclay<sup>4,5</sup>, Prof. Philip Morgan<sup>4,5</sup>

<sup>1</sup>University of Newcastle, Office of Indigenous Strategy and Leadership, The Chancellery, Callaghan, Australia,

<sup>2</sup>University of Newcastle, Wollotuka Institute, Indigenous Education and Research, Birabahn building,

Callaghan, Australia, <sup>3</sup>University of Newcastle School of Psychological Sciences College of Engineering,

Science and Environment, Callaghan, Australia, <sup>4</sup>University of Newcastle, Centre for Active Living and

Learning, School of Education, College of Human and Social Futures, Callaghan, Australia, <sup>5</sup>Active Living Research Program, Hunter Medical Research Institute, New Lambton Heights, Australia

**S.1.11 - Adaptation of a healthy lifestyle program for fathers and their children (Healthy Dads Healthy Kids) across different countries, settings and cultures., UKK - Main Hall June 15, 2023, 4:15 - 5:30 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Colonisation has devalued the unique critical role that Aboriginal fathers play in child-rearing. There is also a significant gap in published research on culturally appropriate parenting interventions for Aboriginal fathers, which is indicative of the limited support available. To address this, this paper will describe the cultural adaptation process of Healthy Dads Healthy Kids (HDHK) for Aboriginal fathers and their children living on Darkinjung Country, Australia.

**Methods:** To ensure the adapted HDHK program meets the needs of participants, we are completing an extensive cultural adaptation process. This includes the establishment of the following two panels who will provide feedback on the program, informed by their expertise, community relationships and lived experience: i) *Expert Panel* (University and community representatives), and ii) *Community panel* (Yerin Aboriginal Medical Services Men's Group). By consulting with the community panel in a series of yarning circles, we will ensure that Aboriginal fathers can define their own objectives and indicators of success for the program. The expert panel will guide the adaptation process ensuring that the tailored HDHK program is culturally appropriate ahead of a feasibility trial to be conducted in 2023.

**Results:** The expert and community panels are able to influence the content, design, location, and methodologies of the culturally tailored HDHK program. It is considered that empowering the local Aboriginal community to influence the design of the HDHK intervention will contribute to program success. This presentation will present preliminary findings from the yarning circles to be conducted in early 2023.

**Conclusions:** There is a need to consult with Aboriginal fathers to design a culturally tailored intervention that meets the needs of Aboriginal fathers and their children. Findings from this presentation will highlight the considerations and processes to work effectively with Aboriginal fathers on Darkinjung Country, Australia. Preliminary insights and themes arising from yarning sessions will be shared, such findings are intended to inform culturally appropriate ways to research with Aboriginal fathers and their children in the family-based lifestyle intervention field.



# The CO-CREATE Project: Co-creating policies and research with young people

**Prof. Knut Inge Klepp**<sup>1</sup>, Other The CO-CREATE Consortium

<sup>1</sup>Division of Mental and Physical Health, Norwegian Institute of Public Health, Oslo, Norway, <sup>2</sup>The CO-CREATE Project, Oslo, Norway

**S.1.12 - Experiences of policy and research co-creation with young people: Learnings from the COCREATE Project, UKK - Level 6 Foyer, June 15, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Youth involvement in the design or implementation of policies is an emerging area of research, with increasing practical implications across public health and wider policy areas. This presentation will draw on the experiences of the CO-CREATE study which, through the lens of obesity prevention, aims to advance the investigation of systems-based research that incorporates youth involvement.

**Methods:** The CO-CREATE study adopted a multi-faceted approach and range of methods, including monitoring and benchmarking of relevant policies; systematic literature reviews; epidemiological surveillance; linking observed overweight and obesity trends to observed policy landscapes; group model building to identify the views of adolescents on interrelated drivers of overweight and obesity; alliance-building with adolescents; dialogue with stakeholders; system dynamics modelling to explore the potential impact of co-created policy options; and the application of diverse communication approaches.

**Results:** The presentation will reflect on the outcomes of the study to date, including the tools that have been developed for facilitating policy ideas and investigation of prevention strategies with young people. This includes policy databases, system maps of drivers of overweight and obesity, protocols for organising youth alliances, intergenerational policy dialogue tool, and system dynamic models exploring the impact of co-created policy ideas.

**Conclusions:** These outcomes are seen as critical in building a pan-European infrastructure for designing and evaluating policies, and to provide youth with the opportunity to make their voices heard when policy measures are being debated and decided upon. While much of the work has focused on obesity prevention, nutrition and physical activity, there is scope to apply learnings to other areas of public health.

This submission is made on behalf of the CO-CREATE consortium.

# Policy co-creation with youth through a novel dialogue tool

**Ms. Claire Bouillon**<sup>1,2</sup>, Ms. Samantha Nesrellah<sup>1,2</sup>, Other The CO-CREATE Consortium<sup>2</sup>

<sup>1</sup>EAT, Oslo, Norway, <sup>2</sup>The CO-CREATE Project, Oslo, Norway

**S.1.12 - Experiences of policy and research co-creation with young people: Learnings from the COCREATE Project, UKK - Level 6 Foyer, June 15, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** The CO-CREATE project aims to educate and empower youth to develop policies that promote healthy food and physical activity environments for young people across Europe. Facilitating meaningful dialogue between young people and relevant stakeholders, particularly decision makers, in order to discuss and refine policy ideas is a key component of this.

**Methods:** As part of the CO-CREATE project, an interactive 'Dialogue Forum Tool' was developed to facilitate dialogue between stakeholders and youth, particularly decision makers. The Dialogue Forum Tool design has a particular focus on promoting leadership and ensuring equal representation for young people and is available in both a digital and physical format, ensuring engagement is widespread and cost-efficient. From June 2020 to March 2022, 20 Dialogue Forums were hosted with participants from over 55 countries. In addition to five regional/international Dialogues Forums, the CO-CREATE countries (the Netherlands, Norway, Poland, Portugal, the United Kingdom) held local level and/or national level Dialogue Forums.

**Results** The process of implementing and evaluating 20 Dialogue Forums has provided unique insight into best practices for establishing multi-actor Dialogues, for engaging youth in policy dialogue and for intergenerational, action-oriented discussion. From this, eight recommendations to ensure meaningful engagement is achieved during the planning, execution and follow-up phases of a Dialogue have been devised. These recommendations can be used by anyone looking to hold a Dialogue Forum, but are particularly relevant for youth looking to engage decisionmakers and conversely, decisionmakers looking to meaningfully engage youth.

**Conclusions:** The Dialogue Forum Tool, and accompanying recommendations, provide a mechanism by which to facilitate meaningful engagement with young people. While the Tool was originally developed in the context of youth engagement in obesity prevention policies, it can be applied to a wide range of contexts and can serve a wide range of functions for ensuring meaningful engagement of different actors.

# Associations between social media, adolescent mental health and diet: a systematic review

Ms. Laurence Blanchard<sup>1</sup>, **Ms. Kaitlin Conway-Moore<sup>1</sup>**, Mrs. Anaely Aguiar Rodriguez<sup>3</sup>, Furkan Onal<sup>3</sup>, Prof. Harry Rutter<sup>2</sup>, Dr. Arnfinn Helleve<sup>4</sup>, Emmanuel Nwosu<sup>5</sup>, Jane Falconer<sup>1</sup>, Dr. Natalie Savona<sup>1</sup>, Prof. Emma Boyland<sup>6</sup>, Prof. Cecile Knai<sup>1</sup>

<sup>1</sup>Faculty of Public Health Policy, London School of Hygiene and Tropical Medicine, London, United Kingdom, <sup>2</sup>Department of Social & Policy Sciences, University of Bath, Bath, United Kingdom, <sup>3</sup>System Dynamics Group, University of Bergen, Bergen, Norway, <sup>4</sup>Division for Mental and Physical Health, Norwegian Institute of Public Health, Oslo, Norway, <sup>5</sup>Department of Human Biology, University of Cape Town, Cape Town, South Africa, <sup>6</sup>Department of Psychology, University of Liverpool, Liverpool, United Kingdom

**S.1.12 - Experiences of policy and research co-creation with young people: Learnings from the COCREATE Project, UKK - Level 6 Foyer, June 15, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose** Social media use is integral to many adolescents' lives. While it can bring new opportunities for information sharing and interpersonal connection, it can also have detrimental effects on physical and mental health. We previously conducted a qualitative systems mapping exercise with 16-18-year-olds in six countries. Mental health was identified as a risk factor for adolescent obesity, acting as a mediator between social media (including social media influencers) and both dietary intake and physical activity. In the present study, we further interrogate the relationship between social media, mental health and dietary outcomes in adolescents.

**Methods** We conducted a systematic review examining associations between social media use, adolescent mental health (including body image, self-esteem, stress, interpersonal relationships/loneliness, anxiety, and depressive symptoms) and dietary outcomes. Eleven databases were searched for quantitative studies published between 2019 and 2023. Risk of bias was appraised using ROBINS-E. Data was narratively synthesised by type of outcome, PROGRESS-Plus health equity characteristics, and related to social media influencers.

**Results/findings** Twenty-one studies were included, representing 12 countries and sample sizes ranging from 62 to 244,250 participants. Most studies assessed body image (n=11) and disordered eating symptoms (n=13). Overall, there is evidence supporting the presence of a significant association between social media use and body image, depressive symptoms, and disordered eating in general, as well as anxiety, compulsive overeating, and weight loss/control behaviours, though with a higher risk of bias. Five studies suggested that body image, self-esteem, or anxiety act as moderators between social media use and dietary outcomes. Sex and/or gender was the only equity characteristic assessed (n=8), with mixed evidence. Only one study examined the role of influencers, reporting an association between influencers and both social appearance anxiety and social media addiction in adolescents.

**Conclusion** As social media platforms and marketing become increasingly sophisticated, policy interventions addressing the impact of social media on adolescent mental health and diet—and body image and disordered eating in particular—are needed. Further research on causal pathways, the role of influencers, equity impacts, and the best tools for measuring key outcomes are also needed.

# Longitudinal associations between movement behaviours and development among infants using compositional data analyses

**Prof. Valerie Carson**<sup>1</sup>, Dr. Zhiguang Zhang<sup>1</sup>, Miss Madison Predy<sup>1</sup>, Dr. Lesley Pritchard<sup>1</sup>, Dr. Kylie Hesketh<sup>2</sup>  
<sup>1</sup>University of Alberta, Edmonton, Canada, <sup>2</sup>Deakin University, Geelong, Australia

**S.1.13 - The latest insights in measurement and analysis of 24-hour movement behaviors in the early years – definitions, measurement tools and analysis, UKK - Hall B, June 15, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** To use compositional data analyses to examine the combined and relative longitudinal associations of sleep time, restrained time, back time, and tummy time with development in a sample of infants.

**Methods:** Participants were a subsample of 94 parent-infant dyads from the Early Movers project in Edmonton, Canada. At 2, 4, and 6 months of age, parents completed a 3-day time-use diary. Time spent in four mutually exclusive movement behaviours were calculated representing sleep (i.e., sleep time), sedentary behaviour (i.e., restrained time, back time), and physical activity (i.e., tummy time). Communication, fine motor, gross motor, personal-social, problem solving, and total development were measured at 2, 4, and 6 months of age with the Ages and Stages Questionnaire (ASQ-3). Gross motor development was also measured by a physiotherapist using the Alberta Infant Motor Scale (AIMS) at 6 months. Parents reported the dates six major gross motor milestones (i.e., independent sitting, crawling, assisted standing, assisted walking, independent standing, independent walking) were acquired in the first 18 months of life according to World Health Organization criteria. The ages of milestone achievements were calculated.

**Results:** Approximately half of infants were female (56%) and approximately one third were identified as a race/ethnicity other than Caucasian. Additionally, 30% of parents had an education below a Bachelor's degree and 20% of parents were born outside of Canada. Compositional descriptive statistics will be calculated. Average minutes per day spent in each movement behaviour will be calculated through a series of steps that recognize the four included movement behaviours do not make up the full 24-hour period (i.e., 1440 minutes). Compositional linear mixed models will be created for each developmental outcome that includes movement behaviour variables that have undergone an isometric log-ratio transformation.

**Conclusions:** Most movement behaviour research has been: cross-sectional, focused on isolated movement behaviours, and in age groups that are typically independently mobile. Movement behaviours in the first 6 months of life are unique to other age groups and compositional data analysis is a novel method to understand the longitudinal associations with development that take into account the co-dependent nature of these behaviours.

# Physical activity in early childhood, a terminology consensus project

**Dr. Sanne Veldman<sup>1</sup>**, Dr. Jessica Gubbels<sup>2</sup>, Dr. Lyndel Hewitt<sup>3</sup>, Dr. Valerie Carson<sup>4</sup>, Dr. Zhiguang Zhang<sup>5</sup>

<sup>1</sup>Mulier Institute, Department of Public and Occupational Health, Amsterdam Public Health Research Institute, Amsterdam, Netherlands, <sup>2</sup>Maastricht University, NUTRIM School of Nutrition and Translational Research in Metabolism, department of Health Promotion, Maastricht, Netherlands, <sup>3</sup>Illawarra Shoalhaven Local Health District, Wollongong Hospital, Wollongong, Australia, <sup>4</sup>Faculty of Kinesiology, Sport, and Recreation at the University of Alberta, Edmonton, Canada, <sup>5</sup>Faculty of Education, Beijing Normal University, Beijing, China

**S.1.13 - The latest insights in measurement and analysis of 24-hour movement behaviors in the early years – definitions, measurement tools and analysis, UKK - Hall B, June 15, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** F. Early care and education

**Purpose:** Interest in physical activity (PA) research in early childhood has increased rapidly over the last decade. However, existing studies use a large variety of operational definitions and measures of PA. Definitions are for example based on the intensity of PA (e.g. light, moderate, vigorous) or type of PA (e.g. tummy time, rolling, grasping objects). The quickly changing and developing motor skills of young children further complicate operationalization and assessment of PA. This terminology consensus project aims to establish an agreed set of key terms and definitions of PA in early childhood.

**Methods:** A literature review was completed to identify key terms and definitions used in PA research in children aged <5 years. Based on these key terms and definitions a leadership team proposed a set of key terms and definitions. In the next step, a project team consisting of international researchers with expertise on early childhood PA research will be invited to review and provide feedback on these proposed terms and draft definitions through an online survey. Finally, a broader group of early childhood researchers will be asked to give feedback on final key terms and definitions.

**Results:** Based on preliminary analyses, we included 87 studies in the literature review, with most studies conducted in preschoolers (ages 3-5 years). Fifty studies provided a definition of PA and 37 studies provided no definition. Key terms used include (overall/total) PA, tummy time, active play and outdoor play. Thirty-three out of 50 studies measured PA using accelerometers, and provided definitions based on cut-points for light, moderate and vigorous PA. In the symposium we will present the list of key terms and definitions that is agreed on by the project team.

**Conclusions:** Our literature review confirmed the large variation in key terms and definitions of PA in early childhood research. The final list of agreed key terms and definitions will result in standardized terminology that is widely supported and adopted among researchers in the field of PA in early childhood. The use of these agreed key terms and definitions will advance future research, interventions, policies, and practices related to PA in early childhood.

# Involving end-users in the development of an application to assess 24-hour movement behaviors in 0- to 4-year-old children: My Little Moves

**Mr. Jelle Arts<sup>1</sup>**, Prof. Mai Chin A Paw<sup>1</sup>, Dr. Jessica Gubbels<sup>2</sup>, Prof. Arnoud Verhoeff<sup>3,4</sup>, Miss Annette Brons<sup>5</sup>, Dr. Sanne Veldman<sup>1</sup>, Miss Annelinde Lettink<sup>1</sup>, Dr. Teatske Altenburg<sup>1</sup>

<sup>1</sup>Amsterdam UMC, Vrije Universiteit Amsterdam, Amsterdam, Netherlands, <sup>2</sup>Maastricht University, Maastricht, Netherlands, <sup>3</sup>Public Health Service Amsterdam, Amsterdam, Netherlands, <sup>4</sup>University of Amsterdam, Amsterdam, Netherlands, <sup>5</sup>University of Applied Sciences, Amsterdam, Netherlands

**S.1.13 - The latest insights in measurement and analysis of 24-hour movement behaviors in the early years – definitions, measurement tools and analysis, UKK - Hall B, June 15, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** F. Early care and education

**Background** All 24-hour movement behaviors are important for optimal health in young children. Currently, there are no proxy-report tools available with acceptable reliability and validity to assess these behaviors in children below 5 years old. Potential reasons for this include the lack of involvement of end-users in the development and evaluation of the tool. Therefore, this study aimed to develop a mobile application (app)-based proxy-report tool to assess 24-hour movement behaviors in 0- to 4-year-old children, involving parents, professionals, and researchers.

**Methods** First, we used concept mapping to identify the activities 0- to 4-year-olds engage in. Parents (n = 58) and professionals working with young children (n = 21) generated a list of activities, sorted related activities, and rated how frequently children perform the activities. Second, based on the created activity categories, we developed the first version of the My Little Moves app in collaboration with a software developer. Third, we examined the content validity of the app together with parents (n = 14) and researchers (n = 6) using focus group- and individual interviews.

**Results** The app has a timeline format, in which parents can proxy-report the activities of their child. Eight activity categories are included: personal care, eating and drinking, active transport, passive transport, playing, screen time, sitting/lying quietly, and sleeping. Examples of activities are included to explain the activity categories. In addition, 1-4 follow-up questions provide information on the intensity (e.g., posture) or context (e.g., location). In general, participants considered filling in the app feasible, taking 10-30 minutes per day. Some follow-up questions were considered irrelevant and could be removed. The activity categories were considered comprehensive, but alternative examples were suggested to increase the comprehensibility and relevance. These suggestions were adopted in the second version of the My Little Moves app.

**Conclusion** Involving end-users in the development of the My Little Moves app resulted in a tailored tool to assess 24-hour movement behaviors in young children, which is promising for monitoring these behaviors in large samples. In future studies, the measurement properties of the app will be further evaluated to conclude on the quality of the tool.



# To BMI but Renovations Needed: The Potential and Possibilities of Body Mass Index as a Measure of Health (Debate)

**Dr. Carmen Byker Shanks<sup>1</sup>**

<sup>1</sup>Gretchen Swanson Center for Nutrition , Omaha, USA

**S.1.14 - BMI or Not to BMI? Weighing the Value of Body Mass Index as a Measure of Health (Debate), UKK - Hall C (Level 3), June 15, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** While BMI has experienced widespread use, a fiery debate about BMI's applicability to diverse body types has persisted. This side of the debate, in favor of BMI measurement, will explore potential possibilities, and changes needed for BMI as a continued measure in the toolkit for health.

**Methods:** This presentation will account the history of BMI measurement, describe benefits and challenges to implementation of BMI as a measure of health in diet and physical activity research, monitoring, and surveillance, and the renovations needed to effectively apply it in public health work. The extensive evidence-base about BMI measures will be explored, as well as proposed changes for the future. A case study of this nuanced support for BMI measures will be discussed from work gleaned from the United States Department of Agriculture (USDA's) National Institute of Food and Agriculture (NIFA) Gus Schumacher Nutrition Incentive Program's (GusNIP) National Training, Technical Assistance, Evaluation, and Information Center (NTAE).

**Results:** Body mass index (BMI) standards were set by the National Institutes of Health in 1998 and have been used as a measure to predict health risk associated with weight. The US Centers for Disease Control and Prevention have used the BMI calculation to report obesity rates over time. In diet and/or physical activity behavioral interventions, BMI has been widely applied as a standardized measure that can track participant progress and overall effectiveness. Epidemiological data suggest that higher BMI is tied to greater health risks, such as chronic diseases and COVID-19 hospitalizations. BMI holds potential as a standardized, comparable measure to predict health risks associated with weight, yet renovations are needed to ensure its applicability for diverse body types. Specific strategies for improvements will be discussed, including that the BMI table should be derived from diverse individuals, such as sex, race, and ethnicity. In addition, its application in individual and population health will be explored for reducing health disparities while reducing weight bias.

**Conclusions:** BMI is an important measure of health with a storied history, and warrants updating for the widest application and use in public health work, including for diet and/or physical activity interventions.

# Not to BMI: Body Mass Index Perpetuates Inequalities and has Limited Effect on Health Behavior Promotion (Debate)

**Dr. Meg Bruening<sup>1</sup>**

<sup>1</sup>Penn State University, Department of Nutritional Sciences, University Park, USA

**S.1.14 - BMI or Not to BMI? Weighing the Value of Body Mass Index as a Measure of Health (Debate), UKK - Hall C (Level 3), June 15, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** Body mass index (BMI) is a measure, developed from a homogenous population, is used as diagnostic and outcome measurement tool internationally and across the life span. However, the widespread use of BMI may perpetuate health inequities. A focus away from weight status and towards health behaviors and more sensitive outcomes are needed. This side of the debate will argue against BMI measurement.

**Methods:** The development and implementation of BMI as a measure while also applying a diversity, equity inclusion lens will be presented. Specifically, limitations exist for BMI that make it an inappropriate tool to apply to diverse populations and there is recent and growing dissent in its accuracy and application, which suggest potential de-implementation of BMI as a measure of health.

**Results:** BMI is a poor predictor of adiposity for some populations). As a tool, focusing on BMI is insensitive and may perpetuate inequalities for indigenous populations and communities of color who tend to have higher BMI scores relative to white, lower income populations. Research has indicated that lean populations can be at risk for metabolic diseases based on genetic, lifestyle, and environmental factors. Indeed, healthful behaviors and outcomes can be possible at every size. BMI scores results in differential care and programming (e.g., medical weight loss interventions where behavioral interventions on stress reduction and lifestyle interventions may be needed). Given the limitations and challenges, a focus on BMI may result in inefficient and ineffective health promotion strategies. Further, those with high BMIs face increased levels of stigma and shame, which can result in unhealthy eating and lower physical activity.

**Conclusions:** BMI should be used minimally as a primary research outcome. An emphasis on health behaviors and more sensitive measures of adiposity and health outcomes are needed to tailor interventions and minimize harm, especially for low-income, underrepresented populations.

# Does co-creating an implementation plan with school staff improve the implementation of a school-based sleep intervention?

**Ms. Janneke de Boer**<sup>1,2</sup>, Ms. Lea Delfmann<sup>1,2</sup>, Prof. Maïté Verloigne<sup>1</sup>, Prof. Benedicte Deforche<sup>1</sup>, Prof. Teatske Altenburg<sup>3,4,5</sup>, Ms. Ann Vandendriessche<sup>1</sup>, Prof. Greet Cardon<sup>2</sup>

<sup>1</sup>Faculty of Medicine and Health Science, Department of Public Health and Primary Care, Ghent University, Ghent, Belgium, <sup>2</sup>Faculty of Medicine and Health Science, Department of Movement and Sports Sciences, Ghent University, Ghent, Belgium, <sup>3</sup>Amsterdam UMC Location Vrije Universiteit Amsterdam, Public and Occupational Health, Amsterdam, Netherlands, <sup>4</sup>Amsterdam Public Health, Methodology, Amsterdam, Netherlands, <sup>5</sup>Amsterdam Public Health, Health Behaviors & Chronic Diseases, Amsterdam, Netherlands

**S.1.15 - Let us sleep! Promoting adolescent sleep health: sharing experiences of co-creating sleep health interventions in Belgium and the Netherlands, UKK - Hall D (Level 2 - main floor), June 15, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** The success of school-based interventions to promote health behaviour in youth partly depends on whether school staff feel capable to implement the intervention. Thus, successful implementation is determined by the degree of training school staff receive. This study compares two different approaches to implement a sleep intervention at school, i.e. co-creation of the implementation plan with school staff, and standard implementation plan. Moreover, it investigates how these approaches are experienced by school staff and whether they have an impact on the successful implementation of the intervention.

**Method:** A sleep intervention will be implemented in two secondary schools in Flanders, Belgium. In the co-creation school an action group of school staff (n=6) will be composed to develop an implementation plan using a co-creation approach. This enables school staff to tailor the implementation to their needs and embed the intervention in the school curriculum. In the standard implementation school, school staff will receive one training and a manual designed by researchers to implement the intervention. Questionnaires will be completed at different timepoints (baseline, pre-implementation, post-implementation) in both schools to measure changes in motivation, empowerment, barriers for implementation, and general knowledge about sleep in school staff educating students from the 6th and 7th Grade. Furthermore, focus groups will be conducted to evaluate the co-creation process and the implementation process including its specific intervention materials. Focus groups will be audio-taped and coded using NVivo 12, questionnaires will be analysed using R.

**Results:** We expect that active involvement of school staff during the co-creation of the implementation plan is beneficial for the implementation of school-based interventions, as it fulfills the needs of the implementers. This project will start in November 2022 and will finish in June 2023. The results from the co-creation process to design the implementation plan will be presented at the conference.

**Conclusions:** This study will indicate whether designing an implementation plan together with school staff using a co-creation approach is beneficial for successful implementation. Moreover it will highlight important aspects of the implementation process.

# Scaling an existing co-created intervention to promote healthy sleep using a shortened co-creation process – a process evaluation.

**Ms. Lea Delfmann**<sup>1,2</sup>, Ms. Janneke de Boer<sup>1,2</sup>, Prof. Benedicte Deforche<sup>1</sup>, Prof. Greet Cardon<sup>2</sup>, Ms. Ann Vandendriessche<sup>1</sup>, Prof. Maïté Verloigne<sup>1</sup>

<sup>1</sup>Faculty of Medicine and Health Science, Department of Public Health and Primary Care, Ghent University, Ghent, Belgium, <sup>2</sup>Faculty of Medicine and Health Science, Department of Movement and Sports Sciences, Ghent University, Ghent, Belgium

**S.1.15 - Let us sleep! Promoting adolescent sleep health: sharing experiences of co-creating sleep health interventions in Belgium and the Netherlands, UKK - Hall D (Level 2 - main floor), June 15, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** Because of the high prevalence of poor sleeping behavior among adolescents, effective interventions are needed. Co-creation, i.e. knowledge production through collaboration with the target group and several key stakeholders, has been established as a promising approach to intervention development. However, co-created interventions are in nature localized and their development is time- and resource consuming. The cascade model to scale up co-created interventions suggests a shortened co-creation process to transfer interventions to another context, but it has yet to be investigated how adolescents experience this process. Therefore, this study evaluates the scaling up of an existing co-created healthy sleep intervention for adolescents (aged 11-13) to a new context using a shortened co-creation process.

**Methods:** Eight students from one secondary school in Flanders were selected to form an action group. The shortened co-creation process will consist of eleven sessions, starting with a needs assessment. Adolescents' goals and expectations for the intervention will be discussed, after which the existing intervention will be introduced. The majority of sessions will be reserved for the adaptation of existing intervention components. The remaining sessions will be used to discuss the implementation plan together with other relevant stakeholders, i.e., school staff and parents. Lastly, one session will be used to discuss the evaluation of the scaled-up intervention. Adolescents' experiences, feelings of ownership, empowerment, self-efficacy, and wellbeing will be assessed using interviews, focus groups, and questionnaires. Qualitative data will be analyzed in NVivo, and quantitative data will be analyzed using the statistical package R.

**Results:** The co-creation process started in October 2022 and will be finished in February 2023. Results of the process evaluation will be presented. Based on previous research, it is expected that adolescents participating in a co-creation process report increased feelings of empowerment, ownership, and self-efficacy.

**Conclusion:** If our hypotheses can be confirmed, this provides initial evidence that participation in a shortened co-creation process to scale up a healthy sleep intervention can increase feelings of ownership, empowerment, and self-efficacy in adolescents.

# Charge Your Brainzzz: Applying participatory system dynamics to co-produce a whole systems approach promoting adolescent sleep health

**Ms. Danique Heemskerk<sup>1,2</sup>**, Dr. Maartje van Stralen<sup>1</sup>, Prof. Jessica Piotrowski<sup>3</sup>, Dr. Carry Renders<sup>1</sup>, Dr. Vincent Busch<sup>2</sup>

<sup>1</sup>Faculty of Science and Amsterdam Public Health Research Institute, Department of Health Sciences, Vrije Universiteit Amsterdam, Amsterdam, Netherlands, <sup>2</sup>Sarphati Amsterdam, Municipal Health Service Amsterdam, Amsterdam, Netherlands, <sup>3</sup>Amsterdam School of Communication Research ASCoR, University of Amsterdam, Amsterdam, Netherlands

**S.1.15 - Let us sleep! Promoting adolescent sleep health: sharing experiences of co-creating sleep health interventions in Belgium and the Netherlands, UKK - Hall D (Level 2 - main floor), June 15, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** Inadequate sleep health is a tremendous problem among Dutch adolescents which can have detrimental effects on their physical and mental well-being. Systems thinking is acknowledged as a promising approach to understand and respond to this complex health problem. This study aims to apply participatory system dynamics in designing a 'whole systems approach' promoting sleep health of Dutch adolescents, thereby expanding the knowledge on how to apply systems methodologies in designing health interventions in complex systems.

**Methods:** This study applied participatory system dynamic methods (i.e. combining system dynamics and participatory methods) to co-design actions based on points of leverage within the system influencing adolescent sleep health. Five (multi)stakeholder co-creation sessions were held with adolescents (N=40, 12-15 years), parents (N=11) and professionals (N=10). When co-designing actions, we used the Action Scale Model (ASM) to create a coherent whole systems approach that is evidence-based, feasible, has potential to change the system, and that can be sustainably implemented. Thereafter, three sessions with Public Health Services (GGD) from several Dutch regions as well as organizations that act on a national level were held using the World Café Methodology to identify agents of change and to create an implementation plan for the prospective whole systems approach promoting adolescent sleep health.

**Results:** The initial Causal Loop Diagram (CLD) of our previous study that was created to map the 'system' of adolescent sleep health was expanded with actions targeting potential leverages of change, end-products and agents of change that are able to influence those levers. These were distributed across the six identified subsystems within the CLD around the following themes: (1) School environment; (2) Mental health; (3) Screen use & social media; (4) Family & Home environment; (5) Lifestyle behaviors & Leisure activities; (6) Personal & biological determinants.

**Conclusions:** This study expands knowledge on how participatory systems methodologies can be applied in designing a whole systems approach promoting sleep health. Combination of these approaches is recommended for designing health interventions in complex systems as it increases understanding in the needs of adolescents, parents, and professionals. The expanded CLD served as a logic model informing the development of a whole systems approach.

# Exploring the impacts of food retail policies and actions for public health through a systems approach

**Dr. Alexandra Morshed<sup>1</sup>**, Dr. Melissa Tracy<sup>2</sup>, Dr. Megan Winkler<sup>1</sup>

<sup>1</sup>Emory University Rollins School of Public Health, Atlanta, USA, <sup>2</sup>University at Albany School of Public Health, Rensselaer, USA

**S.1.16 - Leveraging Systems Science to Improve Nutrition and Obesity-Related Policy and Actions, UKK - K1 (+K2) (Level 3), June 15, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Retail food environments (RFEs) and their relationships to healthy purchasing represent complex systems—they consist of multi-level and interdependent causal factors, heterogeneous actors who shape them, and feedback mechanisms. Agent-based modeling is well-suited to realistically characterize how these spatial and social environments generate dynamic and potentially unexpected behaviors of consumers and retail actors, and thus is a necessary tool for framing and analyzing interventions within these systems. In this presentation, we first present as a case study a model of sugar-sweetened beverage (SSB) purchasing in small urban food stores that compared the impacts from a range of policy scenarios. Then, using examples from RFE modeling to date, we highlight additional modeling strategies that can be instrumental in this early, formative stage of intervening in these systems.

**Methods:** In the case study, we used agent-based modeling to develop a simulation that captures the spatial distribution of small food stores, their in-store consumer environments, supply-side decision-making, and customer purchasing of SSBs and healthier beverages in Minneapolis-St. Paul, USA. The model structure, parameters, and mathematical functions representing model dynamics are based on analyses of retail data, review of existing literature, and key stakeholder interviews with small store managers and beverage companies. Additional modeling strategies used for policy analysis were informed from prior systematic reviews and other literature.

**Results:** The case study model represents small food stores and their customers in a representative spatial grid, where each week, customers decide to visit small stores, purchase beverage products at each visit, and update their body mass index and beverage preferences within a period of 5 years. Multiple intervention scenarios (e.g., healthy checkout ordinance, SSB taxes) were simulated to evaluate independent and combined impacts on beverage selections across different customer groups (e.g., socio-economic status) as well as on store behavior. Additional strategies effective to understanding complex RFE problems and informing solutions included participatory modeling, casual loop diagramming, and engaging stakeholders.

**Conclusions:** Agent-based modeling and additional modeling strategies are important tools to frame and prioritize action for RFEs-- a key precursor for effective policy design aimed to reduce the public health burden of unhealthy purchasing.



# Applying systems thinking to strengthen food policy and nutrition actor networks

Dr. Yeeli Mui<sup>1</sup>, Dr. Steven Allender<sup>2</sup>, Dr. Atif Adam<sup>3</sup>, Other Raychel Santo<sup>3</sup>, Other Karen Bassarab<sup>3</sup>, Other Anne Palmer<sup>3</sup>

<sup>1</sup>Johns Hopkins Bloomberg School of Public Health, Baltimore, USA, <sup>2</sup>Deakin University Global Centre for Preventive Health and Nutrition, Geelong, Australia, <sup>3</sup>Johns Hopkins Center for a Livable Future, Baltimore, USA

**S.1.16 - Leveraging Systems Science to Improve Nutrition and Obesity-Related Policy and Actions, UKK - K1 (+K2) (Level 3), June 15, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Developing effective nutrition support can be facilitated by understanding the roles and relationships between institutional networks and actors and the system that can support political commitment. The objective of this presentation is to showcase different systems science approaches, focusing on the role of key stakeholders in the development and adoption of policies and actions to support food and nutrition security.

**Methods:** In Study 1, social network analysis was used to understand the network structures of food policy councils (FPCs; n=195) across the United States and explore how FPCs' relationships with partners enabled them to pivot their work toward responding to food-related needs in the COVID-19 pandemic. Specifically, we 1) characterized the network of actors and relationships within FPCs; and 2) evaluated how FPCs' network characteristics (e.g., network size, density) relate to programmatic, policy, and advocacy actions. In Study 2, a system science theory of change for community-based interventions is introduced and insights about the role of key actors are demonstrated. Examples are presented from practice and a system dynamic model of how role models impact water and sugar sweetened beverage consumption in one obesity prevention trial.

**Results:** In Study 1, government agencies and food supply chain actors were identified as core features of FPC networks. Regarding FPCs' network characteristics, we also found that FPC network density had the largest effect on FPCs taking any action but especially for advocacy actions. In Study 2, multiple system models demonstrate the interrelationship among different forms of political commitment and the factors (e.g., key actors, resources, political context) that shape the effectiveness of nutrition actor networks in generating political commitment for nutrition. These models helped to generate insights into how political commitment could be strengthened to support nutrition policy and action.

**Conclusion:** Leveraging different systems science approaches sheds light on network structures (i.e., the 'what') and factors that shape the effectiveness of nutrition actor networks (i.e., the 'why'), providing unique insights into strategies to advance food and nutrition security.

# Using Agent Based Modeling to Evaluate Public Health Intervention Strategies Targeting Obesity and Related Behaviors in Young Children from Low-Income Households

**Dr. Megan Mueller<sup>1</sup>**, Dr. Roch Nianogo<sup>2</sup>, Dr. Kurt Kreuger<sup>3</sup>, Dr. Nathaniel Osgood<sup>3</sup>, Dr. May Wang<sup>2</sup>

<sup>1</sup>Colorado State University College of Health and Human Sciences, Fort Collins, USA, <sup>2</sup>University of California Fielding School of Public Health, Los Angeles, USA, <sup>3</sup>University of Saskatchewan Department of Computer Science, Saskatoon, Canada

**S.1.16 - Leveraging Systems Science to Improve Nutrition and Obesity-Related Policy and Actions, UKK - K1 (+K2) (Level 3), June 15, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** The influx of funding, multiple co-occurring intervention efforts, and complex, multi-factorial nature of childhood obesity make it difficult to evaluate intervention and policy impacts using traditional epidemiological approaches. Here, we discuss the use of systems science methods, specifically agent-based modeling, in retrospectively evaluating policies and other community interventions targeting obesity, nutrition, and physical activity in young children from low-income households enrolled in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) in Los Angeles (LA).

**Methods:** The model was developed iteratively using a community-based modeling approach. The top intervention strategies implemented in LA were classified as using micro- level (e.g., home visitation programs) or macro-level (e.g., business practices) approaches. We simulated a population of 1500 children enrolled in WIC, with specific diet, physical activity, breastfeeding behaviors and body mass index z-scores (BMIz), following them from age 2 to 5 years. Intervention strategies were tested individually and in combination.

**Results:** Breastfeeding interventions that employed both micro-level and macro-level strategies appeared to be moderately effective, reducing BMIz by 0.03 (95% CI -0.05, -0.01). Home visitation programs and business practices targeting obesity-related behaviors, also appeared to be moderately effective at reducing BMIz by 0.04 (95% CI -0.06, -0.02) and 0.02 (95% CI -0.04, 0.00), respectively. Contrary to expectation, combining all micro and macro interventions appeared to have no impact or moderately increased the proportion of obesity/overweight among children.

**Conclusions:** This simulation model provided insight into intervention strategies that may have resulted in reductions in obesity among WIC participants. Results suggest that interventions targeting breastfeeding were the most effective at reducing BMIz when both micro- and macro-level strategies were implemented. Home visitation interventions and business practice interventions (like menu labeling or product placement) were also effective at reducing BMIz. Findings also highlighted the potential difficulties of shifting obesity trajectories through diet and physical activity interventions alone, especially in populations living in low-income households that are disproportionally exposed to other social determinants of health that impact overall risk. Systems science approaches are a useful tool to retrospectively evaluate multi-level interventions and policies that can dynamically impact health behavior and health outcomes.

# Uptake and implementation of machine learning techniques with wearable devices: Lack of innovation or diffusion failure?

**Prof. Stewart Trost<sup>1</sup>**

<sup>1</sup>University of Queensland, QLD, Australia

**S.1.17 - Novel insights on physical behaviour and non-communicable disease from the UK Biobank: A unified physical activity, posture, and sleep framework, UKK - K3+4, June 15, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** The application of wearable devices such as accelerometer-based motion sensors to objectively measure free-living physical activity, sedentary behaviour, and sleep is common in public health research. However, the research potential of accelerometers has been severely under-utilised, with analysis restricted to the application of simple cut-points or linear regression models based on proprietary activity counts.

**Methods:** Machine learning approaches to accelerometer data reduction have emerged as a more accurate and versatile alternative to cut-point methods. However, the uptake of machine learning methods by clinical and public health researchers has been limited, in part, due to the difficulties of implementation, the concern that models trained on data from laboratory-based activity trials do not generalize well to free-living environments, and the lack of studies demonstrating the relative advantage of machine learning approaches over traditional cut-point methods.

**Results:** Diffusion of innovation theory provides a useful conceptual framework for understanding the process of developing and deploying new approaches to accelerometer data processing. Diffusion is defined as the process by which an innovation is communicated through certain channels over time among members of a social system. An innovation is an idea, program, or practice that is perceived as new by an individual or group. Therefore, machine learning approaches to accelerometer data reduction can be viewed as an innovation that must be successfully “diffused” or translated into practice over time.

**Conclusions:** This presentation will focus on the application of machine learning accelerometer data processing methodologies for human activity recognition. Diffusion of innovation theory will be used to identify points of dissemination failure and potential solutions. It will explore the advantages of machine learning methods relative to cut-point methods and introduce deployment tools that enable health researchers without specialist training in data science to implement machine learning physical activity classification and energy expenditure estimation algorithms.

# Prospective associations of daily step counts and intensity with mortality, and incident cardiovascular disease, cancer, and dementia

**Associate Professor Borja del Pozo Cruz<sup>1</sup>**, Dr. Mathew Ahmadi<sup>2</sup>, Prof. I-Min Lee<sup>3,4</sup>, Prof. Emmanuel Stamatakis<sup>2</sup>, Prof. Sharon Naismith<sup>2</sup>

<sup>1</sup>University of Southern Denmark, Odense, Denmark, <sup>2</sup>University of Sydney, NSW, Australia, <sup>3</sup>Harvard Medical School, Boston, USA, <sup>4</sup>Brigham and Women's Hospital, Boston, USA

**S.1.17 - Novel insights on physical behaviour and non-communicable disease from the UK Biobank: A unified physical activity, posture, and sleep framework, UKK - K3+4, June 15, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** Increasing daily steps is often advocated as an important part of chronic disease and premature mortality prevention. Recommendations for the number of steps per day may be easier to enact for some people than current time and intensity-based physical activity guidelines, but the evidence to support steps-based goals is limited.

**Methods:** This population-based prospective cohort study included adults 40 to 79 years old in England, Scotland, and Wales who wore an accelerometer on their wrist for up to 7 consecutive days. In our studies, we assessed the associations and mean rate of change (MRC) between daily step counts and intensity with incident cardiovascular disease (CVD), Cancer, and dementia and all-cause and cause-specific mortality.

**Results:** We included 78,500 participants over a median follow-up 7.0 years, of whom 664 died due to CVD and 1,325 due to cancer (total deaths 2,179). There were 10,245 incident CVD events, 2,813 cancer incident events, and 864 dementia cases over the observation period. More daily steps were associated with a lower risk of all-cause (MRC [95%CI]= -0.08 [-0.11 to -0.06]), CVD (-0.10 [0.15 to -0.06]), and cancer (-0.11 [-0.15 to -0.06]) for up to approximately 10,000 steps. Similarly, accruing more daily steps was associated with lower incident disease. The optimal dose (ie, exposure value at which the maximum risk reduction was observed) was 9,826 steps (hazard ratio= 0.49 [0.39 to 0.62]) for dementia risk. Peak-30 cadence was consistently associated with lower risks across all outcomes, beyond the benefit of total daily steps.

**Conclusions:** More steps per day up to the popular ~10,000 steps/day target may be associated with lower risk of mortality and CVD, cancer, and dementia incidence. Steps performed at higher cadence may be associated with additional risk reduction, particularly for incident disease.

# Association of wearable device-measured vigorous intermittent lifestyle physical activity with mortality

**Dr. Matthew Ahmadi<sup>1</sup>, Prof. Emmanuel Stamatakis<sup>1</sup>**, Prof. Peter Katzmarzyk<sup>2</sup>, Prof. I-Min Lee<sup>3</sup>, Prof. Jason Gill<sup>4</sup>, Prof. Cecilie Thøgersen<sup>5</sup>, Associate Professor Borja del Pozo Cruz<sup>5</sup>, Prof. Aiden Doherty<sup>6</sup>, Prof. Mark Hamer<sup>7</sup>

<sup>1</sup>University of Sydney, NSW, Australia, <sup>2</sup>Pennington Biomedical Research Center, Louisiana, USA, <sup>3</sup>Harvard Medical School, Boston, USA, <sup>4</sup>University of Glasgow, Glasgow, United Kingdom, <sup>5</sup>University of Southern Denmark, Odessa, Denmark, <sup>6</sup>University of Oxford, Oxford, United Kingdom, <sup>7</sup>University College London, London, United Kingdom

**S.1.17 - Novel insights on physical behaviour and non-communicable disease from the UK Biobank: A unified physical activity, posture, and sleep framework, UKK - K3+4, June 15, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** Wearable devices can capture unexplored movement patterns such as brief bursts of vigorous intermittent lifestyle physical activity (VILPA) that is embedded into everyday life, rather than being done as leisure-time exercise. Currently, there is a very limited understanding of the minimal and optimal amounts of vigorous physical activity in relation to mortality and disease incidence.

**Methods:** A prospective study in 25,241 non-exercising adults and 71,893 adults in the general population (median age [IQR] 62.5 years [55.3, 67.7]) from the UK Biobank cohort with wrist-worn accelerometry. We examined the association of VILPA with all-cause, cardiovascular disease (CVD) and cancer mortality. We also examined VPA volume (min/week) and frequency of short VPA bouts ( $\leq 2$  min) in the general population sample.

**Results:** Over an average follow-up of 6.9 years, during which 852 deaths occurred, VILPA was inversely associated with all three of these outcomes in a near-linear fashion. As compared to participants who engaged in no VILPA, participants who engaged in VILPA at the sample median frequency of three VILPA bouts per day (lasting up to one or up to two minutes each) showed a 38-40% reduction in all-cause and cancer mortality risk and a 48-49% reduction in CVD mortality risk. Moreover, the sample median duration of 4.4 VILPA minutes per day was associated with a 26-30% reduction in all-cause and cancer mortality risk and a 32-34% reduction in CVD mortality risk. We obtained similar results when repeating the above analyses for vigorous physical activity (VPA) in 71,893 adults in the general population.

**Conclusions:** These results indicate that small amounts of vigorous non-exercise physical activity are associated with substantially lower mortality. VILPA in non-exercisers appears to elicit similar effects to VPA in exercisers, suggesting that VILPA may be a suitable physical activity target, especially in people not able or willing to exercise. The presenter will also share results of two analogous studies with incident cancer and incident CVD related outcomes.

# The Kahnawà:ke Schools Diabetes Prevention Program – An Exemplar of Indigenous Health Promotion in Action

Mrs. Brittany Mcbeath<sup>1</sup>, **Dr. Brittany Jock**<sup>3</sup>, Other KSDPP Team<sup>2</sup>, Dr. Lucie Lévesque<sup>1</sup>

<sup>1</sup>Queen's University, Kingston, Canada, <sup>2</sup>Kahnawà:ke Schools Diabetes Prevention Program, Kahnawà:ke, Canada, <sup>3</sup>McGill University, Montreal, Canada

**S.1.18 - Indigenous Health Promotion - A Distinct and Decolonial Approach to Promoting Health Led by Indigenous Communities, Clarion Hotel Gillet - Room Gillesalen, June 15, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** Indigenous communities are reclaiming control of their physical, cultural, social, and emotional health and wellness with Seven Generations<sup>[1]</sup> in mind. Indigenous Health Promotion is led by Indigenous communities; it centers Indigenous knowledge systems in its planning, implementation, and evaluation. The Kahnawà:ke Schools Diabetes Prevention Program (KSDPP) is an award-winning community-driven participatory research partnership and recognized best practice for type 2 diabetes prevention within Indigenous communities in Canada. This presentation will present KSDPP as an exemplar of Indigenous Health Promotion in action.

**Methods:** KSDPP utilizes a community-driven participatory approach to implement and study community-led health promotion efforts specifically related to type 2 diabetes prevention. The KSDPP intervention model employs a robust socioecological design based upon Haudenosaunee values and principles to promote and support healthy lifestyles among Kanien'kehá:ka children and the community to prevent type 2 diabetes Seven Generations into the future. Through conversational methods and storytelling, the KSDPP team will share the origin story, and future directions of the project. Through the analogy of a Strawberry Story, we will discuss how a successful Indigenous community-led model of type 2 diabetes prevention can bear fruit and propagate for over a quarter century.

**Results:** Within Indigenous Health Promotion and related research, the process is seen as equally important as the products in effecting change and producing knowledge. Over 27 years, the KSDPP program has evolved from localized health promotion community mobilization and research within Kahnawà:ke, to sharing intervention and research knowledge and expertise with other communities across Turtle Island through community mobilization training and community-to-community mentorship. The KSDPP intervention framework, community mobilization program theory and related research will be highlighted to demonstrate how health promotion efforts are best grounded within Indigenous culture and values.

**Conclusions:** To achieve health equity and social justice for Indigenous peoples, Indigenous Health Promotion calls for collective community mobilization founded on Indigenous values and epistemologies. The tenets of health promotion cannot be achieved until this occurs.

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<sup>[1]</sup> The Seven(th) Generation Principle from The Great Law of the Iroquois Confederacy is based on the philosophy that decisions we make today consider the impact seven generations into the future.



# A realist evaluation of FEHNCY Community Engagement and Mobilization for knowledge translation: centering cultural safety and traditional foods in engaging communities

**Dr. Brittany Jock<sup>1</sup>**, Ms. Jolian Wong<sup>1</sup>, Assistant Professor Dave Bergeron<sup>2</sup>

<sup>1</sup>McGill University, St-Anne-de-Bellevue, Canada, <sup>2</sup>L'Université du Québec à Rimouski, Rimouski, Canada

**S.1.18 - Indigenous Health Promotion - A Distinct and Decolonial Approach to Promoting Health Led by Indigenous Communities, Clarion Hotel Gillet - Room Gillesalen, June 15, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** Although community engagement is required for research with Indigenous peoples in Canada, there is an absence of research that examines how community engagement supports knowledge translation. The Food, Environment, Health and Nutrition of First Nations Children and Youth (FEHNCY) study is a nationally representative survey of First Nations (FNs) communities. The goal of FEHNCY is to inform the development of policies and programs that address the health needs of FNs children and youth. The Community Engagement and Mobilization component aims to facilitate meaningful engagement of FNs communities by facilitating community partnerships, supporting cultural safety, and engaging youth and broader community members to achieve knowledge translation. This study examines how, for whom, and in what circumstances the FEHNCY Community Engagement and Mobilization impacts knowledge translation.

**Methods:** We used a realist evaluation methodology to develop a middle-range theory of community engagement and mobilization. Eighteen in-depth interviews and two Talking Circles were conducted to understand community partner and study researcher perspectives on the study's community engagement. In-depth interviews explored participant perspectives on engagement processes and Talking Circles were conducted to confirm and clarify our preliminary findings. A combined inductive and deductive coding approach was used to identify contexts, interventions, mechanisms, and outcomes (CIMO) and CIMO configurations.

**Results:** We found that the community socio-political context, switch to virtual engagement during the pandemic, and study design were highly influential contextual factors. Participants highlighted the importance of in-person gatherings, sharing traditional foods, having youth-friendly engagement activities, and integrating local culture, values, and language as vital aspects of engagement activities. Building trusting relationships, centering community champions, and facilitating community ownership were essential mechanisms to trigger key outcomes including increased awareness of health issues, development of relevant health information for communities, and changing practices and programs.

**Conclusion:** Our research identified CIMO subthemes and is the first to develop a middle-range theory for community engagement for knowledge translation. This research advances understanding of essential community engagement approaches for supporting knowledge translation. This research can inform the future planning, implementation, and evaluation of community engagement and mobilization approaches to strategically support knowledge translation.

# The role of Indigenous knowledge in enhancing physical activity research, practice, and tertiary education

**Dr. Isaac Warbrick<sup>1</sup>, Mr. Robert Hogg<sup>1</sup>**

<sup>1</sup>Auckland University of Technology, Auckland , New Zealand

**S.1.18 - Indigenous Health Promotion - A Distinct and Decolonial Approach to Promoting Health Led by Indigenous Communities, Clarion Hotel Gillet - Room Gillesalen, June 15, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** Indigenous knowledge enabled our ancestors to survive and thrive for generations in challenging environments and situations, prior to European colonisation. Although physical activity and improved nutrition are major contributors to improving health in Indigenous peoples, public health interventions, health promotion, and health research, often lack cultural relevance and/or input from Indigenous peoples and communities. This presentation will discuss key principles of engaging at the interface of Indigenous and Western approaches to physical activity research, highlighting examples of this approach translated into practice in New Zealand. The presentation will also outline the creation and delivery of a tertiary course recently launched at Auckland University of Technology, underpinned by Māori knowledge and uniquely Indigenous forms of physical activity.

**Methods:** Led by narratives, values, and perspectives handed down through generations, our network of Māori researchers is working with Māori communities to design culturally relevant physical activity initiatives and community-driven research projects to achieve health outcomes that best reflect the aspirations of Indigenous communities.

**Results:** In addition to increasing the uptake of physical activity, these projects have highlighted the role of physical activity to reconnect Indigenous people with ancestral lands and sites of significance, rejuvenate ancestral narratives, and strengthen cultural identity.

**Conclusions:** Indigenous peoples can be cautious of scientific institutions and Western researchers because of the harms done in past research and the negative portrayal of Indigenous peoples within colonial discourse and media. Accordingly, participation and engagement of Indigenous peoples in research, particularly relating to physical activity, can be low, and research outcomes and aims may not reflect the aspirations of Indigenous people. Nevertheless, Indigenous research teams and projects in various countries have highlighted the value of a uniquely Indigenous perspective, Indigenous knowledge, and values in understanding physical activity and providing meaningful health outcomes for Indigenous and non-Indigenous peoples alike.

# A community-based online intervention to improve fundamental movement skills in children with obesity in Singapore

**Dr. Elaine Chew<sup>1</sup>, Ms. Khairunisa Khaider<sup>1</sup>**, Dr. Courtney Davis<sup>1</sup>, Dr. Cody Neshteruk<sup>2</sup>, Dr. Sarah Armstrong<sup>2</sup>  
<sup>1</sup>KK Women's and Children's Hospital, Singapore, Singapore, <sup>2</sup>Duke University School of Medicine, Durham, USA

**S.1.19 - The Power of Parks: The role of parks and recreation spaces in promoting youth physical activity, Clarion Hotel Gillet - Room Akademien, June 15, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** Children with overweight have fundamental movement skills (FMS) difficulties, which may hinder their participation and enjoyment in physical activity. In collaboration with Sport Singapore, we developed a multicomponent intervention for young children with overweight to improve physical activity and FMS. Sport Singapore is the national sport agency in charge of community recreational centers with its mission to encourage Singaporeans to be more active. Physical activity sessions were co-designed with staff from Sport Singapore and focused on the development of FMS. The aim of this study was to estimate the effectiveness of the intervention on perceived and actual FMS.

**Methods:** A two arm randomized controlled trial was conducted with children, aged 4-7 years old, with overweight and obesity. Participants were randomized to either the online intervention or a usual care control group. Physical activity sessions were delivered three times per week via Zoom over three months by Sport Singapore coaches. Activities included different sports such as gymnastics, athletics and basketball to introduce FMS to participants. Objective gross motor skills were assessed using the Test of Gross Motor Development-Third Edition (TGMD-3) and participants' perceived motor competence was assessed using the Perceived Movement Skill Competence (PMSC) at baseline and 6 months.

**Results:** Intervention participants showed no significant improvements in their perceived locomotor skills ( $20.4 \pm 2.9$  vs  $17.8 \pm 3.9$ ;  $p=0.13$ ) and ball skills ( $22.0 \pm 21.5$ ;  $p=0.13$ ) as compared to the control. Using TGMD, intervention participants had no significant improvements in their locomotor scores ( $32.0 \pm 6.7$  vs  $27.0 \pm 7.2$ ;  $p = 0.243$ ) or ball skills ( $22.9 \pm 5.5$  vs  $20.6 \pm 5.7$ ;  $p = 0.343$ ). However, there were significant improvements in jump ( $0.8 \pm 2$  vs  $-0.9 \pm 1.8$ ;  $p = 0.022$ ) and underhand throw ( $1.2 \pm 1.4$  vs  $-0.4 \pm 1.7$ ;  $p = 0.014$ ) in intervention compared to control participants.

**Conclusions:** Children in the online intervention demonstrated trend towards greater improvement in their actual and perceived locomotor and ball skills compared to children in the control. This suggest that a community-based online physical activity programme focusing on FMS may be useful in developing FMS in children with overweight.

# Feasibility of Going Places: A Park-Based Active Transportation Toolbox to Promote Youth Physical Activity and Access to Healthy Community Spaces

**Dr. Emily D'Agostino**<sup>1</sup>, Mr. Jason Jones<sup>2</sup>, Ms. Annette Smith<sup>2</sup>, Ms. Advika Kumar<sup>3</sup>

<sup>1</sup>Duke University School of Medicine, Durham, USA, <sup>2</sup>Durham Parks and Recreation, Durham, USA, <sup>3</sup>Duke University, Durham, USA

**S.1.19 - The Power of Parks: The role of parks and recreation spaces in promoting youth physical activity, Clarion Hotel Gillet - Room Akademien, June 15, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose** Going Places is a novel park-based active transportation intervention that aims to promote youth physical activity and access to parks and health promoting spaces. Co-developed with Durham Parks and Recreation in Durham, North Carolina, USA, Going Places draws on community assets and provides a toolbox including transportation equity workshops for youth and families, field trips, mentorship, park neighborhood audits, and transportation passes. We pilot tested the feasibility of implementing Going Places for minority, low-income youth.

**Methods** We recruited participants, ages 12-18 years, from park sites serving minority youth residing in low-income areas. Feasibility was assessed based on recruitment of the target population, retention, engagement with community stakeholders, and curriculum delivery. Baseline surveys, workshops, and one focus group were administered.

**Results** Nineteen youth were recruited from two park sites. Youth were 15.9 years old on average. All participants were Black or African American and 73.7% male. Seventeen participants completed baseline surveys, and 17 transportation equity workshops were provided. Three youth, one parent, and two staff participated in a focus group. Seven Garmin accelerometers were administered to youth. Mean (SD) 7-day step count across the six participants was 8170 (3099) steps per day. Surveys showed more than half of youth did not use active transportation and most reported low levels of physical activity. Mapping exercises, surveys and focus group results demonstrated barriers to active transportation including safety concerns, accessibility, and social factors.

**Conclusions** This study demonstrated feasibility for Going Places to recruit minority, low-income youth, administer surveys and accelerometers, engage with community stakeholders, and deliver transportation equity workshops. This work also provides preliminary evidence to guide program development for parks and recreation organizations in support of positive youth physical activity habits and lifelong health.

# A randomized trial of an integrated clinic-community intervention in children and adolescents with obesity

**Dr. Cody Neshteruk<sup>1</sup>**, Dr. Asheley Skinner<sup>1</sup>, Dr. Jennifer Li<sup>1</sup>, Dr. William Kraus<sup>1</sup>, Dr. Svati Shah<sup>1</sup>, Dr. Mary Story<sup>1</sup>, Dr. Nancy Zucker<sup>1</sup>, Dr. Sarah Armstrong<sup>1</sup>

<sup>1</sup>Duke University School of Medicine, Durham, USA

**S.1.19 - The Power of Parks: The role of parks and recreation spaces in promoting youth physical activity, Clarion Hotel Gillet - Room Akademien, June 15, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** Access to effective treatment for childhood obesity remains low, especially among racial/ethnic minority and low wealth populations. One solution is partnering healthcare systems with community organizations. In this clinic-community model, healthcare providers screen for obesity, provide counseling, and treat co-morbidities while recreation centers provide intensive health behavior and lifestyle treatment in community settings. The aim of this study was to evaluate the effectiveness of the clinic-community model of obesity of treatment.

**Methods:** A sample of 255 youth aged 5-17 years with obesity were enrolled in a randomized controlled trial to compare the clinic-community model of child obesity treatment against clinical care alone. Youth in the Hearts & Parks intervention received clinical care as well as access to a community program delivered at a local parks and recreation site. The community program was offered five days per week. It included structured physical activity (5 times/week) and nutrition education (1 time/week). Outcome measures, collected at baseline and 6-months, included youth BMI relative to the 95<sup>th</sup> percentile, cardiorespiratory fitness assessed via the YMCA submaximal bench stepping test, and self-reported quality of life. Generalized linear models adjusted for sex, age, and race/ethnicity were used to assess changes from baseline to 6-months between intervention and control groups.

**Results:** The mean age of participants was 10.0 (3.0) years and the majority were Hispanic (38.9%) or non-Hispanic Black (38.0%). Change in BMI from baseline to 6-months was greater for the intervention compared to the control ( $\beta=-0.67$ , 95% CI: -5.50, 4.16), although findings were not significant. Change in cardiorespiratory fitness from baseline to 6-months showed greater improvements in the intervention compared to the control at 3 minutes ( $\beta=-9.66$ , 95%CI: -16.67, -2.64), 4 minutes ( $\beta=-7.35$ , 95%CI: -13.35, -1.34), 5 minutes ( $\beta=-4.95$ , 95%CI: -10.95, 1.06), and resting ( $\beta=-5.90$ , 95%CI: -11.00, -0.80). Quality of life significantly improved in the intervention compared to the control ( $\beta=4.71$ , 95%CI: 0.11, 9.31).

**Conclusion:** The clinic-community obesity treatment model improved children's fitness, which even in the absence of weight loss has important cardiovascular benefits. Furthermore, this study showed that clinic-community partnerships are effective for improving child health, especially among populations that often are underserved by the healthcare system.

# A systematic scoping review of the interpersonal determinants of diet quality and eating behaviours in young people.

**Ms. Tanya Braune**<sup>1</sup>, Ms. Laura Kudlek<sup>1</sup>, Dr. Holly Harris<sup>1</sup>, Ms. Erin Fitzsimons-West<sup>2</sup>, Ms. Hao Tang<sup>1</sup>, Dr. Jean Adams<sup>1</sup>, Dr. Eleanor Winpenny<sup>1</sup>

<sup>1</sup>MRC Epidemiology Unit, University of Cambridge, Cambridge, United Kingdom, <sup>2</sup>School of Clinical Medicine, University of Cambridge, Cambridge, United Kingdom

**S.1.20 - The changing influence of social and physical environments on diet quality across adolescence and early adulthood, Clarion Hotel Gillet - Room Swedenborg, June 15, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** J. Young Adults

**Purpose:** This review aims to provide an overview of the literature on the interpersonal determinants (as guided by the “Determinants of Nutrition and Eating” (DONE) framework) of diet quality and eating behaviours in young people aged 13-30 years. This will help identify which determinants of the DONE framework have been studied and where future research is needed to better understand how young people’s diets are established.

**Methods:** We searched seven literature databases in February 2022: Medline, Embase, PsychINFO, Web of Science, SCOPUS, ASSIA, and Global Health. Retrieved papers were screened against the eligibility criteria: 1) interpersonal determinants as the exposure(s), 2) diet quality or eating behaviours as the outcome(s), and 3) ages 13-30 years. Data were extracted following published guidelines for scoping reviews and analysed to map the literature onto the DONE framework interpersonal categories.

**Results:** 307 papers were included following screening. Over 60% of studies were in ages 13-15 years (n=192). Determinants were grouped into eight categories: 1) social influences (n=102), 2) social support (n=73), 3) parental behaviours (n=67), 4) family structure (n=57), 5) family meals (n=57), 6) parental feeding practices (n=39), 7) living arrangement (n=39), and 8) parenting style (n=21). Categories 1-4 and 6 overlap with some of the DONE framework categories and 5,7-8 are newly identified determinants outside of the framework. Fruit and/or vegetable and sugar-sweetened beverage intake were the most commonly measured diet outcomes (n=81 and n=71, respectively). Diet quality scores (n=40) included established indices and scores created by the authors. Eating behaviour outcomes included breakfast consumption (n=38), fast food intake (n=30) and snack intake (n=29).

**Conclusions:** This review shows the wide range of interpersonal determinants, both family and peer related, that have been studied in association with diet quality and eating behaviour in young people. The literature is focussed on younger adolescents and there are fewer studies in older adolescents and young adults. Additionally, DONE framework categories including family food culture, parental resources and risk factors and parental attitudes and beliefs are less present in the literature. The review also uncovered new determinants outside of the DONE framework that may need further investigation.



# Family and neighborhood environmental correlates of adolescent sugar-sweetened soft drink intake and mediators of differences by parental level of education

**Mr. Teferi Mekonnen**<sup>1</sup>, Dr. Eleni Papadopoulou<sup>2</sup>, Prof. Nanna Lien<sup>1</sup>, Prof. Lene Frost Andersen<sup>1</sup>, Dr. Maria Pinho<sup>3</sup>, Ms. Hanne Havdal<sup>1</sup>, Mr. Oddbjørn Andersen<sup>4</sup>, Dr. Mekdes Gebremariam<sup>5</sup>

<sup>1</sup>Department of Nutrition, University of Oslo, Oslo, Norway, <sup>2</sup>Norwegian Institute of Public Health, Oslo, Norway, <sup>3</sup>Department of Epidemiology and Data Sciences, Amsterdam UMC, Amsterdam, Netherlands,

<sup>4</sup>Department of Sports Medicine, Norwegian School of Sport Sciences, Oslo, Norway, <sup>5</sup>Department of Community Medicine and Global Health, University of Oslo, Oslo, Norway

**S.1.20 - The changing influence of social and physical environments on diet quality across adolescence and early adulthood, Clarion Hotel Gillet - Room Swedenborg, June 15, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Existing evidence suggests that the intake of sugar-sweetened beverages (SSB) among adolescents remains a public health concern and that socioeconomic differences in intake exist. Tackling these challenges requires identifying the factors associated with SSB intake and mediators of socioeconomic differences in adolescent SSB intake. Thus, this study aimed to explore (i) factors including neighborhood food environmental characteristics associated with intake of carbonated drinks with added sugar (hereafter called soft drink) intake, (ii) mediators of the association between parental education and soft drink intake and (iii) the moderation of indirect effect of parental education on adolescents' soft drink intake by neighbourhood-level income.

**Methods:** Data from 826 7th graders in Oslo, Norway, who participated in the TACKLE cross-sectional study were used. Multiple logistic regression analyses and mediation analyses were conducted. Moderated mediation analyses were used to explore whether an indirect effect of parental education on adolescents' soft drink intake through potential mediators varies across neighbourhood income.

**Results:** Perceived accessibility of soft drink at home, parental modelling for soft drink intake, and frequency of food/drink purchased from the neighbourhood store were significant factors associated with higher soft drink intake among adolescents. Perceived and objectively measured neighbourhood environmental factors were not significantly associated with adolescents' soft drink intake. Perceived accessibility of soft drink at home, parental modelling for soft drink intake and frequency of food/drink purchased were significant mediators of the association between parental education and soft drink intake among adolescents. A significant moderation of the indirect effect of parental education on adolescent soft drink intake through perceived accessibility of soft drink at home by neighbourhood income was found.

**Conclusions:** The present study identified modifiable factors that could be targeted in public health interventions designed to reduce the intake of soft drinks in general and to tackle socioeconomic inequalities in soft drink intake among adolescents. We found a significant moderation of the indirect effect of parental education on adolescent soft drink intake; this effect went through perceived accessibility of soft drink at home among children of the lower educated parents only.

# Do food-related capabilities, opportunities and motivations of adolescents mediate the association between socioeconomic position in adolescence and diet quality in early adulthood?

**Dr. Katherine Livingstone<sup>1</sup>**, Dr. Dana Olstad<sup>2</sup>, Prof. Sarah McNaughton<sup>1</sup>, Ms. Sara Nejatnamini<sup>2</sup>, Dr. James Dollman<sup>3</sup>, Prof. David Crawford<sup>1</sup>, Prof. Anna Timperio<sup>1</sup>

<sup>1</sup>Institute for Physical Activity and Nutrition, Deakin University, Geelong, Australia, <sup>2</sup>Department of Community Health Sciences, University of Calgary, Calgary, Canada, <sup>3</sup>Alliance for Research in Exercise, Nutrition and Activity, University of South Australia, Adelaide, Australia

**S.1.20 - The changing influence of social and physical environments on diet quality across adolescence and early adulthood, Clarion Hotel Gillet - Room Swedenborg, June 15, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** J. Young Adults

**Purpose:** Socio-economic position (SEP) in adolescence may influence diet quality over the lifecourse. However, knowledge of whether individual and environmental determinants of diet quality mediate the longitudinal association between SEP and diet quality is limited. This study examined whether and to what extent food-related capabilities, opportunities and motivations of adolescents mediated the longitudinal association between SEP in adolescence and diet quality in early adulthood.

**Methods:** Longitudinal data (annual surveys) from 776 adolescents (16.9 years at baseline; 76% female) from ProjectADAPT (T1 (baseline), T2, T3) were used. SEP in adolescence (T1) was operationalized as highest level of parental education and area-level disadvantage (based on postcode). The Capabilities, Opportunities and Motivations for Behavior (COM-B) model was used as a framework to inform the analysis. Determinants in adolescence (T2) included food-related activities and skills (Capability), home availability of fruit and vegetables (Opportunity) and self-efficacy (Motivation). Diet quality in early adulthood (T3) was calculated using a modified version of the Australian Dietary Guidelines Index based on brief dietary questions on intake of foods from eight food groups. Structural equation modelling was used to estimate the mediating effects of adolescents' COM-B in associations between adolescent SEP and diet quality in early adulthood. Standardized beta coefficients ( $\beta$ ) and robust 95% confidence intervals (CI) were generated, adjusted for confounders (T1 age, sex, diet quality, whether still at school, and living at home) and clustering by school.

**Results:** There was evidence of an indirect effect of area-level disadvantage on diet quality via Opportunity ( $\beta$ : 0.021; 95% CI: 0.003 to 0.038;  $p=0.024$ ), but limited evidence for parental education ( $\beta$ : 0.018; 95% CI: -0.003 to 0.039;  $p=0.09$ ). Opportunity mediated 49% of the association between area-level disadvantage and diet quality. There was no evidence of an indirect effect via Capability or Motivation for either area-level disadvantage or parental education.

**Conclusions:** Using the COM-B model, the home availability of fruit and vegetables (Opportunity) of adolescents explained a large proportion of the association between area-level disadvantage in adolescence and diet quality in early adulthood. Interventions to address poor diet quality among adolescents with a lower SEP should prioritize environmental determinants of diet quality.

# Explanatory variables of objectively measured 24-hour movement behaviors in patients with type 2 diabetes mellitus: a systematic review

**Ms. Lotte Bogaert<sup>1</sup>**, Miss Iris Willems<sup>1,2</sup>, Dr. Vera Verbestel<sup>1</sup>, Mr. Boyd Strumane<sup>1</sup>, Miss Margot Van Daele<sup>1</sup>, Mrs. Marga Decraene<sup>1</sup>, Miss Manon Kinaupenne<sup>1</sup>, Prof. Bruno Lapauw<sup>1</sup>, Prof. Patrick Calders<sup>1</sup>, Assistant Prof. Marieke De Craemer<sup>1</sup>

<sup>1</sup>Ghent University, Ghent, Belgium, <sup>2</sup>Research Foundation Flanders, Brussels, Belgium

**S.1.21 - Move, sit, sleep: the co-dependence of physical activity, sedentary behavior and sleep in adults with (pre)diabetes, Clarion Hotel Gillet - Room Swedenborg, June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** Physical activity (PA), sedentary behavior (SB) and sleep (i.e., 24-hour movement behaviors (24h-MBs)) have an impact on health indicators of type 2 diabetes mellitus (T2DM) patients. Nevertheless, most these patients do not meet the guidelines of the movement behaviors. Therefore, this systematic review aimed to summarize the influencing factors of PA, SB and sleep T2DM patients. This information could inform future interventions regarding the factors that could be targeted to change patients' 24h-MBs.

**Methods:** A systematic search of four databases (PubMed, Web of Science, Scopus & Embase) was conducted. Following studies were included: (1) adults with T2DM, (2) all age ranges from 18 years, (3) PA, SB or sleep objectively measured, (4) associations with at least one explanatory variable and (5) full text and written in English. The influencing factors of the movement behaviors were classified across three different domains using the socio-ecological model: individual, interpersonal and environmental variables. Based on the findings that support an association (+, -, indeterminate or no association), an influencing factor of PA, SB or sleep was determined.

**Results:** A total of 54 studies were included in the systematic review of which the majority investigated PA. Sex was studied in all movement behaviors but was only associated with MVPA and LPA. Being male was positively associated with MVPA but negatively with LPA. Age was negatively associated with all levels of PA (LPA, MVPA and total PA). Body Mass Index (BMI) and waist circumference (WC) were negatively associated with MVPA and total PA. A positive association was found BMI and WC on the one hand and SB on the other hand.

**Conclusion:** Across all behaviors, most studied influencing factors are located at the individual level. Almost no factors were investigated at the interpersonal and environmental level despite the dynamic interrelations between individual, interpersonal and environmental levels. Additionally, information about influencing factors of sleep and LPA is scarce while these behaviors are easier to influence within behavior change interventions compared to MVPA. Finally, the results of this review underscore the lack of focus on the interrelationship of 24h-MBs within studies.

# Cross-sectional associations between 24-hour movement behaviors and cardiometabolic health parameters among adults with type 2 diabetes according to weight status

**Miss Iris Willems**<sup>1,2</sup>, Dr. Vera Verbestel<sup>1</sup>, Prof. Patrick Calders<sup>1</sup>, Prof. Bruno Lapauw<sup>1</sup>, Miss Lotte Bogaert<sup>1</sup>, Dr. Marieke Blom<sup>3</sup>, Assistant Professor Femke Rutters<sup>3</sup>, Dr. Nicole den Braver<sup>3</sup>, Assistant Professor Marieke De Craemer<sup>1</sup>

<sup>1</sup>Ghent University, Ghent, Belgium, <sup>2</sup>Research Foundation Flanders, Brussels, Belgium, <sup>3</sup>Vrije Universiteit Amsterdam, Amsterdam, Netherlands

**S.1.21 - Move, sit, sleep: the co-dependence of physical activity, sedentary behavior and sleep in adults with (pre)diabetes, Clarion Hotel Gillet - Room Swedenborg, June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** A population which is known to struggle with a high prevalence of overweight and obesity is the group of adults with type 2 diabetes mellitus (T2DM). The combination of T2DM and overweight or obesity has a detrimental health effect, which in turn makes these adults a high risk group where secondary prevention is important. Therefore, striving for a better cardiometabolic health is important and this is mostly dependent on all movement behaviors that one conducts during a 24-hour day (physical activity (PA), sedentary behavior (SB), sleep). The aim of this study is to compare the 24-hour movement behaviors (24h-MBs) of adults with T2DM regarding their weight status (i.e. normal weight, overweight or obese) and to explore associations with cardiometabolic health within each weight status group.

**Methods:** This study used data of 718 adults with T2DM (151 adults had normal weight, 311 adults were overweight, 256 adults were obese). During the waking day, participants wore an Actigraph GT3X to measure PA and SB and sleep data were collected using a sleep diary. The following cardiometabolic health parameters were collected: HbA1c, fasting glucose, triglycerides, cholesterol, blood pressure, body mass index, and waist circumference. A compositional data analysis approach was conducted to analyze the data.

**Results:** A significant difference in 24h-MBs was found among adults with T2DM for different weight states ( $p < 0.001$ ). The obese T2DM group slept less (510.88 min/day), were more sedentary (720.61 min/day), and performed less light PA (202.37 min/day) and moderate to vigorous PA (6.14 min/day) compared to the normal weight T2DM group (i.e. 531.08; 659.94; 241.10; 7.88 min/day) or overweight T2DM group (i.e. 521.48; 679.70; 230.66; 8.17 min/day). Additionally, these 24h-MBs compositions were significantly associated with adults' cardiometabolic health. Predictions based on time reallocations into more PA by reducing SB while keeping sleep duration unchanged seemed to be beneficial for body mass index, waist circumference, HDL-cholesterol and triglycerides.

**Conclusion:** These results suggest that reallocations of time into a more optimal 24h-MBs composition may be effective for different cardiometabolic health parameters. However, longitudinal and experimental studies are required to confirm these results.

# Application of time-use approaches to study associations of physical activity and sedentary behavior with cardiometabolic risk factors in people with type 2 diabetes and prediabetes

**Dr. Jenny Rossen<sup>1</sup>**, Miss Kristina Larsson<sup>1</sup>, Prof. Maria Hagströmer<sup>1,2</sup>, Prof. Unn-Britt Johansson<sup>1</sup>, Dr. Philip Von Rosen<sup>2</sup>

<sup>1</sup>Sophiahemmet University, Stockholm, Sweden, <sup>2</sup>Karolinska Institutet, Stockholm, Sweden

**S.1.21 - Move, sit, sleep: the co-dependence of physical activity, sedentary behavior and sleep in adults with (pre)diabetes, Clarion Hotel Gillet - Room Swedenborg, June 15, 2023, 2:15 PM - 3:45 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** Waking time in sedentary behavior (SB), light physical activity (LIPA), and moderate-to-vigorous physical activity (MVPA) are interrelated. To consider this interrelationship of time in different behaviors it has become recognized that physical activity should be regarded from a time-use approach. We explored the associations of physical activity and SB with cardiometabolic risk factors in people with type 2 diabetes and prediabetes with two time-use approaches.

**Methods:** Cross-sectional data from individuals with prediabetes and type 2 diabetes was used. MVPA, LIPA and SB during the awake time were measured with ActiGraph GT1M accelerometer. Two time-used approaches, isothermal substitution analysis, and compositional data analysis (CoDa) were applied to explore the associations of physical activity and SB with cardiometabolic risk factors such as anthropometrics, glucose metabolism and lipids.

**Results:** Data was provided for 124 participants in the isothermal and 175 participants in the CoDa analyses. Of these 50 respectively 42% were female, mean age was 64 years in both samples. The findings showed strong positive associations with cardiometabolic risk factors for time spent in MVPA and negative associations of time spent in SB relative to time spent in the other behaviors. Theoretically, reallocating time from SB to MVPA was beneficially associated with BMI, waist circumference, and HDL cholesterol. When applying CoDa reallocation of 19 minutes MVPA to SB or to LIPA was associated with a 17% and 17% larger sagittal abdominal diameter, 39% and 36% larger HOMA-IR values, and 3% and 2% lower levels of HDL, respectively.

**Conclusion:** In conclusion, our analyses from two different time-use perspectives showed similar results. The findings support the current evidence of device-measured physical activity and sedentary time. A high proportion of SB is devastating for cardiometabolic health. Maintaining or increasing time in MVPA are the most important features of the time-use behaviors in adults with prediabetes and type 2 diabetes.



# Stranger Danger or Good Samaritan? Examining correlates of parental tolerance of risk among Canadian parents

**Prof. Guy Faulkner**<sup>1</sup>, Ms. Julia McKenna<sup>1</sup>, Mr. Matthew Fagan<sup>1</sup>, Prof. Mariana Brussoni<sup>2</sup>, Prof. Mathieu Belanger<sup>3</sup>, Associate Professor Katie Gunnell<sup>4</sup>, Prof. Mark Tremblay<sup>5,6,7</sup>, Dr. Richard Larouche<sup>8</sup>

<sup>1</sup>School of Kinesiology, University of British Columbia, Vancouver, Canada, <sup>2</sup>Faculty of Medicine, University of British Columbia, Vancouver, Canada, <sup>3</sup>Faculté de médecine et des sciences de la santé, Université de Sherbrooke, Sherbrooke, Canada, <sup>4</sup>Department of Psychology, Carleton University, Ottawa, Canada, <sup>5</sup>Healthy Active Living and Obesity Research Group, CHEO Research Institute, Ottawa, Canada, <sup>6</sup>Department of Pediatrics, University of Ottawa, Ottawa, Canada, <sup>7</sup>Department of Health Sciences, Carleton University, Ottawa, Canada, <sup>8</sup>Faculty of Health Sciences, University of Lethbridge, Lethbridge, Canada

**S.2.21 - Parental perceptions of risk and safety: Do they undermine child and youth physical activity, and can they be reframed?, UKK - Main Hall (Level 6), June 16, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Independent mobility (IM; i.e., a child's freedom to move around in public space without adult supervision) is consistently associated with increased levels of active travel, outdoor play and physical activity. However, negative parental perceptions of risk may restrict children's opportunities for IM. Excessively minimizing children's exposure to risks in their environment may have a range of developmental consequences. The purpose of this study was to investigate correlates of parental tolerance of risk among a large sample of Canadian parents.

**Methods:** This is a secondary data analysis using baseline data collected in December 2020 from an ongoing national longitudinal study assessing changes in movement behaviours and IM among children over time. A sample of 2,291 parents of 7-12 year olds completed online questionnaires assessing sixteen potential individuals (e.g., gender), social (e.g., neighbourhood cohesion), and environmental (e.g., walkability) correlates of parental tolerance of risk (Tolerance of Risk in Play Scale). Logistic regressions were created to assess the odds of individual, social, and environmental factors being associated with the most risk averse quartile. The logistic regression was built in hierarchical steps relying on the AIC and pseudo  $R^2$  to inform model progression.

**Results:** The final model had a pseudo  $R^2$  of 0.16. Three correlates were significantly associated with risk aversion in parents. Concerns about stranger danger were found to increase the odds of risk aversion (OR=2.54, CI[2.12, 3.07]). A higher number of children in the home was found to lessen the odds of risk aversion in parents (OR=0.78, CI[0.68, 0.90]). Finally, children of parents born outside of Canada had higher odds of being risk averse compared to parents born in Canada (OR=2.26, CI[1.64, 3.11]).

**Conclusions:** Concerns about stranger danger persist despite occurrences of stranger abduction being extremely rare. Tailored interventions that reframe perceptions of risk of IM for parents are needed. However, such interventions may be challenged in effectively helping parents focus on likelihood rather than the potential of emotionally charged negative events happening. A complementary focus on examining how cultural background influences risk perceptions is needed in future research.



# Is adolescent independent mobility to school influenced by parental sociodemographic characteristics and perceptions?

**Dr. Francisco Javier Huertas-Delgado<sup>1</sup>**, Dr. Manuel Herrador-Colmenero<sup>1,2</sup>, Associate Professor Palma Chillón<sup>2</sup>

<sup>1</sup>La Inmaculada Teacher Training Centre, University of Granada, Granada, Spain, <sup>2</sup>PROFITH "PROmoting FITness and Health through Physical Activity" Research Group, Sport and Health University Research Institute (iMUDS), Department of Physical Education and Sports, Faculty of Sport Sciences, University of Granada, Granada, Spain

**S.2.21 - Parental perceptions of risk and safety: Do they undermine child and youth physical activity, and can they be reframed?, UKK - Main Hall (Level 6), June 16, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Independent mobility (IM) has been related to higher physical activity levels, as well as greater autonomy and a better understanding of safety issues in adolescents. Parental sociodemographic characteristics and their perceptions are related to adolescents' mode of commuting behaviours. The purposes of this study were to analyze the sociodemographic characteristics and perceived barriers towards active commuting between mobility groups (independent versus not) and parental sociodemographic characteristics and perceptions.

**Methods:** A total of 365 adolescents, 192 (52.6%) girls, mean age 14.08 ( $\pm 1.02$ ) years old, and their parents from Granada, Valencia, Jaen and Toledo (Spain) participated in this study. Adolescents reported their mode of commuting behaviours, and their parents reported their gender, age, educational level, socioeconomic status and perceived barriers. Educational level, gender and parental barrier differences between the independent and dependent mobility groups were analyzed using the chi-square test, and the age and socioeconomic status differences between independent and dependent mobility groups were analyzed using T-student test. A binary logistic regression model with stepback analysis was fitted to analyze the associations between the IM and the parental sociodemographic characteristics and perceptions that differed between mobility groups, controlled by the adolescents' age and gender, and the distance from home to school.

**Results:** Parents with higher socioeconomic status showed lower levels of IM in their adolescents than those with lower socioeconomic status ( $p=0.001$ ); however, there were not significant associations between parental educational level, gender, and age with the adolescents' IM. The parents of adolescents with IM reported higher importance to crime and the absence of bike lanes (both  $p<0.05$ ), whereas the parents of adolescents who reported dependent mobility to school reported higher importance to distance, walking and cycling convenience (all  $p<0.05$ ). When all the variables were included in the same model, lower socioeconomic status ( $OR=0.700$ ,  $CI=0.500-0.981$ ), higher parental perception about the absence of bike lanes ( $OR=1.420$ ,  $CI=1.135-1.777$ ), lower perception of convenience ( $OR=0.681$ ,  $CI=0.529, 0.876$ ) as barriers were associated with higher IM.

**Conclusions:** Parental concerns about safety were not important in this adolescent sample. Developing programs that focus on overcoming barriers related to parental convenience and developing active travel infrastructure are needed.

# Parent and play ambassador perceptions of ‘risky’ and ‘unstructured’ play. An evaluation of a community-based outdoor ‘loose parts’ play program

**Prof. Patricia Doyle-Baker**<sup>1,2,3</sup>, Ms. Calli Naish<sup>4,5</sup>, Ms. Meghan Ingstrup<sup>5</sup>, Associate Professor Gavin McCormack<sup>1,2,3,4,5,6</sup>

<sup>1</sup>University of Calgary, Calgary, Canada, <sup>2</sup>School of Planning, Architecture, and Landscape, University of Calgary, Calgary, Canada, <sup>3</sup>Alberta Children’s Hospital Research Institute, University of Calgary, Calgary, Canada, <sup>4</sup>Department of Communication, Media and Film, Faculty of Arts, University of Calgary, Calgary, Canada, <sup>5</sup>Department of Community Health Sciences, Cumming School of Medicine, University of Calgary, Calgary, Canada, <sup>6</sup>Faculty of Sport Sciences, Waseda University, Tokyo, Japan

**S.2.21 - Parental perceptions of risk and safety: Do they undermine child and youth physical activity, and can they be reframed?, UKK - Main Hall (Level 6), June 16, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Loose parts (LP) play involves providing children with a variety of synthetic typical/atypical and natural materials with which they interact, physically and cognitively, in a self-directed manner. LP offers children with unstructured play opportunities that can facilitate physical activity and social interaction, build confidence and independence, and encourage risk-taking. We explored perspectives of ‘unstructured’ and ‘risky’ play among parents of children who participated in, and among play ambassadors who facilitated a recreational facility-led LP program (Vivo Recreation Play Hubs). The play hubs provided free, supervised unstructured play in six local parks in Calgary (Canada). Vivo implemented the program between autumn 2019 and summer 2022.

**Methods:** We conducted semi-structured telephone interviews on two occasions to gather in-depth information about perceptions of play (10 parents/ambassadors in 2020 and 12 ambassadors only in 2022). Interview questions covered a range of topics related to play and participation in the program, including participant perceptions and experiences in facilitating ‘risky play’. We conducted thematic analysis, but separately on the 2020 and 2022 interview data.

**Results/findings:** Four themes emerged from the 2020 (parents/ambassadors) interviews, revealing commonalities in their perceptions of play and the program: (1) *The importance of play*; (2) *Perceptions of the play environment*; (3) *Facilitating unstructured play*, and; (4) *Community impacts of the play events*. Three themes emerged from the 2022 (ambassadors only) interviews: (1) *Experiences supporting unstructured play*; (2) *Learning to take risks in play*, and; (3) *Value of the play hubs*. Notably, parents and ambassadors recognized the importance of ‘risky’ play for child development and for identifying their physical limits, ability to assess risky situations, and to develop confidence and problem-solving skills. Ambassadors described how their perception of risk changed as they learned about risky and unstructured play, how they supported risky play, and how they educated parents who were hesitant about risky and unstructured play offered at the play hubs. Parents also described the need for balancing risk and safety during play.

**Conclusions:** Strategies for increasing parent awareness about the benefits of risky play and more community programs that offer safe ‘risky’ play may be beneficial for supporting child development.

# Association of perceived home and community environment with adolescent sedentary behaviour

**Dr. Ranjit Mohan Anjana**<sup>1,2</sup>, Dr. Harish Ranjani<sup>1,2</sup>, Dr. Rajendra Guha Pradeepa<sup>1,2</sup>, Prof. Ester Cerin<sup>3,4</sup>, Prof. Anthony Barnett<sup>3</sup>, Prof. Jo Salmon<sup>5</sup>, Prof. Cindy Sit<sup>6</sup>, Prof. Delfien Van Dyck<sup>7</sup>, Dr. Terry Conway<sup>8</sup>

<sup>1</sup>Madras Diabetes Research Foundation, Chennai, India, <sup>2</sup>Dr. Mohan's Diabetes Specialities Centre, Chennai, India, <sup>3</sup>Mary MacKillop Institute for Health Research, Australian Catholic University, Melbourne, Australia, <sup>4</sup>Australia School of Public Health, The University of Hong Kong, Hong Kong, Hong Kong, China, <sup>5</sup>Institute for Physical Activity, Deakin University, Melbourne, Australia, <sup>6</sup>Department of Sports Science and Physical Education, The Chinese University of Hong Kong, Hong Kong, China, <sup>7</sup>Department of Movement and Sport Sciences, Ghent University, Ghent, Belgium, <sup>8</sup>Department of Family Medicine and Public Health, University of California, San Diego, USA, San Diego, USA

**S.2.22 - Relation of home and neighbourhood environments to adolescent physical activity and sedentary behaviour: The IPEN- Adolescent study, UKK - Level 6 Foyer, June 16, 2023, 8:15 - 9:30 AM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** Understanding environmental correlates of sedentary behaviour among young people is important because children and adolescents tend to have less behavioral autonomy and may be more influenced by environments around them. This paper aims to estimate the associations between perceived home and neighbourhood environments with objective measures of adolescent sedentary behaviour from 14 countries.

**Methods:** Data from the International Physical activity and the Environment Network (IPEN) Adolescent (11-19 years) study were used. Participants wore an accelerometer for seven days, and completed a questionnaire assessing home and neighborhood environment and sedentary behaviours. Accelerometry-assessed sedentary time [ST] was available in 3,982 participants. We estimated the total effect (here defined as an exposure-outcome association unadjusted for environmental mediators) and direct effect (exposure-outcome association adjusted for potential environmental mediators) of each environmental attribute on ST.

**Results:** Having electronic devices at home (especially in the bedroom) was linked to more ST in boys ( $b:1.7$ ;  $CI:0.5,2.9$ ;  $p=0.005$ ) vs. girls ( $b:-0.7$ ;  $CI:-2.0, 0.6$ ;  $p=0.281$ ) who tended to accumulate more sedentary time during out-of-school periods on school days. Having own social media accounts was positively related to reported screen time in all countries ( $b:39.6$ ;  $CI:29.2,50.0$ ;  $p<0.001$ ). A significant inverse association was found between accessibility to walking facilities and ST ( $b:-12.8$ ;  $CI:-19.4, -6.2$ ;  $p<0.001$ ). Parent-perceived access to recreational facilities ( $b:-1.9$ ;  $CI:-3.6, -0.2$ ;  $p=0.033$ ) and pedestrian infrastructure and safety ( $b:-2.1$ ;  $CI:-4.1, -0.01$ ;  $p=0.049$ ) showed significant negative associations with ST during out-of-school periods on school days in the total-effect models, and park proximity ( $b:1.69$ ;  $CI:0.04,3.35$ ;  $p=0.045$ ) showed a positive association in the direct-effect models. A negative association between transit stop proximity and perceived neighbourhood/home environment with ST was observed among girls both in the direct ( $b:-3.1$ ;  $CI:-5.8, -0.4$ ;  $p=0.026$ ) and total-effect ( $b:-3.2$ ;  $CI:-5.8, -0.7$ ;  $p=0.014$ ) models.

**Conclusions:** Our findings indicate both home and neighborhood environment features are related to sedentary time in adolescents, and associations differ by sex. Environmental modifications should be considered to help reduce sedentary time among adolescents globally.

# Association of perceived home and community environment with adolescent sedentary behaviour

**Dr. Ranjit Mohan Anjana**<sup>1,2</sup>, Dr. Harish Ranjani<sup>1,2</sup>, Dr. Rajendra Guha Pradeepa<sup>1,2</sup>, Prof. Ester Cerin<sup>3,4</sup>, Dr. Muhammad Akram<sup>3</sup>, Prof. Anthony Barnett<sup>3</sup>, Prof. Jo Salmon<sup>5</sup>, Prof. Cindy Sit<sup>6</sup>, Prof. Delfien Van Dyck<sup>7</sup>, Dr. Terry Conway<sup>8</sup>, Dr. Adriano Akira Ferreira Hino<sup>9</sup>, Dr. Andreia Pizarro<sup>10</sup>, Professor Erica Hinckson<sup>11</sup>, Prof. Jim Sallis<sup>3,8</sup>

<sup>1</sup>Madras Diabetes Research Foundation, Chennai, India, <sup>2</sup>Dr. Mohan's Diabetes Specialities Centre, Chennai, India, <sup>3</sup>Mary MacKillop Institute for Health Research, Australian Catholic University, Melbourne, Australia, <sup>4</sup>School of Public Health, The University of Hong Kong, Hong Kong, China, <sup>5</sup>Institute for Physical Activity, Deakin University, Melbourne, Australia, <sup>6</sup>Department of Sports Science and Physical Education, The Chinese University of Hong Kong, Hong Kong, China, <sup>7</sup>Department of Movement and Sport Sciences, Ghent University, Ghent, Belgium, <sup>8</sup>Department of Family Medicine and Public Health, University of California, San Diego, USA, <sup>9</sup>Catholic University of Paraná, Curitiba, Brazil, <sup>10</sup>Reitoria da Universidade do Porto, Praça Gomes Teixeira, Porto, Portugal, <sup>11</sup>School of Sport & Recreation, Auckland University of Technology, Auckland, New Zealand

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**Conclusions:** Our findings indicate both home and neighborhood environment features are related to sedentary time in adolescents, and associations differ by sex. Environmental modifications should be considered to help reduce sedentary time among adolescents globally.

# Evaluating performance of spatial indicators of destinations and land-use mix in international analyses of adolescents' physical activity

**Prof. Ester Cerin**<sup>1</sup>, Dr. Terry Conway<sup>2</sup>, Ms. Kelli Cain<sup>2</sup>, Dr. Marc Adams<sup>3</sup>, Associate Professor Anthony Barnett<sup>1</sup>, Prof. Poh-chin Lai<sup>4</sup>, Prof. Scott Duncan<sup>5</sup>, Dr. Ana Queralt<sup>6</sup>, Prof. James Sallis<sup>1,2</sup>

<sup>1</sup>Mary MacKillop Institute of Health Research, Australian Catholic University, Melbourne, Australia, <sup>2</sup>Herbert Wertheim School of Public Health and Human Longevity Science, University of California San Diego, La Jolla (CA), USA, <sup>3</sup>College of Health Solutions, Arizona State University, Phoenix (AZ), USA, <sup>4</sup>Department of Geography, The University of Hong Kong, Hong Kong, Hong Kong, <sup>5</sup>School of Sport and Recreation, Auckland University of Technology, Auckland, New Zealand, <sup>6</sup>AFIPS Research Group, Department of Nursing, University of Valencia, Valencia, Spain

**S.2.22 - Relation of home and neighbourhood environments to adolescent physical activity and sedentary behaviour: The IPEN- Adolescent study, UKK - Level 6 Foyer, June 16, 2023, 8:15 - 9:30 AM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Destination and land-use mix can be operationalised in numerous ways using Geographic Information Systems (GIS). The utility of various GIS-based spatial indicators of destinations and land-use mix for explaining adolescents' physical activity (PA) internationally is yet to be established. This study will describe a range of GIS destinations and land-use measures, examine how they vary across countries, and establish their criterion/content and construct validity in relation to adolescents' PA.

**Methods:** We employed data from 12 cities across nine countries participating in the IPEN Adolescent study. GIS data were used to characterise adolescents' (11-19 years; N~5000) neighbourhoods defined as 1-km street-network buffers around their homes. Eleven categories of spatial indicators of destinations and land-use mix were computed for each participant. Adolescents wore an accelerometer for a week. Average daily minutes of accelerometry-assessed PA and moderate-to-vigorous PA across the whole week and during non-school periods were estimated. Adolescents self-reported the distance of their school from home, active travel to/from school and other types of destinations, and out-of-school PA. Parents of adolescents reported the proximity of 26 types of facilities to home.

**Results:** Descriptive statistics of spatial indicators of destinations and land-use mix will be provided for each city to examine between-city variations. To assess criterion/content validity of the spatial indicators, we will estimate their associations with composite measures of parent-reported proximity to relevant destinations. To assess construct validity of the spatial indicators, we will examine their associations with measures of adolescents' PA. Each PA outcome will be regressed onto each of the indicators after adjusting for potential confounders. Self-reported distance to school will be included as a moderator of the relations of spatial indicators with active transport to school and accelerometry-assessed overall PA. We will also examine the extent to which spatial indicator-PA associations vary across cities.

**Conclusions:** Constructing comparable measures of destinations and land-use mix that can be used to examine environment-PA associations internationally can be challenging. Analyses and results from this study will identify the strengths and limitations of various spatial indicators of destinations and land-use mix available in the IPEN Adolescent study and will inform future studies.



# Parental perceptions of neighbourhood environments and active transport to/from school among adolescents

**Prof. Anna Timperio**<sup>1</sup>, Prof. Scott Duncan<sup>2</sup>, Dr. Muhammad Akram<sup>3</sup>, Dr. Javier Molina-García<sup>4</sup>, Prof. Delfien Van Dyck<sup>5</sup>, Prof. Anthony Barnett<sup>3</sup>, Dr. Ferdinand Salonna<sup>6</sup>, Dr. Anjana RM<sup>7</sup>, Prof. James F Sallis<sup>3,8</sup>, Prof. Ester Cerin<sup>3,9</sup>

<sup>1</sup>Institute for Physical Activity and Nutrition (IPAN), Deakin University, Geelong, Australia, <sup>2</sup>Auckland University of Technology, Auckland, New Zealand, <sup>3</sup>Australian Catholic University, Melbourne, Australia, <sup>4</sup>University of Valencia, Valencia, Spain, <sup>5</sup>Ghent University, Ghent, Belgium, <sup>6</sup>Palacky University, Olomouc, Czech Republic, <sup>7</sup>Madras Diabetes Research Foundation, Chennai, India, <sup>8</sup>Herbert Wertheim School of Public Health, University of California San Diego, La Jolla, USA, <sup>9</sup>School of Public Health, The University of Hong Kong, Hong Kong, Hong Kong

**S.2.22 - Relation of home and neighbourhood environments to adolescent physical activity and sedentary behaviour: The IPEN- Adolescent study, UKK - Level 6 Foyer, June 16, 2023, 8:15 - 9:30 AM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Active transport to and from school (ATS) may be an important source of physical activity for adolescents. However, most studies examining correlates of ATS focus on children. This study aimed to estimate associations of parent-perceived neighbourhood environment characteristics with self-reported ATS among adolescents from 15 countries.

**Methods:** Observational cross-sectional design. Data were from the IPEN-Adolescent study and included adolescents (n=6302, mean age 14.5±1.7 years, 54% girls) from 16 diverse cities. Adolescents self-reported the number of days/week they usually travelled to school and from school by walking and by bicycle, as well as the time it would take to walk. Parents completed items from the NEWS-Youth scale, and scores were computed for 13 aspects of the built environment. Latent profile analyses were conducted to identify distinct profiles based on frequency of walking and of cycling to and from school. Generalised additive mixed models were used to estimate associations with 1) any active transport to/from school, 2) regular (5-10 times/week) walking and 3) cycling to/from school and 4) profiles of ATS.

**Results:** Overall, 58.7% reported any ATS, 39.9% regularly walked, 7.7% regularly cycled, and four profiles of ATS were identified: walk to and from school; walk from school; cycle to and from school; no ATS. Distance to school was negatively associated with all outcomes except regular cycling to/from school. Land use mix – diversity was positively related to all ATS outcomes except those pertaining to cycling. Residential density and accessibility and walking facilities were positively associated with any ATS, regular walking to/from school, and walking to and from school vs. no ATS. Residential density was also negatively related to regular cycling to/from school. Positive associations were observed between traffic safety and any ATS, and between safety from crime, aesthetics and the odds of regular cycling to/from school.

**Conclusions:** Parent perceptions of indicators of compact, mixed use development, walking facilities and both traffic and crime-related safety were important supportive correlates of a range of ATS outcomes among adolescents and should be prioritized in shaping neighbourhoods to better support active and environmentally friendly modes of transport. Correlates of walking and cycling differed.



# Development, Validation, and Reliability of a Sex- and Gender-Based Analysis Tool for Health Research

**Mx. Andrew Putman<sup>1</sup>**, Dr. Shilpa Dogra<sup>1</sup>

<sup>1</sup>University of Ontario Institute of Technology, Oshawa, Canada

**S.2.23 - Sex and Gender Based Analysis: Understanding the Landscape and Improving our Approach, UKK - Hall B (Level 3), June 16, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** The purpose of this talk is to describe the process of developing and testing a newly designed tool to support researchers with integrating sex- and gender-based analysis in their research.

**Methods:** Development and testing of the tool included three stages. In stage 1, a literature review was performed to inform the development and to confirm the face validity of the tool. An initial draft of the tool was presented to two groups of health researchers for feedback. In stage 2, a Delphi consensus study was undertaken with health researchers from across Canada to confirm content validity. The researchers who participated in the study were identified by their institutions as health researchers. The Delphi study consists of a minimum of three rounds and is completed if all of the items in the tool are validated with a consensus of >75% or if the inter-class correlation between rounds is >75%. In stage 3, external reliability will be assessed using a test-retest design with at least 50 participants in the fall of 2023. Participants will be asked to complete the tool on two separate occasions, at least 4 weeks apart.

**Results:** Based on the literature, the tool consists of a categorical indicator of biological sex at birth, and 4 questions pertaining to aspects of gender that affect health. The 4 gender constructs addressed by the tool are: identity, expression, roles, and relations. The Delphi consensus is underway; results and the updated tool will be presented.

**Conclusions:** There is a dire need for the development of a simple tool for sex and gender-based analysis that can be easily implemented in research studies assessing health and health behaviour outcomes. We present a new tool that will be freely accessible and will enable researchers to better understand the effects of gender on health and health behaviour.

# Quantifying intersectionality in large-scale, population-based studies

**Dr. Eun-Young Lee**, Dr. Lee Airton, Mr. Heejun Lim, Ms. Eun Jung

<sup>1</sup>Queen's University, Kingston, Canada

**S.2.23 - Sex and Gender Based Analysis: Understanding the Landscape and Improving our Approach, UKK - Hall B (Level 3), June 16, 2023, 8:15 AM - 9:30 AM**

## **SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** To develop and validate a landmark survey tool that will quantify intersectionality in large-scale, population-based sample surveys, using intersectionality-based experiences of physical activity participation as its developmental terrain.

**Methods:** The project is divided into three methodological phases. During Phase 1, questionnaire was developed based on a series of literature reviews on five modules.

- Module 1: Sex, gender identity, gender expression (5 items)
- Module 2: Sexual orientation, sexuality (10 items)
- Module 3: Race, ethnicity, religion, (im)migration, language, Indigeneity (5 items)
- Module 4: (Dis)ability, health and physical status (3 items)
- Module 5: Class, socioeconomic status (4 items)

The questionnaire is currently being reviewed by a panel of experts (Phase 2), following the Delphi method. Phase 3 will establish validity and reliability of the questionnaire. This will involve a pilot study to examine content and construct validity, internal consistency, and test-retest reliability. An online survey program will be used for data collection and will engage the easily accessible population of students in post-secondary institutions as survey participants.

**Results:** The outcome of the developed questionnaire and its psychometric properties will be presented during the symposia.

**Conclusions:** As the Global population continues to diversify, single-variable approaches to studying social participation (including but not limited to physical activity) are increasingly insufficient. Our research corrects for this insufficiency by developing and validating a tool for quantifying intersectionality. This will help various sectors to develop and also justify quality policies and programs that meet the needs of varying social groups in a constantly shifting and increasingly polarized social landscape. This research also innovates in relation to the study of gender in large-scale data sets by operationalizing inter- and intra-categorical gender diversity in lieu of collecting binary sex-based data, and renders both gender identity and gender expression as intersectional variables. Our questionnaire will provide researchers and policymakers with the means to create evidence-based studies and programs that enhance quality of life across an ever-expanding gender spectrum which includes (transgender or non-transgender) women and men, as well as nonbinary people, while refusing the over-simplification of these categories that has long characterized large-scale research.

# Association of wearable device-measured vigorous intermittent lifestyle physical activity with mortality, incident cardiovascular disease and cancer

**Prof. Emmanuel Stamatakis<sup>1</sup>**, Dr. Matthew Ahmadi<sup>1</sup>, Prof. Jason Gill<sup>2</sup>, Prof. Cecilie Thøgersen-Ntoumani<sup>3, 4</sup>, Prof. Martin Gibala<sup>5</sup>, Prof. Aiden Doherty<sup>6</sup>, Prof. Mark Hamer<sup>7</sup>

<sup>1</sup>The University of Sydney, Camperdown, Australia, <sup>2</sup>The University of Glasgow, Glasgow, United Kingdom,

<sup>3</sup>University of Southern Denmark, Odense, Denmark, <sup>4</sup>Curtin University, Bentley, Australia, <sup>5</sup>McMaster University, Hamilton, Canada, <sup>6</sup>Oxford University, Oxford, United Kingdom, <sup>7</sup>University College London, London, United Kingdom

**S.2.24 - Time-efficient accumulation of sufficient physical activity: Vigorous Intermittent Lifestyle Physical Activity (VILPA), UKK - Hall C (Level 3), June 16, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** This talk will present results from 3 UK Biobank studies (1 published, two unpublished) examining the associations of VILPA with prospective outcomes in a sample of 25,241 non-exercisers, i.e., people who do not do leisure-time exercise and do not walk regularly for recreation (mean age 61.8 years, 14,178 women/11,063 men).

**Methods & Results:** The first study, which will be published in Nature Medicine in December 2022, examined the association of VILPA with all-cause, cardiovascular disease (CVD) and cancer mortality. Over an average follow-up of 6.9 years, during which 852 deaths occurred, VILPA was inversely associated with all three of these outcomes in a near-linear fashion. As compared to participants who engaged in no VILPA, participants who engaged in VILPA at the sample median frequency of three VILPA bouts per day (lasting up to one or up to two minutes each) showed a 38-40% reduction in all-cause and cancer mortality risk and a 48-49% reduction in CVD mortality risk. Moreover, the sample median duration of 4.4 VILPA minutes per day was associated with a 26-30% reduction in all-cause and cancer mortality risk and a 32-34% reduction in CVD mortality risk.

**Conclusions:** These results indicate that small amounts of vigorous non-exercise physical activity are associated with substantially lower mortality. VILPA in non-exercisers appears to elicit similar effects to VPA in exercisers, suggesting that VILPA may be a suitable physical activity target, especially in people not able or willing to exercise. The second study will examine the associations of VILPA with major adverse cardiovascular events and the third with incident cancer.

# Deriving an empirical definition of vigorous intermittent lifestyle physical activity (VILPA)

**Dr. Matthew Ahmadi<sup>1</sup>**, Prof. Cecilie Thøgersen-Ntoumani<sup>2</sup>, Prof. Emmanuel Stamatakis<sup>1</sup>

<sup>1</sup>The University of Sydney, Camperdown, Australia, <sup>2</sup>University of Southern Denmark, Odense, Denmark

**S.2.24 - Time-efficient accumulation of sufficient physical activity: Vigorous Intermittent Lifestyle Physical Activity (VILPA), UKK - Hall C (Level 3), June 16, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** This talk will present a study to provide empirical evidence for VILPA bout length definitions in future studies.

**Methods:** 58 adults (mean age 55.7 (SD=10.1) years) completed five activities of daily living while wearing an indirect calorimetry unit (Cosmed K5) and Polar heart-rate monitor. The activities included: 1) Walking on a flat surface at a self-selected “very fast” pace; 2) Walking on a flat surface whilst carrying shopping-like bags equivalent to 5% of body weight at a self-defined “fast” pace; 3) Walking on a flat surface whilst carrying shopping-like bags equivalent to 10% of body weight at a self-defined “fast” pace; 4) walking at 2.5% gradient at a self-defined “very fast” pace (treadmill); 5) walking at 7.0% gradient at a self-defined “very fast” pace (treadmill). The sequence of activities was randomised for each participant and counterbalanced across participants to prevent biases due to residual fatigue accumulating during the protocol.

**Results:** Participants performed each activity until vigorous intensity was reached for two out of three criteria: 1) %VO<sub>2</sub>max ( $\geq 64\%$ ); 2) %HRmax ( $\geq 77\%$ ); 3) Rating of perceived exertion (Borg Scale)  $\geq 15$ . For %VO<sub>2</sub>max and %HRmax, the threshold had to be met for at least 30 consecutive seconds to minimise the effects of noise. VO<sub>2</sub>max was calculated using the Ebbeling treadmill test and heart rate max was calculated using the Tanaka equation. Between activities, participants had 5 minutes of seated recovery, or until heart rate and breathing returned to resting levels. Resting VO<sub>2</sub> and heart rate were measured at the beginning of each session with the participant lying supine using 5 minutes of steady-state (%CV  $\leq 10\%$ ). The mean time required to reach vigorous intensity in two of the above three physiological intensity indices was 73.5(SD=26.2) seconds across all activities. These results suggest up to 1 minute and up to 2 minute bouts can be used to measure VILPA in free living conditions.

**Conclusion:** This study presents an empirically derived definition for VILPA bout lengths that can be applied in future trials and cohort studies that examine the health-enhancing effects of VILPA.

# A co-design behaviour change intervention to promote Vigorous Intermittent Lifestyle Physical Activity in adults transitioning to retirement

**Miss Bingyan Pang<sup>1</sup>**, Dr. Joanna Moullin<sup>1</sup>, Dr. Craig Thompson<sup>1</sup>, Prof. Cecilie Thøgersen-Ntoumani<sup>1,2</sup>, Prof. Emmanuel Stamatakis<sup>3</sup>, Associate Professor Joanne McVeigh<sup>1,4</sup>

<sup>1</sup>Curtin University, Bentley, Australia, <sup>2</sup>University of Southern Denmark, Odense, Denmark, <sup>3</sup>The University of Sydney, Camperdown, Australia, <sup>4</sup>Wits University, Johannesburg, South Africa

**S.2.24 - Time-efficient accumulation of sufficient physical activity: Vigorous Intermittent Lifestyle Physical Activity (VILPA), UKK - Hall C (Level 3), June 16, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** This presentation will provide an overview and systematic outline of applying a theoretical behaviour change framework in developing an intervention to promote Vigorous Intermittent Lifestyle Physical Activity (VILPA) in adults transitioning to retirement.

**Methods:** A circular development process was used to guide the intervention development co-designed with 30 insufficiently active adults transitioning to retirement and 20 healthcare professionals. The Behaviour Change Wheel (BCW) framework was used to 1) seek existing evidence on barriers and enablers to participation in vigorous lifestyle physical activity in adults aged 55 to 75 via a systematic search of literature; 2) understand the barriers and enablers to participation in VILPA via focus groups with adults transitioning to retirement; 3) identify board intervention categories with the research team; and 4) identify intervention content and implementation options with the collaboration of health professionals.

**Results:** Barriers and enablers to participation in VILPA identified through focus groups with adults transitioning to retirement were mapped to the Theoretical Domains Framework (an expansion of the BCW), resulting in the selection of six broad intervention categories. The broad intervention categories are *Education, Persuasion, Incentivisation, Environmental Restructure, Modelling and Enablement*. A literature review and participant focus groups informed the selection of relevant intervention techniques (e.g., self-monitoring of behaviour, social reward, and action planning). Twenty health professionals were asked to consider the clinical utility and practicality of the proposed intervention. They provided peer review of the intervention techniques to refine intervention content and mode of delivery.

**Conclusions:** We present a co-designed, theoretically informed, in-depth and systematic approach to developing an intervention to promote VILPA in adults transitioning to retirement. The feasibility and preliminary efficacy of this intervention will be examined.

# Longitudinal association between retirement-induced changes in 24-h movement behaviors and obesity indicators: compositional data analysis

**Dr. Kristin Suorsa<sup>1</sup>**, Dr. Nidhi Gupta<sup>2</sup>, Dr. Tuija Leskinen<sup>1</sup>, Prof. Lars L Andersen<sup>2</sup>, Mr. Jesse Pasanen<sup>1</sup>, Miss Jaana Pentti<sup>1,3</sup>, Prof. Jussi Vahtera<sup>1</sup>, Prof. Sari Stenholm<sup>1</sup>

<sup>1</sup>University of Turku, Turku, Finland, <sup>2</sup>National Research Centre for the Working Environment, Copenhagen, Denmark, <sup>3</sup>University of Helsinki, Helsinki, Finland

**S.2.25 - Data-driven and compositional data analysis for profiling and assessing the associations of 24-hour movement behaviors and cardiometabolic health, UKK - Hall D (Level 2 - main floor), June 16, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** Retirement changes 24-h movement behavior composition towards more passive behaviors, especially sleep, in relation to physical activity, but it is not known how these changes affect obesity indicators. This study aimed to investigate longitudinal associations between changes in 24-h movement behaviors and obesity indicators in relation to the transition from work to retirement.

**Methods:** The study population included 213 retiring public sector workers (mean age 63.5 years, standard deviation 1.1) from the Finnish Retirement and Aging study. Daily time spent in sedentary behavior (SED), light physical activity (LPA) and moderate-to-vigorous physical activity (MVPA) were estimated with a thigh-worn Axivity accelerometer which participants wore for at least four days per measurement before retirement and again one year later, when they had retired. Participants' sleep time per 24-h day was estimated using daily logs, in which participants filled in bed times and waking times for each measurement day. Participants' BMI and waist circumference were measured at the same time points. Compositional regression analysis and compositional isotemporal substitution analysis were used to study associations between changes in 24-h movement behaviors and changes in obesity indicators.

**Results:** Increasing MVPA in relation to sleep, SED and LPA was associated with decreasing BMI ( $\beta=-0.60$ ,  $p=0.04$ ) and waist circumference ( $\beta=-2.14$ ,  $p=0.05$ ). Moreover, increasing sleep in relation to SED, LPA and MVPA was associated with increasing BMI ( $\beta=1.30$ ,  $p=0.03$ ). Reallocating 60 min from MVPA to SED and sleep was estimated to increase BMI by on average  $0.8-0.9 \text{ kg/m}^2$  and waist circumference by 3.0 cm during one year. In general, estimated effects of reallocating time away from MVPA on obesity indicators were larger than effects of reallocating time to MVPA.

**Conclusions:** In the transition from work to retirement, changes in MVPA and sleep in relation to the remaining behaviors were associated with changes in obesity indicators. Retirees should be encouraged to maintain or increase their MVPA levels after retirement to prevent weight gain.



# Joint profiles of sedentary time and physical activity in adults and their associations with markers of cardiometabolic health

**Dr. Vahid Farrahi<sup>1</sup>**, Mr. Mehrdad Rostami<sup>1</sup>, Dr. Dot Dumuid<sup>2</sup>, Prof. Sebastien F. M. Chastin<sup>3,4</sup>, Dr. Maisa Niemelä<sup>1,5,6</sup>, Prof. Raija Korpelainen<sup>1,5,6</sup>, Prof. Timo Jämsä<sup>1,5</sup>, Dr. Mourad Oussalah<sup>1</sup>

<sup>1</sup>University of Oulu, Oulu, Finland, <sup>2</sup>University of South Australia, Adelaide, Australia, <sup>3</sup>Glasgow Caledonian University, Glasgow, United Kingdom, <sup>4</sup>Ghent University, Ghent, Belgium, <sup>5</sup>Oulu University Hospital, Oulu, Finland, <sup>6</sup>Oulu Deaconess Institute Foundation, Oulu, Finland

**S.2.25 - Data-driven and compositional data analysis for profiling and assessing the associations of 24-hour movement behaviors and cardiometabolic health, UKK - Hall D (Level 2 - main floor), June 16, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** Robust evidence exists that, regardless of accumulation patterns, moderate-to-vigorous physical activity (MVPA) could be beneficial for cardiometabolic health. However, how the patterns and variations of sedentary time and light-intensity physical activity (LPA) contribute to adults' cardiometabolic health is unclear. This study aimed to identify and characterize joint profiles of sedentary time and physical activity among adults and investigate how these profiles are associated with markers of cardiometabolic health.

**Methods:** The participants included 3,702 of the Northern Finland Birth Cohort 1966 at age 46 years, who wore a hip-worn accelerometer during waking hours and provided 7 consecutive days of valid data. Sedentary time, LPA, and MVPA on each valid day were obtained, and a data-driven clustering approach ("KmL3D") was used to characterize joint profiles of sedentary time and physical activity intensities. Participants self-reported their sleep duration and performed a submaximal step test with continuous heart rate measurement to estimate their cardiorespiratory fitness (peak heart rate). Linear regression was used to determine the association between the profiles with cardiometabolic health markers, including adiposity markers and blood lipid, glucose, and insulin levels.

**Results:** Four distinct groups were identified: "Active couch potatoes" (n=1,173), "Sedentary light movers" (n=1,199), "Sedentary exercisers" (n=694), and "Movers" (n=636). Although sufficiently active, Active couch potatoes had the highest daily sedentary time (>10 hours) and lowest LPA. Compared to Active couch potatoes, Sedentary light movers, Sedentary exercisers, and Movers spent less time in sedentary by performing more physical activity at light-intensity upward and had favorable differences in their cardiometabolic health markers after accounting for sleep duration, cardiorespiratory fitness, and other potential confounders (1.1%–25.0% lower values depending on the health marker and profile).

**Conclusions:** Regardless of sleep duration and cardiorespiratory fitness, accommodating more physical activity at light-intensity upward in the waking activity behavior composition could benefit cardiometabolic health in adults.

# Daily physical activity patterns and their associations with cardiometabolic biomarkers: The Maastricht Study

**Dr. Tuija Leskinen<sup>1</sup>**, Dr. Valéria Lima Passos<sup>2,3</sup>, Dr. Pieter C. Dagnelie<sup>2,4</sup>, Dr. Hans H.C.M. Savelberg<sup>2</sup>, Dr. Bastiaan E. de Galan<sup>2,4,5</sup>, Dr. Simone J.P.M. Eussen<sup>2</sup>, Dr. Coen D.A. Stehouwer<sup>2,4</sup>, Prof. Sari Stenholm<sup>1</sup>, Associate Professor Annemarie Koster<sup>2</sup>

<sup>1</sup>University of Turku, Turku, Finland, <sup>2</sup>Maastricht University, Maastricht, Netherlands, <sup>3</sup>Royal College of Surgeons in Ireland, Dublin, Ireland, <sup>4</sup>Maastricht University Medical Center+, Maastricht, Netherlands,

<sup>5</sup>Radboud University Medical Center, Nijmegen, Netherlands

**S.2.25 - Data-driven and compositional data analysis for profiling and assessing the associations of 24-hour movement behaviors and cardiometabolic health, UKK - Hall D (Level 2 - main floor), June 16, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** The 24-hour accelerometer measurements provide data to study heterogeneity in the daily patterns of physical activity. This study aimed to identify joint daily physical activity patterns over weekdays and weekend days among middle-aged and older adults, and examine their association with cardiometabolic biomarkers in a cross-sectional design.

**Methods:** Overall 6072 participants (mean age 60.2 years (SD 8.6), 50% women) from The Maastricht Study provided daily physical activity data collected with thigh-worn activPAL3 accelerometers (mean 6.5 days, SD 0.7). The patterns of daily physical activity over weekdays and weekend days were identified by using Group Based Trajectory Modeling which clusters individual repeated measurements to identify latent trajectory groups with similar developmental paths. Cardiometabolic biomarkers included measured body mass index (BMI), waist circumference, office blood pressure, and, laboratory assessed glucose, HbA1c, and cholesterol levels. Associations between the physical activity patterns and cardiometabolic outcomes were examined using the analyses of covariance adjusted for sex, age, education, smoking, and diet. Because of statistically significant interaction, the analyses were stratified by type 2 diabetes status.

**Results:** Overall, seven physical activity patterns were identified: consistently inactive (21% of the participants), consistently low active (41%), active on weekdays (15%), early birds (2%), consistently moderately active (7%), weekend warriors (8%), and consistently highly active (6%). The consistently inactive and low active patterns had higher BMI, waist, and glucose levels compared to the consistently moderately and highly active patterns, and these associations were more pronounced for participants with type 2 diabetes. The more irregular patterns accumulated lower daily total activity levels compared to the more consistent patterns but their cardiometabolic profiles were rather similar.

**Conclusions:** The cardiometabolic profile among the patterns accumulating moderate to high levels of daily total physical activity was similar suggesting that the amount rather than the pattern of daily physical activity is more important for cardiometabolic health.

# Cultural adaptations and methodological innovations in developing systemic interventions to combat malnutrition in all its forms in China and Southeast Asian countries through Group Model Building – the SYSTAM CHINA SEACS project

**Dr. Bai Li**<sup>1</sup>, Prof. Boyd Swinburn<sup>2</sup>, Prof. Poh Bee Koon<sup>3</sup>, Prof. Steve Allender<sup>3</sup>, Dr. Zouyan He<sup>5</sup>, Dr. Remco Peters<sup>1</sup>, Dr. Weiwen Zhou<sup>6</sup>, Prof. Yunfeng Zou<sup>5</sup>

<sup>1</sup>University of Bristol, Bristol, United Kingdom, <sup>2</sup>University of Auckland, Auckland, New Zealand, <sup>3</sup>Universiti Kebangsaan Malaysia, Kuala Lumpur, Malaysia, <sup>4</sup>Deakin University, Geelong, Australia, <sup>5</sup>Guangxi Medical University, Nanning, China, <sup>6</sup>Guangxi Centre for Disease Prevention and Control, Nanning, China

**S.2.26 - Is it feasible to apply a systems approach to nutrition interventions in non-western, low- to middle-income countries? Sharing empirical experience from China, Southeast Asia, South Pacific, and the Middle East., UKK - K1 (+K2) (Level 3), June 16, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose** Different forms of malnutrition share common causes and solutions. They also co-exist at individual-, family-, community- and country-level. However, over- and under-nutrition interventions around the world are often developed in an isolated manner. To effectively tackle the double burden of malnutrition, which is a leading public health crisis in China and Southeast Asian (SEA) countries, this MRC-funded project explored whether and how Group Model Building (GMB) can be applied successfully to develop double-duty nutrition interventions in these countries.

**Methods** Collaborating with national, regional, and local governments in China and Southeast Asian countries, we made cultural adaptations and methodological innovations to the standard GMB process to successfully co-develop double-duty interventions with leaders from 16 governmental departments and the food industry within a pilot city in China. Examples of cultural adaptations were including leaders of a similar seniority in the same workshop to avoid power dynamic issues; and providing hand boards for individual participants to express opposing views friendly. Examples of methodological innovations included development of hybrid methods for the GMB process; and expanding the 3-stage GMB process to include 9 stages. We hosted a high-level, online international forum to 1) share the pilot work with 26 Ministry of Health senior officials from 10 SEA countries, and 2) discuss the feasibility of applying the piloted approach in their countries through three focus groups (in breakout rooms).

**Results** The culturally adapted, hybrid GMB process led to 1) collective prioritisation of inter-sectoral interventions targeting common drivers of over- and under nutrition in the pilot city within 2 themes: environmental pollution and the food supply chain. It also led to the establishment of local Action Groups consisting leaders of various governmental departments for sustainable intervention implementation. Senior SEA officials believe it is feasible to apply the piloted systems approach in their countries, and suggested country-specific issues (e.g. targeting the right level of authority and technical training) to be addressed to maximise success.

**Conclusion** It is feasible to apply a systems approach to developing double-duty nutrition interventions in China and SEA countries. Country-level cultural adaptations and the hybrid GMB process are recommended for SEA countries.

# Lessons from Systems Approaches to Childhood Obesity Prevention Interventions across the South Pacific

**Prof. Steve Allender<sup>1</sup>**

<sup>1</sup>Deakin University, Geelong, Australia

**S.2.26 - Is it feasible to apply a systems approach to nutrition interventions in non-western, low- to middle-income countries? Sharing empirical experience from China, Southeast Asia, South Pacific, and the Middle East., UKK - K1 (+K2) (Level 3), June 16, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Childhood obesity represents a global health priority which has proven resistant to prevention efforts. This intransigence flows from the complex relationships of cause and effect which include non-linear effects, operating over different time scales, impacted by multiple external influences resulting in multiple unintended consequences. System science represents a suite of approaches that support the capture of this complexity and the deliberate use of this understanding in the development, evaluation, and evolution of efforts to improve child obesity prevention initiatives. This presentation summarises lessons from 20 years of community-based childhood obesity prevention from countries across the South Pacific, including countries such as Fiji, Tonga and Australia. Comparative reflections on practical differences between countries within this region will be presented.

**Methods:** A system model of the key drivers of community intervention will provide the basis of describing the critical aspects of successful intervention and their intersections. Examples are drawn to illustrate these relationships from across >20 community trials. The trials represent the cutting edge in obesity prevention including rigorous high quality outcome measures.

**Results:** The overarching systems model identified 9 stocks and 4 pairs of central balancing and reinforcing feedback loops. Illustrative key lessons include building commitment through relationships, mutual learning, strengthening collaboration, and embedding capacity. The examples show how critical defining roles and engaging leaders is and the importance of extending this work more broadly than traditional approaches to prevention. This broadening of perspectives creates roles for food retailers, government, and business and emphasises the importance of high-quality data and clear process to systematically address the complexity of obesity.

## **Conclusion:**

The use of systems thinking offers great potential to address the global syndemic of obesity. This presentation demonstrates several of these approaches and the status of current practice.

# How are guidelines for physical activity throughout pregnancy developed?

**Dr. Kristi Adamo**<sup>1</sup>, Dr. Margie Davenport<sup>2</sup>, Dr. Michelle Mottola<sup>3</sup>, Dr. Stephanie-May Ruchat<sup>4</sup>, Dr. Gregory Davies<sup>5</sup>

<sup>1</sup>University of Ottawa, Ottawa, Canada, <sup>2</sup>University of Alberta, Alberta, Canada, <sup>3</sup>University of Western Ontario, London, Canada, <sup>4</sup>Université du Québec à Trois-Rivières, Québec, Canada, <sup>5</sup>Queen's University, Ontario, Canada

**S.2.27 - 9 months and 24-hours: Innovations in 24-hour Movement Behaviors during Pregnancy, UKK - K3+4 (Level 3), June 16, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** N. Other

**Purpose:** In light of a wave of new research examining the role of physical activity/exercise in promoting health and wellness in pregnant individuals and their offspring, the absence of clear, evidence-based recommendations represented a gap to be filled. This presentation will describe the process followed by the Canadian team in developing the Clinical Practice Guideline for physical activity throughout pregnancy, including the application of the Appraisal of Guidelines for Research and Evaluation (AGREE) II instrument and the use of the Grading of Recommendations Assessment, Development and Evaluation (GRADE) methodology for rating the quality of recommendations.

**Methods:** A *Guidelines Consensus Panel*, consisting of researchers, methodology experts, exercise professionals and various stakeholder groups was convened, and with input from pregnant individuals, selected a set of key outcomes related to maternal, fetal and neonatal health. A comprehensive literature search strategy was created and performed by a research librarian targeting all relevant databases. The guidelines were informed by a set of twelve systematic reviews describing the impact of PA on outcomes of interest with the intent of illustrating the balance between benefits and potential harms of PA. The GRADE system was used to grade the strength of recommendations.

**Results:** As a result of the guideline development process, the *Guidelines Consensus Panel* arrived at a set of 6 recommendations of varying strength and evidence quality indicating who will benefit, from how much, how often, and what type.

**Conclusion:** Strong recommendations were made specifying that all pregnant individuals without contraindication should be physically active throughout pregnancy. They should engage in a minimum of 150 min of moderate- intensity PA weekly, accumulated over a minimum of 3 days, and greater benefits can be achieved by incorporating a variety of aerobic and resistance training modalities.

# Maternal 24-hour movement behaviors across pregnancy and 1 year postpartum: the LIFE-Moms consortium

**Dr. Chelsea Kracht<sup>1</sup>**, Dr. Kimberly Drews<sup>1</sup>, Dr. Emily Flanagan<sup>1</sup>, Dr. Sarah Keadle<sup>2</sup>, Dr. Leanne Redman<sup>1</sup>  
<sup>1</sup>Pennington Biomedical Research Center, Baton Rouge, USA, <sup>2</sup>Colifornia Polytechnic State University, San Luis Obispo, USA

**S.2.27 - 9 months and 24-hours: Innovations in 24-hour Movement Behaviors during Pregnancy, UKK - K3+4 (Level 3), June 16, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** N. Other

**Purpose:** Physical activity (PA) and sleep are critical during the perinatal period for maternal and child health. This analysis aimed to: 1) describe changes to 24-hour movement behaviors (PA, sleep, sedentary behavior [SB]) throughout pregnancy and 1-year postpartum, and 2) examine attainment of movement behavior guidelines in pregnancy and postpartum.

**Methods:** LIFE-Moms was a consortium of behavioral clinical trials for adequate gestational weight gain in women with overweight and obesity. Women assigned to the control group with complete data across all timepoints ( $n=161$ ) were included in the current analysis. Measurement of 24-hour movement behaviors (by Actigraph Gt3x) occurred in early (9-15 weeks) and late (35-36 weeks) pregnancy, and ~1-year postpartum. Sleep was defined by software algorithm identified episodes and remaining accelerometer wear time was used to quantify PA (light PA and moderate-to-vigorous [MVPA]), and SB. Sleep and PA were compared to adult and pregnancy-specific guidelines, respectively. SB was classified into quartiles. Generalized linear mixed models were used to examine changes in movement behaviors across time. Mixed models with appropriate adjustments were used to examine the association between baseline guideline attainment and the number of postpartum guidelines met.

**Results:** Participants were  $31.2 \pm 3.5$  years, 36.6% White, 44.1% overweight, 34.1% class-I obesity. In early pregnancy, approximately half (52.1%) attained one behavior guideline, while others met 2 (25.4%), all 3 (11.2%) or no guidelines (11.2%). There was a significant time effect for all movement behaviors ( $p$ 's < 0.001). Sleep (hours/day) decreased over time ( $7.9 \pm 1.1$ ,  $7.6 \pm 1.3$ ,  $7.2 \pm 1.2$ , respectively). SB (hours/day) increased during pregnancy (early:  $10.1 \pm 1.1$ ; late:  $10.4 \pm 1.1$ ) but then decreased postpartum ( $9.7 \pm 1.1$ ). Conversely, light PA and MVPA decreased during pregnancy and increased from late pregnancy to postpartum. Attainment of the PA guideline and being the lowest SB quartile in early pregnancy were independently related to meeting more guidelines postpartum.

**Conclusion:** In this sample, all three 24-hour movement behaviors changed between early pregnancy and postpartum. SB and PA had a reciprocal relationship across these time points, while sleep duration continually decreased. Supporting mothers to be physically active and spending less time in SB in early pregnancy may help restore a healthy balance of movement behaviors postpartum.



# Movement behaviors and maternal health outcomes: simulation using a compositional data approach

**Prof. Marie LÖf<sup>1</sup>**, Dr. Johanna Sandborg<sup>1</sup>, Ms. Emmie Söderström<sup>1</sup>, Dr. Jairo Migueles<sup>1</sup>

<sup>1</sup>Karolinska Institutet, Huddinge, Sweden

**S.2.27 - 9 months and 24-hours: Innovations in 24-hour Movement Behaviors during Pregnancy, UKK - K3+4 (Level 3), June 16, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** N. Other

**Purpose:** Physical activity is beneficial for maternal and offspring health. However, thus far, focus has primarily been on moderate-to-vigorous physical activity (MVPA), and the co-dependency of the other movement behaviors on the 24hr continuum (sleep; light physical activity, LPA; sedentary behavior, SB) also needs to be considered. In this presentation we will 1) report the results for the proportion of women meeting current guidelines for movement behaviors in early and late pregnancy in a Swedish sample 2) demonstrate and simulate how compositional analyses as a method can be used to examine associations between co-dependent movement behaviors and health outcomes in early and late pregnancy.

**Methods:** These analyses utilize data from the HealthyMoms trial in 306 Swedish women that were repeatedly measured in gestational weeks 14 and week 37. We measured time spent in different movement behaviors by means of wrist-worn accelerometry using ActiGraph wGT3x-BT during seven 24-hr periods. Fat mass index (Bod Pod), and cardiometabolic health indicators (i.e., glucose levels, homeostatic model for insulin resistance [HOMA-IR], systolic and diastolic blood pressure, metabolic syndrome [MetS] score) were also assessed.

**Results:** Seventy-five percent of the women met the guidelines for MVPA in gestational week 14, while the corresponding figure in gestational week 37 was 50%. A high proportion of women (>90%) exceeded the guidelines for SB at both time points. In this sample, reallocating time to MVPA from LPA, SB, and sleep was associated with lower MetS score (adjusted  $\gamma=-0.34$ ,  $P=0.002$ ) in gestational week 14. Correspondingly, reallocating time to LPA from SB and sleep in gestational week 14 was associated with lower fat mass index, HOMA-IR and MetS score (adjusted  $\gamma=-0.47$  to  $-0.78$ ;  $P<0.05$ ) in gestational week 37. We will present different simulations on how changes in the different behaviors may impact the investigated health outcomes.

**Conclusions:** A large proportion of pregnant women in this Swedish sample did not meet current guidelines for MVPA, and had high levels of SB, which is a major public health concern. Our compositional analyses can provide a more comprehensive understanding on how changes in the individual behaviors during pregnancy may improve maternal health outcomes.

# Teachers' perception of integrating high-intensity physical activity breaks into senior school lessons: Findings from the Burn 2 Learn program

**Dr. Angus Leahy**<sup>1,2</sup>, Dr. Mark Babic<sup>1,2</sup>, Ms. Vibeke Hansen<sup>3</sup>, Associate Professor Narelle Eather<sup>1,2</sup>, Dr. Jordan Smith<sup>1,2</sup>, Dr. Sarah Costigan<sup>4</sup>, Prof. David Lubans<sup>1,2,5</sup>

<sup>1</sup>University of Newcastle, Callaghan, Australia, <sup>2</sup>Hunter Medical Research Institute, New Lambton Heights, Australia, <sup>3</sup>Southern Cross University, Coffs Harbour, Australia, <sup>4</sup>Deakin University, Geelong, Australia,

<sup>5</sup>University of Jyväskylä, Jyväskylä, Finland

**S.2.28 - Can school-based high-intensity interval training (HIIT) interventions be scaled-up for population health?, Clarion Hotel Gillet - Room Gillesalen, June 16, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** In recent years, there has been an increase in the number of school-based high-intensity interval training (HIIT) interventions, however few have specifically targeted older adolescents. This presentation will explore teachers' perspectives of integrating HIIT into academic lessons for older adolescents, and address considerations for implementation at-scale.

**Methods:** Teachers were provided with training, resources, and support to deliver a 16-week HIIT program known as Burn 2 Learn (B2L). Teachers facilitated the delivery of 2-3 HIIT sessions per week during academic lessons. Following the intervention period, twelve teachers who delivered the program completed a semi-structured interview with a member of the research team (~30 minutes per interview). Audio recordings of the interviews were transcribed verbatim and analysed by an independent researcher using a template analysis approach.

**Results:** Four broad themes were identified: (i) appeal and motivation to deliver B2L, (ii) program barriers and facilitators, (iii) impact on students' health, well-being, and cognition, and (iv) sustainability of B2L in schools. The perceived benefit on students' wellbeing and classroom engagement was a primary driver for teachers to deliver the program. Unsurprisingly, academic pressure was reported as the main barrier to delivery, particularly as examinations drew closer. Another barrier was the school uniform that was not conducive to HIIT. Most teachers expressed witnessing a positive impact of the program on students' mental health and classroom focus, which was also noticed by the students themselves.

**Conclusion:** Teachers were supportive of the B2L program, citing benefits for students' wellbeing and classroom engagement as the main reason for implementation. Despite the relatively short time commitment, competing academic pressure was a common barrier to program delivery. As such, researchers may need to explore alternative times during the school day to implement the program (i.e., in the morning before classes). Our findings provide support for re-directing curriculum time towards physical activity in the senior school years. We recommend the scheduling of three mandatory classroom activity breaks (15-20 mins) per week.

# FFIT for girls? A qualitative evaluation of pupils' and teachers' experiences of a school-based high-intensity interval training (HIIT) programme for adolescent girls

**Dr. Kathryn Weston**<sup>1</sup>, Dr. Naomi Burn<sup>2</sup>, Dr. Shaun McLaren<sup>3</sup>, Dr. John Franklin<sup>4</sup>, Dr. Samantha Harrison<sup>4</sup>, Ms. Helene Elliot-Button<sup>5</sup>, Ms. Alice Lester<sup>6</sup>, Dr. Alan Barker<sup>6</sup>, Dr. Matthew Weston<sup>7</sup>

<sup>1</sup>Edinburgh Napier University, Edinburgh, United Kingdom, <sup>2</sup>University of South Australia, Adelaide, Australia, <sup>3</sup>Newcastle Falcons Rugby Club, Newcastle, United Kingdom, <sup>4</sup>Teesside University, Middlesbrough, United Kingdom, <sup>5</sup>University of Hull, Hull, United Kingdom, <sup>6</sup>University of Exeter, Exeter, United Kingdom, <sup>7</sup>University of Edinburgh, Edinburgh, United Kingdom

**S.2.28 - Can school-based high-intensity interval training (HIIT) interventions be scaled-up for population health?, Clarion Hotel Gillet - Room Gillesalen, June 16, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** To explore participants' experiences of FFIT (Fun Fast Interval Tasks) for Girls; a school-based HIIT programme.

**Methods:** Pupils (66 females, aged  $12.4 \pm 0.3$  years [mean  $\pm$  SD]) were recruited from one school to participate in a 4-week HIIT programme called FFIT for Girls. The school neighbourhood was in the first decile (i.e., most deprived) of the English Index of Multiple Deprivation. FFIT for Girls took place during physical education (PE) lessons and comprised 10 maximal effort activities across two sessions weekly (one boxing-based, one running). Intensity was quantified via ratings of perceived exertion. Post-programme, 12 participants took part in focus groups to discuss their experiences. Semi-structured interviews were conducted with PE teachers (n=2). All data were transcribed, then analysed using directed content analysis using NVivo 12.

**Results:** Focus groups revealed some pupils were unsure about the intensity of HIIT but signed up because they wanted to try something new with their friends. Post-programme, pupils described HIIT as physically challenging, leading to sensations of breathlessness, tiredness, and sore muscles, which decreased across the four weeks. Some pupils thought HIIT could be adapted for everyone, whereas others thought some activities exposed they were not as fit as their peers. Generally, pupils viewed boxing more favourably than running. Pupils and teachers thought variety in activities was important for maintaining interest. Post-programme, pupils described feelings of togetherness and feeling fitter and stronger; others felt improved confidence. However, concerns were expressed about HIIT replacing PE lessons, and the potential impact on pedagogical outcomes. The teachers also highlighted that a flexible programme structure, which responded to pupils' needs and the school environment was a key facilitator for successful implementation.

**Conclusions:** FFIT for Girls could be modified to include various HIIT activities, with elements allowing direct peer comparisons minimised. Social support and group dynamics appear important to overall programme experience. To provide potential participants a better understanding of what HIIT can look and feel like, familiarisation sessions could be included in the recruitment of future programmes. To maximise implementation of school-based HIIT at scale, concerns over HIIT replacing, rather than complimenting, PE must be addressed.

# Teacher experiences delivering in-school HIIT incorporating indigenous narratives: the Pau te Hau programme

**Associate Professor Nigel Harris**<sup>1</sup>, Dr. Isaac Warbrick<sup>1</sup>, Dr. Denise Atkins<sup>1</sup>, Mrs. Jacqui Pratt<sup>1</sup>, Mrs. Nikki Penetito-Hemara<sup>1</sup>, Mr. Darrio Penetito-Hemara<sup>2</sup>, Prof. David Lubans<sup>3</sup>, Prof. Rachael Taylor<sup>4</sup>

<sup>1</sup>Auckland University of Technology, Auckland, New Zealand, <sup>2</sup>Toi Tangata, Auckland, New Zealand,

<sup>3</sup>University of Newcastle, Callaghan, Australia, <sup>4</sup>University of Otago, , New Zealand

**S.2.28 - Can school-based high-intensity interval training (HIIT) interventions be scaled-up for population health?, Clarion Hotel Gillet - Room Gillesalen, June 16, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** To explore barriers and facilitators to teachers' delivery of in-school high-intensity interval training (HIIT) incorporating indigenous narratives.

**Methods:** Nine schools, including 834 student participants (11.6±1.0 years, 51.2% female), and 26 teachers participated. The programme known as 'Pau te Hau' consisted of twice weekly 10-15 minute HIIT sessions delivered in classrooms by generalist teachers using the customised Pau te Hau app, and Polar H10™ heart rate monitors for real-time effort feedback projected on screen. The app included exercise and 'pūrākau' videos on which sessions were based. Pūrākau are traditional Māori (indigenous population of Aotearoa New Zealand) stories. Teachers attended a 4-hour professional learning session prior to the start of a 16-week programme punctuated by a 2-week school break. Six of the schools were subsequently closed owing to government imposed COVID-19 restrictions from week nine onwards. At 16-weeks, semi-structured interviews were conducted with all teachers (including those in the COVID affected schools), using open ended interview questions then transcribed and analysed for key themes using NVivo™ software.

**Results:** Teachers identified the following as facilitators of implementation: (i) usability of the Pau te Hau app, (ii) provision of heart rate feedback as a motivator for students, (iii) the curriculum links (such as class analyses of heart rate data in mathematics and incorporation of Mātauranga Māori (Māori knowledge), and (iv) increased student focus and engagement immediately post-session. There was strong general intention expressed for continued implementation. The use of the heart-rate monitors was identified as a potential barrier to future use given their cost and management at school level. Some teachers felt they were not confident to expand on the pūrākau to use as part of teaching practice, or that the links between the pūrākau and the exercises were not clear enough to be meaningful to student engagement and learning.

**Conclusions:** Facilitators of the Pau te Hau programme were generally expressed as factors encouraging further use. The barriers noted might limit broader implementation, hence specific mitigating strategies would need to be pre-emptively offered to enhance sustainability and scalability, however HIIT delivered in the classroom incorporating indigenous narratives by non-specialist teachers appears scalable.

# Methodological foundation for evidence-based co-creation

Ms. Giuliana Longworth<sup>4</sup>, **Ms. Danielle Agnello<sup>1</sup>**, **Ms. Katrina Messiha<sup>3</sup>**, Ms. Rabab Chirou<sup>2</sup>

<sup>1</sup>Glasgow Caledonian University, Glasgow, United Kingdom, <sup>2</sup>Ghent University, Ghent, Belgium, <sup>3</sup>Amsterdam University Medical Centers, Amsterdam, Netherlands, <sup>4</sup>Fundacio Blanquerna, Barcelona, Spain, <sup>5</sup>National Center for Scientific Research Demokritos, Athene, Greece, <sup>6</sup>Umea University, Umea, Sweden, <sup>7</sup>Jacob University, Bremen, Germany

**S.2.29 - Advancing the science of co-creation of health promotion and behaviour change interventions: Health Cascade Network, Clarion Hotel Gillet - Room Akademien, June 16, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** To investigate the theoretical, ethical and methodological underpinning of co-creation to elevate co-creation into a rigorous and evidence-based methodology in collaboration with state-of-the-art digital technologies.

**Methods:** Through robust evidence synthesis, four Early Career Researchers are developing research to enable evidence-based co-creation. As a collective process, these fellows produce a methodology informed through continuous feedback from the multi-sectorial application.

**Methods:** An exhaustive database of scientific publications about co-creation in all field of research was compiled using a systematic search aided by artificial intelligence to consolidate existing knowledge on co-creation. Series of reviews were completed to establish the epistemological underpinning, ontological and ethical guiding principles and named theories currently in use in co-creation in various fields. We developed an exhaustive list of methods and evaluation frameworks that have been used in co-creation and organised them into taxonomy. Finally, using the differentiate principle we are developing key characteristics that have to be enacted by co-creation practice to be evidence-based and rigorous.

**Results:** The database contains over 13000 articles published until 2021. Reviews reveal multiple gaps between the aspiration of using co-creation and how it is delivered in practice. There is a lack of theoretical underpinning and methods used rarely go beyond simply consulting other stakeholders. We have established a working definition for evidence-based co-creation. Further to contemplate a guiding ontology for evidence-based co-creation in public health, such as the promise of critical realism. We have provisional ethical considerations such as 'acting in value' and the critical heuristics of co-creation using existing literature. We have developed a taxonomy of methods and critically appraised different evaluation frameworks.

**Conclusions:** For co-creation to be rigorous and an evidence-based methodology there a need to combine the rigour of Mode 1 research with the participatory and flexible approach of Mode 2 research Gibbons (2000). A Draft Evidence-based Co-Creation for Public Health Guideline is collective ongoing piece of work intended to provide co-creators with step-by-step guidance for executing a co-creation process in public health.

# Enabling Technology for Evidence-Based Co-creation

**Mr. George Balaskas<sup>2</sup>, Mr. Quentin Loisel<sup>1</sup>**

<sup>1</sup>Glasgow Caledonian University, Glasgow, United Kingdom, <sup>2</sup>National Center for Scientific Research Demokritos, Athenes, Greece

**S.2.29 - Advancing the science of co-creation of health promotion and behaviour change interventions: Health Cascade Network, Clarion Hotel Gillet - Room Akademien, June 16, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** How can supportive digital technologies, such as artificial intelligence tools, knowledge management, cloud-based platforms and other tools can assist and enhance the process of conducting, governing and evaluating co-creation? What characteristics these technology need to have in order to enable and enact a rigorous, evidence-based and ethical process?

**Methods:** Two Early Career Researchers are developing investigations to answer these questions. They have established a needs assessment based on qualitative expert interviews, scoping review of the literature (based on the database of co-creation research established by the network) and fieldwork working while developing co-creation protocols in Education, Health Care, Urbanism and Work-place settings. They have reviewed human limitations in the process of co-creation (e.g. bias, power play). They have done review of existing technology and identified gaps.

**Results:** Three class of needs were identified. First, the need for technology enabling the co-creation process including data management and knowledge synthesis, communications and organisation of the process. Second, the need for technology enabling the governance of the process and ensuring transparency, openness and ethics. Third, the need for technology to enable a conducive material and human environment. Existing and gaps in technologies were identified and prioritised. The need for tools to enable rapid evidence synthesis being the top priority. Two prototype technologies have been developed: A question and answer system enabling rapid synthesis of evidence that can be used by co-creators during the process to find evidence and a system capable of listening to co-creation workshops and outputting a summary of key themes and decision made.

**Conclusion:** Technology can enable to surmount some human limitation in the co-creation process but also speed up the process and render it more robust, fairer and more transparent. However, technology with the right characteristics need to be developed and tested.



# Multi-sectorial application of evidence-based co-creation

**Ms. Kunshan Goh<sup>3</sup>, Mr. Anand Kumar Vinayak<sup>6</sup>**, Ms. Janneke De Boer<sup>2</sup>, Ms. Lea Delfmann<sup>2</sup>, Ms. Mira Vogelsang<sup>1</sup>, Ms. Lauren McCaffrey<sup>1</sup>, Mr. Jorge Zapata<sup>4</sup>, Ms. Qingfan An<sup>5</sup>, Ms. Sara Rachdan<sup>3</sup>  
<sup>1</sup>Glasgow Caledonian University, Glasgow, United Kingdom, <sup>2</sup>Ghent University, Ghent, Belgium, <sup>3</sup>Amsterdam University Medical Centers, Amsterdam, Netherlands, <sup>4</sup>Fundacio Blanquerna, Barcelona, Spain, <sup>5</sup>Umea University, Umea, Sweden, <sup>6</sup>Jacob University, Bremen, Germany

**S.2.29 - Advancing the science of co-creation of health promotion and behaviour change interventions: Health Cascade Network, Clarion Hotel Gillet - Room Akademien, June 16, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** Evidence-based co-creation methodology complemented by enabling technologies have a multi-sectorial application for health promotion and behaviour change in diverse group of people. The purpose of this talk is to present the range of settings and population in which evidence-based co-creation is being deployed, tested and adapted through action research.

**Methods:** Nine Early Career Researchers are co-creating health promotion interventions in diverse sector and populations including: a) promotion of sleep in school adolescent, b) promotion of physical activity in Small and Medium Enterprises, c) non-pharmaceutical digital health intervention for COPD patients, d) design of common indoor and outdoor spaces for healthy ageing in care home residents, e) place-making for youth-friendly urban spaces to promote health and wellbeing and f) digital health tools for mother and baby health in obstetrics.

**Results:** Collective co-creation protocol clinics, reflection practices and evaluation have been developed to extract lesson learned and improve the methodological foundation of evidence-based co-creation. A co-creation protocol library has been established. Recruitment and early development are underway.

**Conclusions:** Cross-learning from different applications can be extracted for understanding co-creation as applied to various contexts/ settings, demographics and public health concern. Use of the foundational methodology (namely underpinning theory, ethics, methods, implementation and evaluation) as well as supporting technologies to this end provides evidence for learning about what works well and what could be improved.

# Evaluating factors that influence the implementation of the Active Living After Cancer program using the Consolidated Framework for Implementation Research: A mixed-methods study

**Dr. Scherezade Mama<sup>1</sup>**

<sup>1</sup>The University of Texas MD Anderson Cancer Center, Houston, USA

**S.2.30 - Effectiveness and Implementation of Active Living After Cancer: A Community-Based Program to Increase Physical Activity, Physical Function, and Quality of Life in Cancer Survivors, Clarion Hotel Gillet - Room Swedenborg, June 16, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** C. Cancer prevention and management

**Purpose:** The Active Living After Cancer (ALAC) program was expanded to MD Anderson's Houston-area locations (HALs) to extend program reach to cancer survivors in the greater Houston area and to test a new delivery model, where HAL employees task-shift to facilitate implementation. This study aimed to understand more about organizational factors that impacted program implementation and reach.

**Methods:** Between July 2021 and April 2022, data were collected through questionnaires and key informant interviews with HAL employees. The Consolidated Framework for Implementation Research (CFIR) was used to guide collection and analysis of questionnaire and interview data. Questions covered key attributes that influence implementation, including inner and outer setting characteristics of HALs, characteristics of individuals involved with implementation of ALAC within HALs, and processes and priorities within HALs that impact implementation. A construct by case matrix was created with ratings for each CFIR construct by interviewee and grouped by HAL to identify which constructs most strongly influenced implementation at each HAL.

**Results:** Twenty individuals across the four HALs completed key informant interviews and a brief questionnaire. An additional four individuals, one at each HAL, completed an organizational questionnaire about the HAL. Individuals who completed questionnaires and interviews included those in leadership and managerial positions (30%), clinical providers (50%), and other clinical staff (20%) at the HALs, and most were involved with the ALAC program as a champion (45%) or facilitator (45%). Most felt physical activity was a high priority to cancer survivors served at their HAL (77.3%) and that implementing ALAC was essential in meeting their organizational goals and objectives (86.4%). When asked what factors helped make implementation successful, individuals mentioned a team-based approach with open and ongoing bidirectional communication, a positive and inclusive culture, regular meetings to aid in implementation planning, and ensuring referrals fit into workflow. Commonly cited barriers included time constraints and a lack of awareness of the program within the HAL.

**Conclusions:** We identified several influential CFIR constructs and their impact on ALAC implementation. Findings reinforce the need for organizational buy-in to facilitate implementation of ALAC into clinical workflow and to extend the reach of evidence-based programs to meet survivorship needs.

# Active Living After Cancer: Program adaptation and outcomes

**Dr. Karen Basen-Engquist<sup>1</sup>**

<sup>1</sup>The University of Texas MD Anderson Cancer Center, Houston, USA

**S.2.30 - Effectiveness and Implementation of Active Living After Cancer: A Community-Based Program to Increase Physical Activity, Physical Function, and Quality of Life in Cancer Survivors, Clarion Hotel Gillet - Room Swedenborg, June 16, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** C. Cancer prevention and management

**Purpose:** Active Living After Cancer (ALAC) is a community-based program to improve the quality of life (QOL) and physical functioning of cancer survivors by promoting PA and providing navigation services for survivorship issues. In Phase 1 the program was provided to breast cancer survivors through partnerships with a single community organization. In Phase 2 we expanded to include survivors of other types of cancer, caregivers, and additional community partners. Here we report the impact of ALAC on PA, physical function, and QOL in underserved cancer survivors and their caregivers.

**Methods:** Participants in both phases were recruited through community organizations to participate in ALAC, which consists of 12 weekly sessions. They completed assessments of PA (Godin Leisure Time Exercise Questionnaire), physical functioning (6-min walk [phase 1 only], 30-sec sit-to-stand test), and QOL (PROMIS physical and mental health) at baseline and follow-up. Paired samples t-tests were used to assess changes in outcomes.

**Results:** In Phase 1, 188 participants enrolled and 127 provided data at both baseline and follow-up. The mean age of enrollees was 59.6 years (SD=10.7); 31% were white non-Hispanic, 31% were Black, and 27% were Hispanic. 15.5% spoke Spanish primarily. PA and QOL (mental and physical) improved from the baseline to follow-up (all  $P < .01$ ). Physical functioning improved, with increases in sit-to-stand repetitions (mean, 12.5 at the baseline vs 14.9 at the follow-up;  $P < .01$ ) and 6-minute walk distances (mean, 428m at the baseline vs 470m at the follow-up;  $P < .01$ ). Improvements were similar across the three racial/ethnic groups. In phase 2, 540 cancer survivors ( $M_{age}=61.1 \pm 11.3$ ) and 87 caregivers ( $M_{age}=62.3 \pm 13.1$  years) enrolled; participants were mostly women (91%), Hispanic (61%) or non-Hispanic Black (19%). Both survivors and caregivers experienced improvements in PA, physical functioning (30-sec sit-to-stand), and QOL.

**Conclusions:** Results indicate ALAC is effective for improving PA, physical functioning, and QOL among medically underserved cancer survivors and their caregivers. Furthermore, ALAC was successfully implemented by community partners within community settings and reached minority and medically underserved cancer survivors. Additional dissemination and implementation efforts are warranted to further extend reach, improve cancer survivorship, and reduce cancer health disparities among underserved cancer survivors.

# Program outcome comparisons between in-person vs. virtual group-based physical activity intervention for cancer survivors: Results from Active Living After Cancer

**Dr. Yue Liao<sup>1</sup>**

<sup>1</sup>University of Texas at Arlington, Arlington, USA

**S.2.30 - Effectiveness and Implementation of Active Living After Cancer: A Community-Based Program to Increase Physical Activity, Physical Function, and Quality of Life in Cancer Survivors, Clarion Hotel Gillet - Room Swedenborg, June 16, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** C. Cancer prevention and management

**Purpose:** The Active Living After Cancer (ALAC) is an evidence-based program to help cancer survivors be more physically active through 12 weekly group sessions. In March 2020, ALAC stopped the in-person group meetings and converted to a virtual format via videoconferencing in response to the coronavirus pandemic. This study aims to examine the differences in program outcomes between ALAC participants who completed the program in-person vs. those who completed it virtually.

**Methods:** ALAC participants' attendance and program outcomes were compared between those who attended the program virtually vs. those who attended in-person. Participants completed questionnaires which included items to assess physical activity and quality of life, and a 30-second sit-to-stand test (observed via video call for virtual groups) to assess physical functioning at baseline and follow-up. Repeated measures ANOVA was used to test differences between group over time.

**Results:** A total of 578 cancer survivors who attended the in-person program and 191 who attended the virtual program were included in the analysis. Participants in the in-person program were older (61 vs. 58 yrs old), less educated (22% vs. 35% college degree or above) and had a higher portion using Spanish as the primary language (65% vs. 53%) compared to those attended the virtual program ( $p < .05$ ). Only 55% in-person participants attended at least nine sessions vs. 71% in the virtual participants did so ( $p < .05$ ). Both groups increased their physical activity from baseline to follow-up ( $p < .05$ ) at the similar level. Participants in the virtual program had a greater improvement in physical functioning than those in the in-person program ( $p < .05$ ). No changes in quality of life were observed for both programs.

**Conclusions:** Preliminary data suggested that the virtual ALAC program is feasible and produces similar outcomes when compared to the in-person program. However, those who are willing and able to participate in a virtual program might have different demographics than those who participate in an in-person program. Future community-based programs should consider offering both in-person and virtual options to increase the opportunity to engage individuals from diverse backgrounds.

# Get-up study: a cluster RCT on the effects of reduced sitting on toddlers' cognitive development

**Dr. Eduarda Sousa-Sá**<sup>1,2,3,6</sup>, Prof. Anthony D. Okely<sup>1,4</sup>, Associate Professor Dylan P Cliff<sup>1</sup>, Dr. Zhiguang Zhang<sup>5</sup>, Dr. Sanne L.C. Veldman<sup>1,7</sup>, Dr. João R. Pereira<sup>1,2</sup>, Dr. Sara S. Pereira<sup>2,3</sup>, Associate Professor Steven J. Howard<sup>1</sup>, Dr. Rute Santos<sup>3,6</sup>

<sup>1</sup>University of Wollongong, Wollongong, Australia, <sup>2</sup>Lusófona University, Lisbon, Portugal, <sup>3</sup>University of Porto, Porto, Portugal, <sup>4</sup>Western Norway University of Applied Sciences, Sogndal, Norway, <sup>5</sup>Beijing Normal University, Beijing, China, <sup>6</sup>Laboratory for Integrative and Translational Research in Population Health, Porto, Portugal, <sup>7</sup>Vrije Universiteit, Amsterdam, Australia

**S.2.31 - Understanding and improving physical activity and sedentary behaviour: From infancy to adolescence, UKK - Main Hall (Level 6), June 16, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** G. Children and families

**Introduction:** Early childhood is a critical period to establish healthy patterns of physical activity and sedentary behaviours (SB), as well as positive trajectories for cognitive development. Cognitive development is paramount in the early years given its influence on future cognitive performance, academic achievement, health and wellbeing. The aim of this study was to describe the effects of reducing sitting time on cognitive development in Australian toddlers, from low to middle socio-economic strata, of the Get-Up! Study.

**Methods:** The Get-Up! Study was a 12-month, 2-arm parallel-group cluster RCT that included 27 Early Childhood Education and Care services and 333 healthy children (aged 12-26 months) at baseline. The intervention included four main strategies: (i) Educators' Professional development, (ii) Provision of resources/instrumental materials, (iii) Follow-up support and (iv) Performance monitoring and feedback. At baseline and at 12-month follow-up, we assessed cognitive development (Bayley Scales of Infant and Toddler Development Third edition) sitting time, sedentary time, and physical activity (accelerometers) as primary outcomes. Secondary outcomes included cardiovascular health, bone density and motor development. Randomization sequence was performed with a 1:1 allocation to intervention or control group (random block sizes of 2, 4 and 6, at the cluster level). The intervention was blinded to participants.

**Results:** Multilevel regression models showed that the 'Get-Up' study significantly increased the number of breaks in sitting time ( $\beta=29.51$ ,  $p=0.016$ ; 95% CI 5.49-53.54), light and total physical activity time, ( $\beta=17.86$ ,  $p=0.039$ ; 95% CI 0.87-34.84 and  $\beta=23.97$ ,  $p=0.033$ ; 95% CI 1.92-46.03, respectively), during childcare hours. The RCT showed significant effects on toddlers' cognitive development ( $\beta=11.34$ ,  $p=0.01$ ; 95% CI 4.61-18.07). as well as on toddler's motor development, specifically on object manipulation skills scores ( $\beta=0.76$ ,  $p=0.02$ ; 95% CI 0.12-1.40) after controlling for confounders. No adverse events or side effects were observed.

**Conclusions:** The results showed that a simple and affordable intervention, based on professional development targeting educators, to reduce sitting time in young children, during childcare hours, was able to increase breaks in sitting time and physical activity levels, as well as enhance cognitive and motor development.

# Gaining parent and child insights to design a screen time management program

**Dr. Lauren Arundell**<sup>1</sup>, Ms. Laura Gould<sup>1</sup>, Associate Professor Nicola D. Ridgers<sup>1,2</sup>, Dr. Ana Maria Contardo Ayala<sup>1</sup>, Dr. Katherine Downing<sup>1</sup>, Prof. Jo Salmon<sup>1</sup>, Prof. Anna Timperio<sup>1</sup>, Associate Professor Jenny Veitch<sup>1</sup>  
<sup>1</sup>Deakin University, Burwood, Australia, <sup>2</sup>University of South Australia, Adelaide, Australia

**S.2.31 - Understanding and improving physical activity and sedentary behaviour: From infancy to adolescence, UKK - Main Hall (Level 6), June 16, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Screen time is ubiquitous in the lives of children and families, and excessive use can impact physical, social, and mental health and wellbeing. To develop effective programs to help families manage screen time, it is crucial to understand their screen time management experiences and gain insight into their wants and needs for program delivery, strategy design and content, and how to maintain engagement in the program.

**Methods:** Thirty families in Victoria, Australia participated in semi-structures online interviews (parents mean age 40.8 years, 90% female; children mean age 11.4 years, 47% female). The interviews asked about developing a screen time management program for families, specifically who the program audience should be, their preferred delivery platform and delivery mode, what information, strategies and content they would want in the program, and how to maintain program engagement. Interviews were audio taped, transcribed, imported to NVivo, and analysed using inductive thematic analysis and a summative content analysis approach.

**Results:** The majority of families are experiencing challenges trying to manage screen time at home. Families are seeking a screen time management program with the preferred audience being both the parent and child. They want the program delivered online (website or app) with a combination of static and interactive content that could be accessed as needed. Seven categories of content/strategies for the program were sought by families including age-appropriate health information, accessing safe and appropriate online content including cyber-safety, goal setting and rewards, screen monitoring tools particularly for variable platforms and operating systems, examples of alternative activities to screen time, opportunities for parent social connections and sharing of experiences, and links to reputable information. To maintain engagement, it was suggested to include reminders sent via text message or through push notifications from the online platform.

**Conclusions:** Parents are urgently seeking help to manage screen time at home. Findings provide end-user insights into the preferred delivery, strategy design and content and engagement maintenance strategies, which should be considered in the development of a screen time management program for families.



# The mediating role of perceived motor competence and physical literacy on adolescent's physical activity participation

Dr. Nuria Ortega-Benavent<sup>1</sup>, Dr. Cristina Menescardi<sup>1</sup>, Dr. Jorge Romero-Martínez<sup>1</sup>, **Associate Prof. Isaac Estevan**

<sup>1</sup>University of Valencia, Valencia, Spain

**S.2.31 - Understanding and improving physical activity and sedentary behaviour: From infancy to adolescence, UKK - Main Hall (Level 6), June 16, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** An alarming trend of low physical activity (PA) participation in youth is evidenced globally. Actual and perceived motor competence (AMC and PMC, respectively) have been reported to be precursors to long-term PA participation. Specifically, a mediating role of PMC into the relationship between AMC and PA was proposed, and a recent systematic review suggested indeterminate evidence for this path. In addition, MC can also contribute to mental health decreasing anxiety and social stress. So, maybe it is not only PMC that mediates the association between AMC and PA but further aspects linked to self-perception in physical, affective and cognitive domains impacting PA participation. In this line, physical literacy involves the aforementioned domains and is defined as the motivation, confidence, physical competence, knowledge and understanding to value and take responsibility for engagement in PA throughout the lifespan. As a part of the ALPHYL project, the purpose of this study was twofold: (1) to analyse the influence of PMC on the relationship between AMC and PA and, (2) to analyse the mediating role of perceived physical literacy (PPL) in this relationship.

**Methods:** A sample of 222 students (112 girls, 50.5%) aged 12-14 years ( $12.31 \pm 0.57$ ) from four different high-schools participated voluntarily. The PAQ-A, the CAMSA test, the PMSC and the Perceived Physical Literacy scales were used to measure PA, AMC, PCM and PPL, respectively, in the respective schools. Structural equation models controlled by gender were conducted.

**Results:** Regarding the first aim, the results reveal a positive association between AMC and PA both in the direct and in the PMC-mediated relationship pathway. Regarding the second aim, the PPL mediated the relationship AMC-PA practice. Consequently, there are psychosocial factors related to adolescents' self-perception (PMC and PPL) that impact their PA practice. Secondary-school PE teachers and practitioners should maintain a holistic approach by fostering not only physical but psychological, social and cognitive aspects because this is associated with the multicomponent perspective of PA.

**Conclusion:** Finally, physical literacy promotion could be a main goal into the school setting so that adolescent's active lifestyles are fostered (e.g., peers support and effective feedback during PE classes).

# Research- vs. government-driven physical activity policy monitoring: a systematic review across different levels of government

**Dr. Sven Messing<sup>1</sup>**, Dr. Antonina Tcymbal<sup>1</sup>, Dr. Karim Abu-Omar<sup>1</sup>, Ms. Diana Richardson<sup>1</sup>, Dr. Peter Gelius<sup>1</sup>  
<sup>1</sup>Friedrich-Alexander-Universität Erlangen-Nürnberg, Erlangen, Germany

**S.2.32 - Monitoring and assessing physical activity policy from local to national level., UKK - Level 6**  
**Foyer, June 16, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Even though the importance of physical activity policy monitoring has increased in the last decade, there is a lack of understanding what different approaches exist and which methodology they employ. In order to address this research gap, this review attempts to map existing approaches of physical activity policy monitoring and to analyse methodological aspects, especially with regards to the roles of governments and researchers.

**Methods:** A systematic search was conducted in five scientific databases, using the terms “physical activity”, “policy” and “monitoring” and their variations. In total, 12.963 studies were identified and, after the elimination of duplicates, screened independently by two reviewers. During full text analysis, information on methodological aspects was extracted and studies were categorized based on the level of government involvement.

**Results:** The search yielded in a total of 112 studies. More than three quarters of these studies followed a research-driven approach (little or no government involvement) while only two studies were based on a government-driven approach (led by governments). The remaining studies were based on a co-production approach (strong collaboration between researchers and governments). All in all, 18 different tools for physical activity policy monitoring were identified; key examples are the Report Cards on Physical Activity for Children and Youth (research-driven approach), the HEPA Monitoring Framework (government-driven approach) and the HEPA Policy Audit Tool (co-production approach).

**Conclusions:** The level of government involvement in policy monitoring differs significantly, and research-driven, government-driven and co-production approaches can be distinguished. These approaches have different strengths and weaknesses, and can be linked to distinct theories of change and models on research-policy relations. Increasing awareness on the implications of these approaches is key to improve the understanding and further development of physical activity policy monitoring.

# Reviewing local Physical Activity Policy: The CAPLA-Sante tool and its application

Dr. Antoine Noel-Racine<sup>1</sup>, Dr. Aurelie Van Hoyer<sup>2</sup>, Mrs. Amandine Baron<sup>3</sup>, Prof. Anne Vuillemin<sup>1</sup>, **Prof. Catherine Woods<sup>2</sup>**

<sup>1</sup>Université Côte d'Azur, Nice, France, <sup>2</sup>University of Limerick, Limerick, Ireland, <sup>3</sup>French Society of Public Health, Laxou, France

**S.2.32 - Monitoring and assessing physical activity policy from local to national level., UKK - Level 6**  
**Foyer, June 16, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** The promotion of health-enhancing physical activity (HEPA) has become a key objective in public health policy, but the lack of tools at local level is limiting its implementation. Based on the national HEPA Policy Audit Tool Version 2 (HEPA-PAT) of the World Health Organization, the CAPLA-Santé tool was designed to support local governments in assessing HEPA policies. The presentation will describe the adaptation process of the HEPA PAT, as well as results from data collection in France.

**Methods:** The adaptation work was conducted in three stages: (1) an intersectoral group of experts was constituted, and the group adapted each item of the HEPA PAT v2 tool to the local level; (2) a testing phase with seven local governments helped to collect data and feedback on the tool; and (3) a final workshop was organized to adjust and finalize the tool. Then, the CAPLA-Santé was used among 17 cities of the French Riviera.

**Results:** The final version of CAPLA-Santé contains 21 items divided into six major sections: overview of HEPA stakeholders in the local government area, policy documents, policy contents, funding and political engagement, studies and measures relating to physical activity in the local government area, and progress achieved and future challenges. Main findings using CAPLA included that written HEPA policy documents were formalized in only six cities. These documents (n = 14) were mainly from the sports (n = 8) and health services (n = 4) sectors. The key informants reported that support from national policy, the commitment of elected officials, and large local stakeholder networks facilitated HEPA promotion, whereas the lack of intersectoral collaboration and limited resources were the main barriers.

**Conclusions:** CAPLA-Santé allows the collection and in-depth analysis of local level policies to assess the progress in promoting HEPA and intersectoral collaboration as well as identifying successful policy levers and remaining challenges.

# Assessing the implementation of physical activity-promoting public policies in Ireland: A Study using the Physical Activity Environment Policy Index (PA-EPI)

**Mr. Kevin Volf<sup>1</sup>**, Dr. Liam Kelly<sup>1</sup>, Dr. Aurelie Van Hoyer<sup>1</sup>, Dr. Enrique García Bengoechea<sup>1,2</sup>, Prof. Catherine Woods<sup>1</sup>

<sup>1</sup>University of Limerick, Limerick, Ireland, <sup>2</sup>Sport Ireland, Dublin, Ireland

**S.2.32 - Monitoring and assessing physical activity policy from local to national level., UKK - Level 6 Foyer, June 16, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Government policy can promote physical activity (PA) as part of a multilevel systems-based approach. The impact of government policy is determined by its design and its implementation. The Physical Activity Environment Policy Index (PA-EPI) is a tool, consisting of 45 good practice statements (GPS) or indicators, and a monitoring framework to assess government policies and actions for creating a healthy PA environment. This study presents the results of the PA-EPI in Ireland.

**Methods:** An iterative 8-step process was undertaken. Steps 1 to 4 involved collecting concrete examples of evidence of action or inaction on policy implementation and its validation by government officials. A national PA coalition (N=32), a group of non-government public health and PA stakeholders, was established and rated the evidence of the extent of implementation of policy and infrastructure support against international best practice (steps 5-6). A 4-category scorecard was used to attribute high, medium, low or none/very little implementation to each indicator, generating a PA-EPI score. The final steps (7-8) identified future implementation priorities, actions and dissemination strategies.

**Results:** Of the 45 PA-EPI indicators, one GPS received a rating of none/very little, 25 low and 19 medium implementation. Critical implementation gaps were identified in the transport, urban design and healthcare policy domains, while sport and education fared better. In infrastructure support, evidence of gaps emerged for the Health in all Policies domain. While no GPS was rated as fully implemented by the panel, the GPSs that were implemented to the greatest extent related to government action to sustain mass media campaigns promoting PA and the monitoring of PA across the life course. Ten priority recommendations for public sector action on implementation were developed.

**Conclusions:** The PA-EPI tool can help policymakers determine where their country is now in relation to the implementation of policies to enhance PA, what is possible to change. It provides pathways on how to address implementation gaps and a mechanism for documenting progress. Country cross comparisons of PA-EPI results will, in time, help establish benchmarks for governments at the forefront of creating and implementing policies to address physical inactivity.

# The ‘necessity- versus choice-based physical activity models’ framework

**Dr. Deborah Salvo<sup>1</sup>**, Dr. Alejandra Jauregui<sup>2</sup>, Dr. Deepti Adlakha<sup>3</sup>, Dr. Olga Sarmiento<sup>4</sup>, Dr. Rodrigo Reis<sup>5</sup>  
<sup>1</sup>The University of Texas at Austin, Austin, USA, <sup>2</sup>Instituto Nacional de Salud Publica, Cuernavaca, Mexico, <sup>3</sup>North Carolina State University, Raleigh, USA, <sup>4</sup>Universidad de los Andes, Bogota, Colombia, <sup>5</sup>Washington University in St. Louis, St. Louis, USA

**S.2.33 - When moving is the only option: the role of necessity versus choice for understanding and promoting physical activity in Low- and Middle-Income Countries, UKK - Hall B (Level 3), June 16, 2023, 4:15 PM - 5:30 PM**

## **SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** For many, physical activity is not a “healthy choice”, but an economic necessity. The aim of this paper is to describe a new conceptual tool for guiding contextually-relevant physical activity research and promotion efforts globally, with emphasis in low- and middle-income countries (LMICs): the “necessity- vs. choice-based physical activity models” framework.

**Methods:** A critical review of the physical activity literature was conducted to understand why to date most physical activity research and promotion efforts are framed through a “choice-based model. This included a summary of the: a) historical population patterns and drivers of physical activity, b) origins and evolution of the field of physical activity and health research, and c) key macro-level drivers of physical activity in LMICs. A new framework for conducting ethical and contextually-relevant physical activity research and promotion in different global settings, including those where physical activity is the result of economic necessity, was developed.

**Results:** We identified the “physical activity transition” and “physical activity paradox” theories as critical for understanding population patterns and drivers of physical activity in LMICs. Data from a selection of LMICs and high-income countries on the share of the population in physical labor jobs, car ownership prevalence, and income inequality measures, support the need for a necessity-based model of physical activity in these settings. The “necessity- vs. choice-based physical activity models” framework includes: 1) a classification of the domains that contribute to choice- (leisure and choice-based active transport), versus necessity- (occupational and necessity-based active transport) based physical activity; 2) the use of macro-contextual information to determine the predominant physical activity model in the population (economic context, epidemiological context, job market, family life, crime and violence, infrastructure and traffic safety, travel mode patterns, and discretionary time patterns); and 3) a 5-stage process for conducting contextually-responsive physical activity research and promotion with consideration of the underlying model in the given setting (necessity vs. choice based).

**Conclusion:** To promote equity, physical activity research, programs and policies in LMICs must focus on improving the conditions under which necessity-driven physical activity occurs for a vast majority of the population, whilst increasing opportunities for active leisure.

# Innovative strategies to improve the conditions in which necessity-based physical activity takes place in LMICs: case study of informal urban settlements in Bogotá, Colombia

**Dr. Olga Sarmiento**<sup>1</sup>, Dr. Alejandra Jauregui<sup>2</sup>, Dr. Deepti Adlakha<sup>3</sup>, Dr. Rodrigo Reis<sup>4</sup>, Dr. Deborah Salvo<sup>5</sup>

<sup>1</sup>Universidad de los Andes, Bogotá, Colombia, <sup>2</sup>Instituto Nacional de Salud Pública, Cuernavaca, Mexico,

<sup>3</sup>North Carolina State University, Raleigh, USA, <sup>4</sup>Washington University in St. Louis, St. Louis, USA, <sup>5</sup>The University of Texas at Austin, Austin, USA

**S.2.33 - When moving is the only option: the role of necessity versus choice for understanding and promoting physical activity in Low- and Middle-Income Countries, UKK - Hall B (Level 3), June 16, 2023, 4:15 PM - 5:30 PM**

## **SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** Cable cars are part of a novel sustainable transport model emerging in multiple Latin American cities for providing efficient public transport options to low-income populations living in informal urban settlements, for whom commuting times are otherwise extremely high, hindering their quality of life and reducing their free-time. We assessed the effects of TransMiCable on physical activity among dwellers of informal urban settlements in Bogotá, Colombia.

**Methods:** The natural experiment TrUST (Urban Transformations and Health) was conducted in 2018 and 2019 in intervention and control neighbourhoods. Physical activity was assessed before and after the implementation of the TransMiCable system using questionnaires (825 and 854 adults in the intervention and control groups) and accelerometers (357 and 334 adults in the intervention and control groups). Physical activity was also assessed using direct observation in parks in the studied areas. Multilevel regression models were used to assess changes in physical activity associated with the implementation of TransMiCable.

**Results:** 40.5% of adults in the intervention-group reported walking for transport more than 150 minutes per week before the TransMiCable and 51.6% afterwards (95% CI for the change: 6.4%, 15.9%), but this change did not differ from controls (OR 1.1; 95% CI 0.8, 1.5). Moderate-to-vigorous physical activity measured with accelerometry was 52.1 minutes per day before and 59.4 minutes per day after the TransMiCable in new users (95% CI for change: -22.5, 7.9). We observed an increase in physical activity in one of the intervention-neighborhood parks among males (OR 2.7; 95% CI 1.1, 6.8).

**Conclusion:** It is encouraging that physical activity remained high after implementing a new public transport system that significantly reduces overall commuting times (and hence enhances quality of life) for disadvantaged, low-income groups, for whom walking is the result of necessity and not “a healthy choice”. Urban transport interventions that improve the conditions in which necessity-driven physical activity takes should be accompanied by efforts to improve opportunities for active leisure, to avoid net-losses in overall physical activity, while improving equity and quality of life for urban commuters.



# Uncovering the necessity-based model of physical activity in middle-income country cities: exploring the role of motor-vehicle access on physical activity in Cuernavaca, Mexico, and Chennai, India.

**Dr. Deepti Adlakha**<sup>1</sup>, Dr. Alejandra Jauregui<sup>2</sup>, Dr. Olga Sarmiento<sup>3</sup>, Dr. Rodrigo Reis<sup>4</sup>, Dr. Deborah Salvo<sup>5</sup>

<sup>1</sup>North Carolina State University, Raleigh, USA, <sup>2</sup>Instituto Nacional de Salud Publica, Cuernavaca, Mexico,

<sup>3</sup>Universidad de los Andes, Bogota, Colombia, <sup>4</sup>Washington University in St. Louis, St. Louis, USA, <sup>5</sup>The University of Texas at Austin, Austin, USA

**S.2.33 - When moving is the only option: the role of necessity versus choice for understanding and promoting physical activity in Low- and Middle-Income Countries, UKK - Hall B (Level 3), June 16, 2023, 4:15 PM - 5:30 PM**

## **SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** Efforts to promote active transportation remain under-developed in low- and middle-income countries (LMICs). This study explored the applicability of a necessity-based model of active transportation in two LMIC cities with comparable levels of socioeconomic inequality, by examining the association of motor-vehicle ownership with domain-specific physical activity outcomes.

**Methods:** We conducted a cross-sectional analysis of 674 and 367 adults ( $\geq 18$  years) from Cuernavaca, Mexico (MEX) (2011), and Chennai, India (IND) (2015), respectively. Data were collected using standardized procedures of the International Physical Activity Environment Network adult study. Logistic regressions adjusting for age, sex, education, marital status, and neighborhood sampling cluster estimated the effect of motor vehicle ownership (yes/no) on: 1) any public transit use for commuting; 2) active travel (walking, bicycling) for commuting, 3)  $\geq 150$  minutes/week of leisure-time walking, 4)  $\geq 150$  minutes/week of leisure-time moderate-to-vigorous physical activity (MVPA), and 5)  $\geq 150$  minutes/week of transport-based physical activity. Analyses were stratified by site.

**Results:** In both sites, a higher proportion of participants met recommendations through transport-based physical activity (MEX=46.8%; IND=25.6%), versus leisure-time walking (MEX=14.2%; IND=22.5%) or leisure-MVPA (MEX=20.4%; IND=20.2%). In MEX and IND, after adjusting for covariates, owning a motor-vehicle was significantly associated with lower odds of any public transit use (MEX: OR=0.2, 95%CI=0.2-0.3; IND: OR=0.3, 95%CI=0.1-0.9), any use of active transportation (MEX: OR=0.2, 95%CI=0.2-0.3; IND: OR=0.1, 95%CI=0.0-0.6), and achieving  $\geq 150$  minutes/week of transport-based physical activity (MEX: OR=0.7, 95%CI=0.5-1.0; IND: OR=0.3, 95%CI=0.1-0.8). Motor vehicle ownership was not significantly associated with achieving  $\geq 150$  minutes/week of leisure-time walking or MVPA in either site ( $p>0.05$ ). Findings are consistent with studies from LMICs like Mexico, Colombia, and Nigeria, where car ownership is negatively associated with transport-based activity levels.

**Conclusions:** Most physical activity in both cities is transport-related, and occurs the most among people without access to cars. Participation in leisure-time physical activity in these settings is low. Physical activity research and promotion efforts in Chennai and Cuernavaca should take into consideration the operating necessity-based model for physical activity, by focusing on improving the conditions in which necessity-driven physical activity takes place, changing social norms around car ownership, and increasing opportunities for choice-based physical activity.

# Optimal movement behaviour patterns for adiposity and health-related quality of life outcomes in Australian children

**Dr. Simone JJM Verswijveren<sup>1</sup>**, Prof. Anna Timperio<sup>1</sup>, Prof. Kylie D Hesketh<sup>1</sup>, Associate Professor Nicola D Ridgers<sup>1,2</sup>, Prof. Narcis Gusi<sup>3</sup>, Dr. Karen Lamb<sup>4</sup>, Dr. Lauren Arundell<sup>1</sup>, Prof. Chris Lonsdale<sup>5</sup>, Associate Professor Amanda Telford<sup>6</sup>, Dr. Natalie Lander<sup>1</sup>, Dr. Ana Maria Contardo Ayala<sup>1</sup>, Dr. Emiliano Mazzoli<sup>1</sup>, Dr. Taren Sanders<sup>5</sup>, Ms. Katrina Wilhite<sup>5</sup>, Dr. Helen Brown<sup>1</sup>, Prof. David Lubans<sup>7</sup>, Prof. Adrian Bauman<sup>8</sup>, Prof. Jo Salmon<sup>1</sup>

<sup>1</sup>Institute for Physical Activity and Nutrition, School of Exercise and Nutrition Sciences, Deakin University, Geelong, Australia, <sup>2</sup>Alliance for Research in Exercise, Nutrition and Activity, University of South Australia, Adelaide, Australia, <sup>3</sup>Faculty of Sport Sciences, University of Extremadura, Cáceres, Spain, <sup>4</sup>Melbourne School of Population and Global Health, University of Melbourne, Melbourne, Australia, <sup>5</sup>Institute for Positive Psychology and Education, Australian Catholic University, Sydney, Australia, <sup>6</sup>School of Education, RMIT University, Bundoora, Australia, <sup>7</sup>Centre for Active Living and Learning, School of Education, University of Newcastle, Newcastle, Australia, <sup>8</sup>Sydney School of Public Health, The University of Sydney, Sydney, Australia

**S.2.34 - Goldilocks and the Three Postdocs: Exploring the optimal day for health and wellbeing, UKK - Hall C (Level 3), June 16, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose** The optimal combination and accumulation of movement behaviours (the “Goldilocks Day”) for child health is unknown. This study aimed to: 1) examine associations of device-based movement behaviour compositions, including longer and shorter physical activity and sedentary bouts, with adiposity and health-related quality of life (HRQoL) outcomes; and, 2) determine the optimal time-use composition for these outcomes.

**Methods** Baseline ActiGraph GT3X+ accelerometry, adiposity (measured body mass index [BMI] and waist circumference) and self-reported EQ-5D-Y HRQoL data from the TransformUs effectiveness trial were used (2018; n=1252). Movement behaviours during waking wear time were divided into shorter and longer sedentary (<5 and ≥5 min), and light-, moderate- and vigorous-intensity physical activity (<1 and ≥1 min) bouts. The HRQoL composite score was a sum of five dimensions: mobility, looking after myself, doing usual activities, having pain/discomfort, and feeling worried/sad/unhappy. Compositional regression models examined associations between movement behaviour compositions and outcomes (BMI, waist circumference and HRQoL), adjusting for age, sex, area-level socio-economic status, logarithmic wear time and school. Model predictions were used to estimate the average “Goldilocks Day” time-use composition associated with top-5% health outcomes.

**Results** Valid (≥4 days, including ≥1 weekend day) accelerometry data from 891 children were obtained (mean age=9.0 years, SD=0.71; 51% female; 56% high socio-economic areas). Models showed evidence of associations between overall compositions and BMI ( $F=15.272$ ), waist circumference ( $F=13.009$ ), and quality of life ( $F=4.267$ ; all  $p<0.001$ ). The estimated “Goldilocks Day” for optimal health was similar across outcomes. Specifically, it consisted of 8-8.5 hours of sedentary time (18-22% spent in longer bouts), and 168-200 mins light- (2-2.5% in longer bouts), 36-45 mins moderate- (1-2% in longer bouts) and 38-48 mins (3-4% in longer bouts) of vigorous-intensity physical activity. The ‘Goldilocks Day’ included smaller proportions spent in longer bouts of all intensities compared to suboptimal compositions.

**Conclusions** The results suggest that combined movement behaviours were associated with adiposity and quality of life. Specifically, shorter bouts across the movement behaviour spectrum may be more beneficial for

health compared to longer bouts. Longitudinal studies should confirm whether children should engage in shorter physical activity and sedentary bouts to attain health benefit.

# The Goldilocks Day for optimal overall health among young adult participants within the Raine Study

**Dr. Charlotte Lund Rasmussen<sup>1,2</sup>**, Dr. Dot Dumuid<sup>3</sup>, Associate Prof. Joanne McVeigh<sup>4</sup>, Prof. Leon Straker<sup>4</sup>

<sup>1</sup>Norwegian University of Science and Technology, Trondheim, Norway, <sup>2</sup>Department of Physical Education and Sport Sciences, University of Limerick, Limerick, Ireland, <sup>3</sup>Alliance for Research in Exercise, Nutrition, and Activity (ARENA), Allied Health and Human Performance, University of South Australia, Adelaide, Australia,

<sup>4</sup>School of Allied Health and enAble Institute, Curtin University, Perth, Australia

**S.2.34 - Goldilocks and the Three Postdocs: Exploring the optimal day for health and wellbeing, UKK - Hall C (Level 3), June 16, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose** Daily time spent sedentary and active is well-acknowledged to influence health, with current physical behaviour guidelines recommending adults “sit less” and “move more”. However, how much time to spend in each behaviour for optimal overall health remains uncertain. The aim of this study was to investigate the optimal time-use composition for self-reported overall health among a group of young adults.

**Methods** This cross-sectional study was based on 658 men and 678 women who participated in the 22-year-old follow-up of the Raine Study pregnancy cohort. The average daily time-use composition of sedentary (SB), light physical activity (LPA) and moderate-to-vigorous physical activity (MVPA) was measured using hip-worn accelerometers. Self-reported overall health was assessed using the Short Form 12 Health Survey (SF-12) was regressed against the time-use composition and expressed as isometric log-ratios, adjusted for sex, age, BMI, and smoking status. The model was used to estimate the optimal time-use composition associated with best 5% of overall health, i.e., the “Goldilocks Day”.

**Results** Average age among the study participants was 22.1 years (SD=0.6), average BMI was 25.0 (SD=5.2) and average self-reported overall health was 2.7 (SD=0.9, range=1.0-5.0). The compositional mean in the total sample consisted of 9.3 h of SB, 5.2 h of LPA and 0.4 h of MVPA. The time-use composition was associated with overall health ( $F_{df1=2, df2=684} = 4.95, p = 0.001$ ). Compared to the overall sample mean, more time spent sedentary, and less time spent active was associated with best overall health. Specifically, the estimated Goldilocks Day consisted of 10.6 h of SB, 4.3 h of LPA and 0.1 h of MVPA.

**Conclusions** In contrast to current physical activity guidelines, our results suggest that reducing sedentary time and being more active does not necessarily associate with better overall health among young adults. This may reflect that time spend relaxing is essential for general well-being among this population group. If results are confirmed in future studies, this would imply that physical behaviour guidelines should be tailored to the audience and their current behaviours.

# The Goldilocks Day of 24-Hour Time-Use Behaviours for the Health and Well-Being of Youth within a National Time-Use Survey

**Dr. Nicholas Kuzik<sup>1</sup>**

<sup>1</sup>Healthy Active Living and Obesity Research Group, Children's Hospital of Eastern Ontario Research Institute, Ottawa, Canada

**S.2.34 - Goldilocks and the Three Postdocs: Exploring the optimal day for health and wellbeing, UKK - Hall C (Level 3), June 16, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose** Movement behaviour distribution research has improved our understanding of the ideal day of sleep, physical activity, and sedentary behaviours. Time-use surveys could complement previous research by adding a unique layer of context to the conceptualization of an ideal day of time-use behaviours. The purpose of this study was to identify the ideal distribution of self-reported contextual time-use behaviours for health and well-being in youth.

**Methods** Data from the 2015 General Social Survey (GSS) Time Use Survey (full sample,  $n = 17,390$ ) were used to create an analytical sample including only 15-24-year-old students ( $n=551$ ). Interviewed participants recalled their primary activities over a 24-hour period in 10-min intervals. Primary activities were categorized into the time-use behaviour variables: *Sleep*, Activities of Daily Living (*ADL*), *Active* (Active Leisure and Sports), *Television*, *Socializing*, and *Reading*. Examined outcomes included self-reported: well-being, health, and mental health. Robust regression models were built with the health/well-being outcomes and isometric log-ratio time-use behaviour compositions. For significant models, changes in health/well-being outcomes were predicted for all possible substitutions of time-use behaviours within a 2 SD range (e.g.,  $\pm 2SD$  *Sleep*). The top and bottom 2.5% of predicted health/well-being outcomes were retained to present the best and worst distributions of time-use behaviours.

**Results** The composition of time-use behaviours was significantly associated with subjective well-being, and the best day of time-use behaviors (minutes/day) were: *Sleep*=704.82 [95%CI:704.55, 705.07], *ADL*= 207.93 [95%CI:207.80, 208.05], *Active*= 265.97 [95%CI:265.68, 266.28], *Television*= 162.85 [95%CI:162.62, 163.09], *Socializing*= 74.63 [95%CI:74.43, 74.82], and *Reading*= 23.80 [95%CI:23.75, 23.85]. Compared to the average day, all time-use behaviours on the best day were higher except for *ADL*. Interestingly, the worst day of time-use behaviours for subjective well-being included more time spent *Socializing* and *Reading* compared to the best day.

**Conclusions** The best day of time-use behaviours for subjective well-being traded more leisure time for less *ADL*. An optimal zone was observed, where the time spent *Socializing* and *Reading* during the best day was more than the average day but less than the worst day. Future research should continue to explore categories of self-reported contextual time-use behaviours and their interrelationships.

# Showcasing the use of food purchase data in health research – the LoCard study

**Dr. Henna Vepsäläinen<sup>1</sup>**, Dr. Maijaliisa Erkkola<sup>1</sup>, Dr. Satu Kinnunen<sup>1</sup>, Dr. Jelena Meinilä<sup>1</sup>, Dr. Liisa Uusitalo<sup>1</sup>, Dr. Anna-Leena Vuorinen<sup>1</sup>, Dr. Hannu Saarijärvi<sup>2</sup>, Dr. Jaakko Nevalainen<sup>2</sup>, Dr. Mikael Fogelholm<sup>1</sup>

<sup>1</sup>University of Helsinki, Helsinki, Finland, <sup>2</sup>Tampere University, Tampere, Finland

**S.2.35 - A data driven approach to understand food purchasing behaviour and co-produce instore interventions to encourage healthier and more sustainable purchasing behaviour, UKK - Hall D (Level 2 - main floor), June 16, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** Food retailers' customer loyalty-card data provide a unique tool for gaining insights into dietary patterns, health behaviors, and environmental sustainability. This presentation demonstrates the use of food purchase data with the most recent papers published from the LoCard study.

**Methods:** We obtained food purchase data from 47,066 loyalty-card holders of the largest grocery retailer in Finland. The consenting participants were randomized to fill in one of three online questionnaires concerning for example food consumption, attitudes, and nutrition literacy. The papers investigated 1) the relative validity of food purchases as a measure of food consumption, 2) transitions away from red meat as the main source of protein, 3) food purchase patterns and their carbon footprints, and 4) the effects of changes in alcohol legislation on alcohol purchases.

**Results:** Our study showed that the associations between food consumption and purchase data were mostly reasonable, suggesting that purchase data can be used as a proxy for food consumption in population-level studies. Food purchase profiles were dominated by red meat as a protein source, and red meat and plant-based food preferences showed the highest persistence with transitions from red meat most likely occurring towards other animal-based foods. An animal-based purchase pattern had the largest carbon footprint, whereas plant-based pattern had the smallest carbon footprint. The overall alcohol purchases did not increase as a result of a law reform allowing the sale of stronger alcoholic beverages in grocery stores.

**Conclusions:** Food purchase data can be used to examine nutritional quality, price, and carbon footprint of purchases in different socio-demographic groups. Objective, automatically accumulating food purchase data is also beneficial in monitoring the food system transformation as well as the potential short- and long-term effects of unexpected food system crisis, such as the COVID19 pandemic, inflation, or the war in Ukraine. Additionally, it can be used to give personalized, individual feedback on healthiness and carbon footprint of purchases.



# Does incentivisation increase purchases of fruit and vegetables in a supermarket setting? An analysis of loyalty card transaction data.

Ms. Ann Onuselogu<sup>1</sup>, Ms. Maddie Thomas<sup>1</sup>, **Dr. Francesca Pontin**<sup>1</sup>, Ms. Alexandra Dalton<sup>1</sup>, Prof. Willaim Young<sup>1</sup>, Dr. Alison Fields<sup>1</sup>, Associate Professor Michelle Morris<sup>1</sup>

<sup>1</sup>University of Leeds, Leeds, United Kingdom

**S.2.35 - A data driven approach to understand food purchasing behaviour and co-produce instore interventions to encourage healthier and more sustainable purchasing behaviour, UKK - Hall D (Level 2 - main floor), June 16, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** The supermarket setting is a prime location to test interventions that encourage purchase of healthier and more sustainable foods. We analysed two supermarket interventions using incentivisation as a behavioural lever to promote purchases of fruit and vegetables, and investigated the impact on the sales of these items, and the impact on the complete basket in comparison with the Eatwell Guide – the UK dietary recommendations.

**Methods:** In Trial 1, selected items were reduced in price to 60p in 101 UK supermarkets for the first 4 weeks of January in 2020 and 2021. We tested whether there was a difference in sales of the selected items compared to January 2019 and used interrupted time series analysis to test for sustained behaviour post intervention. In Trial 2 the supermarket issued a £2 top up voucher for use on fruit or vegetable purchases, to all shoppers using a government issued healthy start voucher between February and August 2021. We tested whether purchases of these items varied compared to baseline and whether behaviour was sustained post trial. For both trials, we matched all products to the Eatwell Guide categories and investigated differences compared to baseline and to baskets that did not engage with the trial.

**Results:** Reducing the price of fruit and vegetables led to a short-term uplift in the sales, increasing the diversity of the shoppers basket. The intervention was more effective in 2020 (78% uplift, 2.8 million more portions) than in 2021 (56% uplift, 2.1 million more portions) when the UK was living through a covid-19 national lockdown. Providing a £2 top-up voucher for fruit and vegetables for low-income families led to increased purchasing of fruit and vegetables, where the voucher was used. Both trials led to a positive shift towards the Eatwell guide recommendation for baskets that engaged with the trial promotion.

**Conclusions:** Incentivisation is an effective behavioural lever to encourage purchases of fruit and vegetables. In the general population, this lever is only effective for a short period. In low-income communities behaviour change is sustained for longer. More needs to be done to encourage Eatwell guide adherence.

# The role of product placement in encouraging healthier and more sustainable purchasing choices

Dr. Francesca Pontin<sup>1</sup>, Dr. Victoria Jenneson<sup>1</sup>, Associate Professor Michelle Morris<sup>1</sup>

<sup>1</sup>University of Leeds, Leeds, United Kingdom

**S.2.35 - A data driven approach to understand food purchasing behaviour and co-produce instore interventions to encourage healthier and more sustainable purchasing behaviour, UKK - Hall D (Level 2 - main floor), June 16, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** Placement of products within the retail environment, including in-store location, shelving height and placement of complementary products side by side are all proven marketing techniques. We tested the theory that product placement can be utilised to encourage purchasing of healthier and/or more sustainable dietary choices. This presentation evaluates trials with two retailers looking at the placement of a) plant-based meat alternatives and b) salad products to encourage purchasing of these items and alignment of baskets towards the UK's Eatwell Guide recommendations.

**Methods:** Followed a non-randomised controlled before and after design, trial and control stores were matched based on customer demographic information by the retailer. Transaction data was obtained for the included stores for a yearlong pre-trial period, the 12-week intervention duration and a 12-week post-trial period. Interrupted time series modelling was used to evaluate trial success. A fuzzy matching algorithm was also developed to match products within the transaction data to the Eatwell guide to investigate any wider basket shifts towards a healthier and more sustainable diet.

**Results:** The placement of PBMA products alongside their meat counterparts was found to have a significant negative effect, with the sale of these products decreasing by 30% in trial stores. This unintended negative consequence was associated with lack of dual siting, suggesting regular PBMA customers were unable to find the PBMA products. Furthermore, we hypothesise that placement of PBMA products directly next to meat products highlighted the price differences of more expensive PBMA's, discouraging a swap to PBMA's. In contrast the salad placement trial had a positive impact on sales, but only for the first 3-weeks of the intervention. Seasonality appeared to impact the sale of salad products, mediating the trial's longer-term effectiveness.

**Conclusions:** Product placement interventions are product specific and risk unintended consequences, thus should be investigated in a real-world trial setting before long-term implementation. For success of interventions through product placement signposting may be needed to help customers find products which have been moved and prices should be comparable. Seasonality should also be considered to ensure promoted products align with customer preferences.

# Impact of financial incentives and default options on food choices in online retail settings

**Dr. Pasquale Rummo<sup>1</sup>**, Dr. Christina Roberto<sup>3</sup>, Dr. Lorna Thorpe<sup>1</sup>, Dr. Andrea Troxel<sup>1</sup>, Dr. Brian Elbel<sup>1,3</sup>

<sup>1</sup>Department of Population Health, New York University Grossman School of Medicine, New York City, USA,

<sup>2</sup>Wagner Graduate School of Public Service, New York University, New York City, USA, <sup>3</sup>Perelman School of Medicine, University of Pennsylvania, Philadelphia, USA

**S.2.36 - Online grocery stores as a novel tool for promoting healthy diets, UKK - K1 (+K2) (Level 3), June 16, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** The recent growth in online grocery shopping offers a promising opportunity to tailor healthy eating interventions to online settings, where it is easier to modify the design of shopping environments to influence consumer decision-making. We leveraged this opportunity by examining the extent to which financial incentives and default shopping cart options influence fruit and vegetable purchases.

**Methods:** We recruited 2,528 adults residing in the U.S. who currently or have ever received nutrition assistance benefits, and randomly assigned participants to one of four conditions: no intervention, 50% discount on eligible fruits and vegetables, pre-filled shopping carts with tailored fruit and vegetable items (i.e., default options), or a combination of a discount and default options. Participants were instructed to shop for a week's worth of groceries for their household in an experimental online grocery store, with a budget tailored to household size; no payment was taken.

**Results:** Approximately 54% of participants reported shopping online for groceries in the previous 12 months and 70% were classified as being food insecure. On average, participants spent 20.5% (SD=23.5) of total dollars on fruits and vegetables. Compared to no intervention, those in the discount, default, and combination conditions spent 4.7% (98.3% CI: 1.7, 7.7), 7.8% (98.3% CI: 4.8, 10.7), and 13.0% (98.3% CI: 10.0, 16.0) more of total dollars on fruits and vegetables, respectively. There was no difference between the discount and default conditions ( $p=0.06$ ) but the effect in the combination condition was significantly larger than both discount and default conditions ( $p's<0.001$ ). Default shopping cart items were purchased by 93% and 96% of participants in the default and combination conditions, respectively, compared to 46% and 53% of those in the control and discount conditions, respectively ( $p's<0.001$ ). We observed no significant variation by age, gender, or race/ethnicity, and results were similar when we excluded those who reported never shopping online for groceries.

**Conclusions:** Financial incentives for fruits and vegetables and default options, especially in combination, may lead to meaningful increases in fruit and vegetable purchases among adults with low income, which provides support for the implementation of multiple healthy eating strategies in an online retail setting.

# A Randomized Trial to Evaluate the Impact of Social Comparison-based Messages and Financial Incentives leveraging Loss-aversion on Diet Quality

**Dr. Soye Shin<sup>1</sup>**, Dr. Eric Finkelstein<sup>1</sup>, Dr. Mihir Gandhi<sup>2</sup>

<sup>1</sup>Program in Health Services and Systems Research, Duke-NUS Medical School, Singapore, Singapore,

<sup>2</sup>Centre for Quantitative Medicine, Duke-NUS Medical School,, Singapore, Singapore

**S.2.36 - Online grocery stores as a novel tool for promoting healthy diets, UKK - K1 (+K2) (Level 3), June 16, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Non-communicable diseases are a growing concern worldwide. Poor diet quality is an important contributor to this trend, but consumers often fail to make healthier food choices at the point of purchase. This study aims to test two novel behavioral nudges for healthier diets that can only be done in an online store environment. The first intervention is norm-based messaging and peers comparison features based on the healthfulness of grocery baskets, and the other intervention is advance cash that will be forfeited if a shopper's grocery basket is less healthy than the peers' ones (loss-aversion).

**Methods:** We conducted a 3-arm crossover trial involving actual purchases in adult Singapore residents recruited online. Participants shopped once in each condition in an online grocery store in random order: 1) no Front-of-Pack (FOP) label store (Control); 2) store with products displaying Nutri-Score (NS) FOP labels and a vertical ruler with a happy or sad emoticon displaying the healthfulness of the shopper's basket, measured by the weighted average NS (ranging 1; least healthy to 5; healthiest), relative to that of the peers (Peer-comparison) ; 3) Condition 2 with conditional advance cash of 5 SGD provided before shopping (Peer-comparison+Cash). We used first-differenced regressions to assess the impact of the conditions on the overall diet quality of the baskets, measured by the weighted average NS, and changes in select nutrients (sugar, sodium, and saturated fat) and calories.

**Results:** The weighted average NS was 0.78 (26%) and 1.26 (42%) higher in the 'Peer-comparison' and 'Peer-comparison+Cash' conditions, respectively, relative to the Control (3.03). The 'Peer-comparison' feature decreased sugar per serving by 9 g (95% CI: [-16.5, -1.5]), sodium per serving by 446 mg (CI: [-983, 92]), and saturated fat per serving by 0.6 g (CI: [-0.9, -0.4]). The 'Peer-comparison+Cash' feature reduced sugar by 13.5 g (CI: [-22.5, -4.5]), sodium by 521 mg (CI: [-1026, -16]), and saturated fat by 0.9 g (CI: [-1.1, -0.6]). No effects on calorie reduction were found.

**Conclusions:** These results shed light on the considerable potential of the online shopping environment to improve diet quality through simple behavioral nudges.

# Developing an online grocery experimental platform for designing and testing food environment policy in Brazil

**Dr. Ana Clara Duran**<sup>1,2</sup>, Dr. Camila Borges<sup>1,2</sup>, Dr. Neha Khandpur<sup>1</sup>, Ms. Carmen Prestemon<sup>3</sup>, Ms. Fenanda Olivato<sup>3</sup>, Associate Professor Lindsey Taillie<sup>3,4</sup>

<sup>1</sup>Center for Epidemiological Studies in Nutrition and Health, University of Sao Paulo, Sao Paulo, Brazil,

<sup>2</sup>Center for Food Studies and Research, Campinas, Brazil, <sup>3</sup>Global Food Research Program, University of North Carolina at Chapel Hill, Chapel Hill, USA, <sup>4</sup>Department of Nutrition, Gillings School of Global Public Health, University of North Carolina at Chapel Hill, Chapel Hill, USA

**S.2.36 - Online grocery stores as a novel tool for promoting healthy diets, UKK - K1 (+K2) (Level 3), June 16, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** Experimental evidence is critical for informing evidence-based policies on food policy. Online grocery stores can provide a realistic experimental platform to assess the effects of food environment policies on consumer shopping behaviour, but their use in low- and middle-income settings is virtually non-existent. This study sought to use cognitive interviews to develop and refine the use of an online store for testing food environment policies on consumer behaviour.

**Methods:** We conducted cognitive interviews using the “think-aloud” protocol with a sample of 10 Brazilian adults from different regions in the country and socioeconomic backgrounds. Two Brazilian interviewers provided participants with instructions on how to navigate the online grocery store ‘Saruê’ that imitated a real and leading online grocery store in Brazil. After an introductory video, participants were instructed to shop for ten items across distinct categories. Interviewers intervened only after a period of silence. Half of the participants received a shopping budget. We present descriptive analyses of the cognitive interviews and discuss how they have helped us set up an experiment using an online grocery store.

**Results:** On average, participants took 25 minutes to complete the shopping task. Those who were given a shopping budget spent less money and shared their difficulties in staying within the given budget. Although most participants fulfilled the shopping requirements, three of them referred to easily forget the shopping task, followed their own shopping list, and had to be reminded of the target items. Participants browsed the food departments for the single items and only used the search bar when searching for meal items. Brands, price, and variety resembled participants real world experience, although they all noticed the scarcity of fresh fruits and promotions - something they mentioned to consider when doing their grocery shopping.

**Conclusions:** These findings shed light on the challenges of setting up an online grocery store that realistically mimic real-world shopping venues; and were key to improving the development of an online grocery store in Brazil. This platform is now more suitable to be used in the assessment of various context-specific food and nutrition policy options.

# The YoCo Project – A scientific approach to placemaking for youth-friendly urban spaces promoting adolescent health and well-being in Amsterdam – A Health CASCADE project.

**Ms. Sara Rachdan<sup>1</sup>**, Ms. Kunshan Goh<sup>1</sup>, Prof. Mai Chin A Paw<sup>1</sup>, Dr. Teatske Altenburg<sup>1</sup>, Prof. Greet Cardon<sup>2</sup>, Dr. Artur Steiner<sup>3</sup>

<sup>1</sup>Amsterdam UMC, Amsterdam, Netherlands, <sup>2</sup>Ghent University, Ghent, Belgium, <sup>3</sup>Glasgow Caledonian University, Glasgow, United Kingdom

**S.2.38 - Engaging different generations in research to co-create healthy urban spaces in Europe and Africa, UKK - K1 (+K2) (Level 3), June 16, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose** The built environment can negatively and positively affect multiple dimensions of adolescent health and well-being. By directly involving adolescents in community- and context-based urban planning processes, YoCo (Youth Co-creation) enables the creation of youth-centred design solutions that meet their needs. Together with youth, YoCo aims to: i) co-create physically- and socially-activating urban spaces that promote their health and well-being; ii) evaluate the co-creation process and outcomes.

**Methods** YoCo follows an interdisciplinary approach with key intersections between 'urban design for health', spatial planning, inclusive research and systems thinking in 4 phases: Phase 1 Needs assessment; Phase 2 Co-designing solutions; Phase 3 Prototyping and testing; and Phase 4 Implementation. Implementation of the co-created spatial interventions will be aligned with local development plans and in collaboration with the local municipality. Academic researchers facilitate co-creation workshops, bringing together key stakeholders including adolescents, community, urban planners and local government. Co-creation workshops use principles and methods to promote adolescents' action and decision-making. Process and outcome evaluation frameworks are incorporated, with iterative evaluations of the co-creative process and effects of the co-created spatial interventions on adolescents' physical activity and well-being.

**Results** Phase 1: Needs assessment was conducted over a combined total of 17 sessions with 33 students aged 11-15, from a local secondary school in the Amsterdam neighbourhood of Reigersbos who participated as young co-researchers. Key activities in this phase included: creating project ownership among stakeholders; understanding adolescents' perspectives of the environment on their health, selecting and adapting measurement instruments; and defining critical decision factors to evaluate the effectiveness of the planned design interventions. More results pertaining to Phase 1: Needs assessment and Phase 2: Co-designing solutions will be presented.

**Conclusion** Lessons learnt from Phases 1 and 2, along with key recommendations for co-creating healthy urban spaces for and with adolescents will be discussed



# Engage4Change – Engaging community-dwelling and institutionalized older adults in Barcelona in the co-creation of healthy urban spaces to promote physical activity and reduce loneliness – A Health CASCADE project.

**Mr. Jorge Raúl Zapata-Restrepo<sup>1</sup>**, Dr. Philippa Dall<sup>3</sup>, Prof. Dawn Skelton<sup>3</sup>, Prof. Mai Chin A Paw<sup>2</sup>, Ms. Giuliana R Longworth<sup>1</sup>, Dr. Sacra Morejón Torné<sup>1</sup>, Prof. Maria Giné-Garriga<sup>1</sup>

<sup>1</sup>Fundació Blanquerna - Universitat Ramon Llull, Barcelona, Spain, <sup>2</sup>Amsterdam UMC, VU University Medical Center, Amsterdam, Netherlands, <sup>3</sup>Glasgow Caledonian University, Glasgow, United Kingdom

**S.2.38 - Engaging different generations in research to co-create healthy urban spaces in Europe and Africa, UKK - K1 (+K2) (Level 3), June 16, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose** Older adults, especially care home residents, are the least active and most sedentary segment of the population, and are more likely to be isolated and experience loneliness. They also present difficulties accessing spaces to engage in physical activity and social interaction. Engage4Change proposes the use of co-creation as an overarching approach to position end-users and key stakeholders as decision-making agents in urban design and spatial planning.

**Methods** Engage4Change focuses on the older adult population (65+) of the Dreta de l'Eixample neighborhood in the city of Barcelona. The participants of this study, known as “co-creators” consist of three groups of 10 older adults ( $n \cong 30$ ) (residents from 2 selected care homes and community dwellers), 3 relatives, 2 health professionals, 2 care-home staff members, 1 researcher, and 2 urban design and planning professionals. This project spans 2 years with 3 phases: Phase 1 Exploratory Stage; Phase 2 Needs assessment; Phase 3 Co-creation Core and Prototyping with an iterative process and outcome evaluation distributed in all phases.

**Ph1:** Care home distribution analysis and public space accessibility, exploratory interviews, and recruitment.

**Ph2:** GPS, photovoice, community walk audits; EQ-5D, Lubben Social Scale, De Jong Loneliness Scale, IPAQ, and SBQ.

**Ph3:** Participatory mapping, world cafes, focus groups, spatial prototyping, and VR/AR testing.

**Results** Phase 1 concluded with the selection of 2 neighboring care homes and 1 community center, conforming 3 groups of co-creators. In phase 2 we identified that these three groups showed different levels of perceived quality of life, loneliness, and PA and SB levels. The three centers shared the use of common outdoor spaces, as shown in the GPS data. The sample documented spatial obstacles present in public spaces. Phase 3 will be geared towards designing an urban community space near the care homes. The group of co-creators will lead the concept ideation, refinement, and project delivery. The project will test the incorporation of VR/AR technologies to deliver a spatial prototype as a result of the co-creation process.

**Conclusions** Lessons learned from Phases 1 and 2, along with key recommendations for co-creating healthy urban spaces for and with older adults will be discussed.

# The development of BRIGHT – an app-based intervention to support healthy growth and responsive feeding amongst formula fed infants

**Ms. Kristiane Tommerup**<sup>1</sup>, Dr. Andrea Smith<sup>2</sup>, Prof. Ken Ong<sup>2</sup>, Dr. Raj Lakshman<sup>2</sup>, Dr. Amy Ahern<sup>2</sup>, Miss Marcella Rosa Cimino Avery<sup>1</sup>, Miss Sara Esser<sup>1</sup>, Mrs. Nilushka Perera<sup>3</sup>, Mr. Matthew Black<sup>3</sup>, Associate Professor Clare Llewellyn<sup>1</sup>

<sup>1</sup>Research Department of Behavioural Science and Health, University College London, London, United Kingdom, <sup>2</sup>MRC Epidemiology Unit, University of Cambridge, Cambridge, United Kingdom, <sup>3</sup>Best Beginnings, London, United Kingdom

**S.2.39 - Opportunities, challenges and strategies for developing digital health interventions for the first 1000 days, Clarion Hotel Gillet - Room Gillesalen, June 16, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Rapid infant weight gain (RIWG) is a risk factor for future childhood obesity. Whilst evidence-based strategies which could encourage responsive feeding behaviours and reduce risk of RIWG exist, they have yet to be delivered through digital intervention. The following talk will present the development of BRIGHT – the first app-based intervention to support healthy growth amongst formula-fed infants through appropriate bottle feeding and complementary feeding behaviours, in collaboration with the Baby Buddy App developed by Best Beginnings. Previous qualitative insights indicate the presence of sensitivity and stigma in relation to formula feeding. Therefore, support and guidance must be produced in collaboration with caregivers. The presentation will present findings from Patient and Public Involvement and Engagement (PPIE) panels with parents, and how these insights were integrated into the BRIGHT prototype.

**Methods:** The person-based approach – inclusive of a PPIE panel (n=10) interviews were applied iteratively to enable co-creation with caregivers of infants. These participatory methods were used to develop the key intervention messages and novel intervention functionalities tailored to infant appetite and growth.

**Results:** The first theme arising from PPIE interviews was the common feelings of stigma and confusion felt by parents of formula-fed infants, given the limited resources available for formula feeding. The second key theme that emerged was the conflict parents feel between the individuality of infant appetite and 'one size fits all' feeding guidance. Hence, we sought to develop and test a 'baby appetite quiz' offering parents information regarding their infant's appetite and how to best manage their child's unique appetite. Additionally, challenges, learnings, and opportunities in developing *tailored* digital interventions for the first 1,000 days were collated.

**Conclusions:** mHealth interventions provide opportunities to scale-up the reach of public health promotion. In co-creation with parents, it was found that digital resources targeting infant feeding and growth must be delivered *sensitively* and with consideration of individual differences in infant appetite and growth. These key learnings may inform future co-creation and development of *tailored* digital interventions, both within and outside the first 1,000 days period.

# Application of the person-based approach to the development of an exclusively app-based intervention targeting diet, physical activity and weight management during pregnancy

**Mrs. Alexandra Rhodes<sup>1</sup>**, Miss Arya Primprikar<sup>1</sup>, Mrs. Alison Baum<sup>2</sup>, Dr. Helen Croker<sup>4</sup>, Dr. Andrea Smith<sup>3</sup>, Associate Professor Clare Llewellyn<sup>1</sup>

<sup>1</sup>Research Department of Behavioural Science and Health, University College London, London, United Kingdom, <sup>2</sup>Best Beginnings, London, United Kingdom, <sup>3</sup>MRC Epidemiology Unit, University of Cambridge, Cambridge, United Kingdom, <sup>4</sup>World Cancer Research Fund International, London, United Kingdom

**S.2.39 - Opportunities, challenges and strategies for developing digital health interventions for the first 1000 days, Clarion Hotel Gillet - Room Gillesalen, June 16, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose** Maternal obesity and excessive gestational weight gain (GWG) are independently associated with adverse maternal and foetal health outcomes. Dietary and physical activity (PA) interventions can be effective in reducing rates of excessive GWG and postpartum weight retention. As an established and free parenting app used widely in the UK's National Health Service, 'Baby Buddy' is an ideal platform for delivering a new innovative digital dietary and PA intervention. A four-phased study was undertaken to create a theory-based intervention to empower and support expectant parents to improve dietary and PA behaviours to assist in managing GWG.

**Methods** The intervention development process adhered to a person-based approach. A systematic review and meta-analysis of digital interventions targeting diet and/or PA in pregnancy (n=11) informed the rudimentary intervention concept by identifying potentially effective behaviour change techniques. Three stages of qualitative research with pregnant and recently pregnant parents followed. Study 1, comprising 4 online focus groups (n=18) and 12 telephone interviews, investigated target users' views of the rudimentary concept and generated ideas for its development. Study 2, comprising online individual and couple interviews (n=29), used wireframes and scripts to explore intervention design, content, branding and tone. Study 3 tested an app prototype using 'think aloud' interviews with current Baby Buddy users (n=21). A Public Patient Involvement (PPI) group (n= 18) and other expert contributors (n=14) provided input and weekly meetings with the Baby Buddy team ensured the intervention remained feasible and aligned with the app's principles.

**Results** Study 1 confirmed the appeal of including partners and identified themes that underpinned the development of the intervention design. Iterative feedback from Study 2 refined the intervention design in line with the views of a culturally-diverse range of target users. Key learnings with regards to weight and health messaging shifted the emphasis away from GWG towards healthier dietary and PA habits for pregnancy and parenthood. Study 3 highlighted functionality, content and design issues and identified ways of improving the user-experience.

**Conclusions** Listening to target users at each stage of the design process yielded actionable insights to optimise the intervention's relevance and appeal to its target audience.

# The development and testing of the INTER-ACT program, an app-supported lifestyle intervention during and between pregnancies to prevent excessive weight gain in pregnancy and enhance optimal weight and a healthy lifestyle in the interpregnancy period.

**Prof. Annick Bogaerts<sup>1,2</sup>**, Prof. Roland Devlieger<sup>1,3</sup>, Dr. Lieveke Ameye<sup>1</sup>, Dr. Margriet Bijlholt<sup>1,2</sup>, Ms. Hanne Van Uytsel<sup>1</sup>

<sup>1</sup>Department of Development and Regeneration, University of Leuven, Leuven, Belgium, <sup>2</sup>Faculty of Medicine and Health Sciences, Centre for Research and Innovation in Care, University of Antwerp, Antwerp, Belgium,

<sup>3</sup>Department of Obstetrics and Gynecology, University Hospitals Leuven, Leuven, Belgium

**S.2.39 - Opportunities, challenges and strategies for developing digital health interventions for the first 1000 days, Clarion Hotel Gillet - Room Gillesalen, June 16, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** This presentation will (1) discuss the development of the INTER-ACT app, which is part of an interpregnancy and pregnancy lifestyle coaching module; and (2) summarize the effect of the INTER-ACT program on eating behaviour, energy intake, physical activity, mental health and maternal anthropometrics. The INTER-ACT program aims to enhance optimal weight gain, a healthy lifestyle in the interpregnancy and pregnancy period and reduce the prevalence of large-for-gestational-age babies, gestational diabetes, pregnancy-induced hypertension, and caesarean deliveries.

**Methods:** Firstly, a mixed methods design involved 15 semi-structured interviews, 2 focus groups, and 2 surveys. The user-interface was evaluated in a pilot study (N=9). Secondly, the INTER-ACT program was tested in a multi-centre randomised controlled trial, targeting women at high risk of pregnancy and birth related complications. At week 6 postpartum, participants were randomised into an intervention or control arm. The intervention focused on weight, diet, physical activity and mental well-being, and comprised face-to-face coaching and the use of an app, which was Bluetooth-connected to weighing scales and an activity tracker. The intervention was rolled out between 6 weeks and 6 months postpartum and during each trimester of the subsequent pregnancy. In this presentation, we report on results from the postpartum period only.

**Results:** Firstly, the INTER-ACT app was valued by its end users because it was offered in combination with face-to-face contact with a caregiver. Secondly, the INTER-ACT program was shown to improve postpartum food intake quality and eating behaviours, but not physical activity and sedentary behaviour. Women in the intervention group who reduced their energy intake and had improved eating behaviours reported a larger decrease in weight and fat percentage.

**Conclusions:** In conclusion, the postpartum phase of the INTER-ACT RCT was effective in improving nutrition-related outcomes, but not directly effective in the reduction of post-partum weight retention and body composition measures. However, improved energy intake and enhanced eating behaviour were associated with higher postpartum weight loss and larger decrease of fat percentage and waist circumference. This emphasizes the need to incorporate not only nutritional intake guidance but also eating behaviour-related aspects in lifestyle interventions.

# Changes in the Daily Activity Profile of Middle-Aged versus Older Adults Following A 6-Month Exercise Intervention

**Dr. Neha Gothe<sup>1,2</sup>**, Dr. Emily Erlenbach<sup>1</sup>, Ms. Revati Malani<sup>1</sup>, Dr. Edward McAuley<sup>1</sup>

<sup>1</sup>University of Illinois Urbana Champaign, Urbana, USA, <sup>2</sup>Northeastern University, Boston, USA

**S.2.40 - Physical Activity and Sedentary Behavior Interventions in Older Adults to Address Cognitive Aging, Clarion Hotel Gillet - Room Akademien, June 16, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** A. Ageing

**Background:** Adults' waking hours are spent engaged in a combination of sedentary time (ST), light-intensity physical activity (LPA) and moderate-vigorous intensity physical activity (MVPA), collectively referred to as a daily activity profile. These profiles often vary between middle-aged (MA) and older-adults (OA)- two groups which differ in their leisure and lifestyle activity levels. As part of a larger RCT, adults were randomized into a 6-month exercise intervention composed of either aerobic, stretch-tone or yoga exercise. We investigated how six months of participation in these three distinct exercise modes may have impacted the composition of participants' daily activity profiles.

**Methods:** Inactive adults were recruited and randomized into one of the three abovementioned exercise groups. All groups met for 3, 60-minute sessions/week for six months. At baseline and 6-months, participants were issued an Actigraph wGT3x+ accelerometer to wear for 7 days to obtain pre-post measures of minutes/day spent in ST, LPA and MVPA. Group\*Time analyses were carried out separately for MAs (<65 years) and OAs (≥ 65) and included sex and program attendance rates as covariates.

**Results:** Our sample consisted of 39 MAs and 50 OAs ( $M_{age} = 58.77$  and  $68.90$ , respectively). Regarding changes in ST, OAs in the stretch-tone group significantly increased their ST by  $63.23$  min/day ( $F(1.00,45)=6.945$ ,  $p=0.011$ ,  $\eta^2_p=0.134$ ). For LPA, MAs in the stretch-tone group significantly decreased their LPA by  $33.92$  minutes/day ( $F(1.00,34) = 5.294$ ,  $p=0.028$ ,  $\eta^2_p=0.135$ ). Changes in LPA min/day among both MA and OAs in aerobics approached significance, with a positive increase in LPA of  $32.25$  minutes/day for MAs and decrease of  $26.87$  min/day of OAs. There were no significant group\*time effects for MVPA among either age or intervention groups.

**Conclusions:** Our findings reveal the subtle ways in which the daily activity profiles of MAs and OAs can be impacted by differing modes of exercise. Future work should investigate the psychological processes MAs and OAs experience when starting an exercise program and sedentary behaviors they may engage in as possible "compensation" for exercising periodically throughout the week.

# Protocol for a sedentary behavior and physical activity intervention for older Latino/Hispanic adults to prevent cognitive decline

**Ms. Mikael Anne Greenwood-Hickman**<sup>1</sup>, Ms. Stefani Florez-Acevedo<sup>1,3</sup>, Ms. Julie Cooper<sup>1</sup>, Dr. Zvinka Zlata<sup>2</sup>, Dr. Dori Rosenberg<sup>1</sup>

<sup>1</sup>Kaiser Permanente Washington Health Research Institute, Seattle, USA, <sup>2</sup>University of California, San Diego, San Diego, USA, <sup>3</sup>University of Washington, Seattle, USA

**S.2.40 - Physical Activity and Sedentary Behavior Interventions in Older Adults to Address Cognitive Aging, Clarion Hotel Gillet - Room Akademien, June 16, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Background:** Rates of Alzheimer's Disease and related dementias (ADRD) are higher for older Hispanic/Latino(as) compared to non-Hispanic White adults. Very few physical activity (PA) interventions have been culturally adapted for the older Hispanic/Latino(a) community. Here, we plan to culturally adapt a sedentary behavior (SB) and PA intervention.

**Methods:** To support design and cultural adaptation, we will convene a community advisory board (CAB) including community members and relevant organizational representatives. Further, we will conduct a pilot intervention for 10 participants to test feasibility and acceptability of initial intervention adaptations. The pilot will be offered in Spanish and English and consist of brief health coaching contacts by phone following a two-step "staircase approach" to gradually increase activity. In Step 1, participants will work to reduce their SB, and then, as ready and able, they progress to Step 2, which focuses on increasing PA and PA intensity. Psychosocial mediators of the intervention will include social support, self-efficacy, enjoyment, and habit strength. Fitbit Inspire bands will be provided to participants to track steps, PA, and receive movement reminders. Data from participants' Fitbit will also be shared with health coaches via Fitabase to inform coaching. Outcomes of interest will include activPAL-measured PA/SB, psychosocial and quality of life measures, and neuropsychological assessments (e.g., digit span, verbal fluency, verbal memory). All measurements will be conducted remotely and, where applicable, leverage measures validated in both Spanish and English. A focus group with all pilot participants will be conducted after pilot completion to aid in further adapting the intervention to prepare for a future efficacy trial.

**Results:** We have recruited 7 community members and organizational stakeholders to serve on the CAB. The first CAB meeting (November 2022) will focus on adapting initial recruitment, intervention, and measurement materials. Pilot participants will be recruited in early 2023 and feasibility and cultural adaptation ideas will be presented.

**Discussion:** There is an urgent need for ADRD prevention interventions that are culturally adapted to support the health of underserved communities. This is one of the first such interventions that will be specifically adapted and tested in a larger RCT for the older Hispanic/Latino(a) community.



# The effect of a 2-year dementia risk reduction intervention on accelerometer-measured physical activity

**Dr. Dori E. Rosenberg<sup>1</sup>**, Dr. Eric Vittinghoff<sup>2</sup>, Dr. Carrie Peltz<sup>2</sup>, Dr. Deborah E. Barnes<sup>2</sup>, Dr. Sascha Dublin<sup>1</sup>, Dr. Benjamin H. Balderson<sup>1</sup>, Ms. Lynn Fleckenstein<sup>1</sup>, Dr. Kristine Yaffe<sup>2</sup>

<sup>1</sup>Kaiser Permanente Washington Health Research Institute, Seattle, USA, <sup>2</sup>University of California, San Francisco, San Francisco, USA

**S.2.40 - Physical Activity and Sedentary Behavior Interventions in Older Adults to Address Cognitive Aging, Clarion Hotel Gillet - Room Akademien, June 16, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** A. Ageing

**Background:** Researchers estimate that ~30-40% of Alzheimer's disease and related dementias (ADRD) may be due to modifiable risk factors. We developed the Systematic Multi-domain Alzheimer's Risk Reduction Trial (SMARRT) to pilot-test a patient-centered intervention targeting medical and behavioral risk factors for ADRD including physical inactivity. Here we describe the accelerometer outcomes of SMARRT.

**Methods:** Participants (N=172) with at least 2 of 8 ADRD risk factors (e.g. less than 150 minutes of physical activity [PA]/week) were randomized to the SMARRT intervention or health education control group for 2-years. The intervention included health coaching sessions every 4-6 weeks to set goals related to risk factors chosen by participants, such as increasing PA and reducing sedentary time (ST). Waist ActiGraph wGT3X+ accelerometers were worn for 7 days at baseline and 24 months in a subset of participants. Outcomes included steps/day and minutes/day in ST, light-intensity PA (LPA), and moderate-to-vigorous PA (MVPA). We used linear regression to calculate between-group treatments effects for accelerometer outcomes adjusting for baseline level of each outcome, wear time (except for step count models), demographics, and comorbidities.

**Results:** There were 45 control and 32 intervention participants in the accelerometer subset (Mean age = ~75 +/- 5 years; 56% women, 67% Non-Hispanic White). At baseline, participants had similarly high ST (median ST ~10.7 hours/day) and low steps (median steps/day = 3965.6, control, and 3058.5, intervention). There were no significant differences in the accelerometer outcomes at 2 years. Patterns showed that both groups decreased PA, but declines were steeper in the control group with median steps/day decreasing by 2042 and 775 (p = 0.36) and median MVPA decreasing by 19.9 and 3.3 mins/day (p = 0.85) in the control and intervention arms respectively. ST and LPA declined in both groups (p-values = 0.70 and 0.69 respectively).

**Conclusions:** Both intervention and control groups showed large decreases in step counts over 2-years, but the control group's decline was 2.5 times larger than the intervention. Although this difference was not statistically significant given the small sample size, the magnitude suggests that this intervention holds promise and warrants testing in an adequately powered full-scale study.

# The Impact of Charitable Food Assistance on Food Insecurity in the United States

**Dr. Craig Gundersen<sup>1</sup>**, Ms. Emily Engelhard<sup>2</sup>, Dr. Tom Summerfelt<sup>2</sup>, Dr. Bill Byrnes<sup>2</sup>

<sup>1</sup>Baylor University, Waco, Texas, USA, <sup>2</sup>Feeding America, Chicago, IL, USA

**S.2.53 - Addressing Food Insecurity: Formal and Charitable Food Assistance and Implications for Nutrition Policy and Practice in Community and Clinical Settings, Clarion Hotel Gillet - Room Swedenborg, June 16, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** Charitable food assistance (CFA) constitutes the second largest source of free meals to vulnerable Americans; only the Supplemental Nutrition Assistance Program (SNAP) distributes more free meals than CFA programs. Despite its prominence in efforts to reduce food insecurity in the U.S. and other high-income countries, research is limited on CFA programs. In particular, one question not addressed: What is the impact of CFA on food insecurity? Answering this is difficult for several reasons including the lack of a well-defined comparison group of those not using CFA; underreporting of CFA use in nationally representative surveys; and an unclear set of approaches to addressing non-random selection into CFAs.

**Methods:** We use data from the 2009 to 2021 Current Population Survey (CPS) supplemented with administrative data from Feeding America (the largest food bank network food banks in the U.S.) for the analyses. Of particular note is a question on the CPS about the amount of resources a household reports needing to be food secure (FS); a question used in other studies. A household is said to be made FS by CFA if the number of meals they report needing to be FS is less than the amount they would receive via CFA. These analyses rely on various assumptions about the distribution of charitable food and self-reports of resources needed to be FS.

**Results:** In 2021, the average food insecure household reported needing \$40.38 more per week to be FS with this value rising sharply from 2019. In the same year, 6.7 billion pounds of free food were distributed in CFA to 53 million Americans. Based on the distribution of responses to dollars needed to be FS, we find that, in the absence of CFA, food insecurity rates would be 11.8% (about 1 percentage point) higher in the U.S. This is our preferred specification; when we consider alternative specifications, the range is from 3.5% to 20.1%.

**Conclusions:** A wide array of tools, including CFA, are used in high-income countries to alleviate food insecurity. The results from this study demonstrate that CFA programs serve a critical role in alleviating food insecurity in the U.S.

# Learning from National and Local Policy Responses to Food Insecurity in the UK During the COVID-19 Pandemic

**Dr. Rachel Loopstra<sup>1</sup>**, Ms. Katy Gordon<sup>2</sup>, Dr. Hannah Lambie-Mumford<sup>2</sup>

<sup>1</sup>University of Liverpool, Liverpool, United Kingdom, <sup>2</sup>University of Sheffield, Sheffield, United Kingdom

**S.2.53 - Addressing Food Insecurity: Formal and Charitable Food Assistance and Implications for Nutrition Policy and Practice in Community and Clinical Settings, Clarion Hotel Gillet - Room Swedenborg, June 16, 2023, 4:15 PM - 5:30 PM**

## **SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** The proportion of households experiencing food insecurity in the UK in September 2022 returned to levels observed at the height of the first wave of the COVID-19 pandemic. Local and national governments are implementing various interventions in response. This paper presents findings from a two-year project monitoring responses to food insecurity over the COVID-19 pandemic, highlighting how and where learnings from the pandemic period can be applied today.

**Methods:** A mixed methods study, involving systematic document searches for policy and programmes implemented across each of the four UK nations, interviews and focus groups with over 100 national, devolved nation and local authority civil servants and charities, and secondary analyses of nationally representative survey data to evaluate the impacts of specific policy interventions on food insecurity.

**Results:** At all levels of government, the scale of responses to concerns about food insecurity over the pandemic was unprecedented. National and devolved governments supported food charities with funding and enacted income-support interventions, namely the furlough scheme and uprating some income-replacement benefits. At the local level, there was heavy reliance on food banks and other third-sector organisations to distribute in-kind food provision. National and devolved governments also provided food boxes to support people who were “shielding”, that is, who were severely vulnerable to COVID-19, to enable them to isolate at home. Quantitative analyses suggested that levels of food insecurity were lower among groups targeted for financial interventions (namely, those furloughed or receiving an uplift in benefits) compared to matched groups not receiving these interventions. The provision of food boxes to people shielding did not have a discernible impact on food insecurity for this group. Qualitative evidence from stakeholders raised concerns about the delivery, reach and appropriateness of in-kind food provision over this period.

**Conclusions:** As policymakers enact responses to growing food insecurity in the UK today, these findings from the pandemic period support the implementation of targeted income interventions to enable secure financial access to food, rather than investment in direct food provision initiatives.

# Understanding the Nutritional Challenges of Food Insecure Adults with a History of Cancer

**Dr. Anna E. Arthur<sup>1</sup>**, Ms. Amirah Burton-Obanla<sup>2</sup>, Ms. Kate Young<sup>1</sup>, Dr. Leonidis Bantis<sup>1</sup>, Ms. Brenda Koester<sup>2</sup>, Dr. Craig Gundersen<sup>3</sup>

<sup>1</sup>University of Kansas Medical Center, Kansas City, MO, USA, <sup>2</sup>University of Illinois, Urbana-Champaign, USA,

<sup>3</sup>Baylor University, Waco, TX, USA

**S.2.53 - Addressing Food Insecurity: Formal and Charitable Food Assistance and Implications for Nutrition Policy and Practice in Community and Clinical Settings, Clarion Hotel Gillet - Room Swedenborg, June 16, 2023, 4:15 PM - 5:30 PM**

**SIG - Primary Choice:** C. Cancer prevention and management

**Purpose:** The economic burden associated with cancer care in the USA may intensify the risk of food insecurity among adults with a history of cancer. Diet quality and nutritional status play a critical role in determining cancer outcomes, but adults diagnosed with cancer are at risk of suboptimal nutrition due to the intensity and burden of the disease and associated treatments. Being food insecure may further exacerbate the nutritional risk of individuals with cancer. Therefore, the purpose of this study was to examine the associations of food insecurity with diet quality, malnutrition risk, and participation in food assistance programs in adults with a recent cancer diagnosis.

**Methods:** This was a cross-sectional pilot study of a hospital-based sample of 220 adults diagnosed with cancer between 2018-2021 in the US. Food insecurity was assessed using the United States Department of Agriculture Six-item Short Form Food Security Survey Model. Usual intake of total fruits and vegetables, percent kilocalories from fat, and dietary fiber were estimated using the National Cancer Institute Multifactor Screener. Malnutrition risk was measured using the Malnutrition Screening Tool. Two additional survey questions asked participants about their use of Supplemental Nutrition Assistance Program (SNAP) benefits and food banks or pantries. Associations between food security status and variables of interest were examined using chi-square or fisher exact tests.

**Results:** The prevalence of food insecurity in the study sample was 10%. Food insecure participants were more likely to consume <5 servings of fruits and vegetables, ≥30% of their total kilocalories from fat, ≤15 grams of fiber per day, and be at risk for malnutrition compared to food secure participants. Food insecure participants also reported utilizing formal food assistance, SNAP benefits, and charitable food assistance, food bank/pantry, at a higher rate compared to food secure participants.

**Conclusions:** Food insecure adults with a recent history of cancer may be more likely to experience nutritional deficits which may, in turn, lead to worse cancer outcomes and use food assistance programs than those who are food secure. Future work should focus on building connections between cancer patients and charitable food assistance programs.

# Co-creation of a school- and home based intervention to promote compliance with 24-hour movement behavior guidelines in low SES preschoolers

Miss Sofie Naeyaert<sup>1</sup>, **Dr. Vera Verbestel<sup>1</sup>**, Prof. Greet Cardon<sup>1</sup>, Assistant Prof. Marieke De Craemer<sup>1</sup>  
<sup>1</sup>Ghent University, Ghent, Belgium

**S.3.41 - Interventions to optimize 24-hour movement behaviors in preschoolers and children, UKK - Main Hall (Level 6), June 17, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** G. Children and families

**Purpose** In 2019, the World Health Organization published 24-hour movement behavior guidelines for sleep, physical activity and sedentary behavior. Research on compliance with these guidelines in socially disadvantaged preschoolers is very limited. Nevertheless, when examining the isolated behaviors, preschoolers with a low socioeconomic status (SES) sleep less, are less physically active and more sedentary, and therefore have a higher risk for health problems later in life. Parents and teachers have a major influence on preschoolers' health behavior. Involving them in the development of an intervention through the intervention mapping protocol (IMP) can increase the effectiveness of interventions. This study aims to describe the co-creation process to develop a school- and family-based intervention to optimize low SES preschoolers' 24-hour movement behaviors.

**Methods** Six weekly or two-weekly co-creation sessions took place with teachers (n=8) and low SES parents (n=4) within the same school. The IMP was used as a theoretical framework. An extra group of low SES parents (n=6) within a community center was consulted after completing the co-creation sessions to discuss the final intervention. The co-creation process was evaluated through reflection questions at the end of each session, and through teacher questionnaires. All sessions were transcribed and thematically analyzed in Nvivo.

**Results** Both co-creation groups went through four steps of the IMP: 1) needs assessment, 2) goal setting 3) methods and applications, and 4) program development. Only a limited number of parents participated, but they all considered the co-creation as very beneficial, and especially enjoyed the social contact and the exchange of experiences with other parents. They felt more understood and supported afterwards. In teachers, there was a lot of resistance at first to develop the intervention. They felt like they were already doing enough to promote preschoolers' movement behaviors. Eventually, their perspectives changed and they did see the need for an intervention which improved cooperation.

**Conclusion** Co-creation through the IMP was an intensive process in both groups and had its strengths (empowerment) and limitations (translating IMP to the target group). A randomized controlled trial is needed to examine whether the developed intervention optimizes 24-hour movement behaviors in low SES preschoolers.

# Implementation degree of the DAGIS intervention, changes in parents' norm for children's screen time and changes in children's screen time

**Prof. Carola Ray**<sup>1,2</sup>, Dr. Reetta Lehto<sup>1,2</sup>, Mr. Aku-Ville Lehtimäki<sup>1</sup>, Prof. Majjaliisa Erkkola<sup>2</sup>, Prof. Eva Roos<sup>1,2,3</sup>  
<sup>1</sup>Folkhälsan Research Center, Helsinki, Finland, <sup>2</sup>University of Helsinki, Helsinki, Finland, <sup>3</sup>Uppsala University, Uppsala, Sweden

**S.3.41 - Interventions to optimize 24-hour movement behaviors in preschoolers and children, UKK - Main Hall (Level 6), June 17, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** G. Children and families

**Purpose** The DAGIS intervention study targeting children's energy balance-related behaviors was based on the intervention mapping (IM) protocol in which the sixth step of IM is evaluation of the program effectiveness and processes. The purpose of this study is to examine whether the intervention had effects on parent's norm about suitable screen time for children and children's screen time according to the degree of implementation of the program in the families.

**Methods** The developed intervention was a 22-week program, which was run in preschools and families targeting children aged 3-6 years (mean age 5.2 years). At the end of the intervention, parents reported the program implementation in their family. Questions about implementation were based on the Saunders process evaluation framework. A variable called degree of implementation (DOI) was formed. At baseline and at the end of the intervention parents reported their view on suitable screen time for children (ST norm), and kept screen time (ST) diary for seven consecutive days for their child. Hayes Process Macro for SPSS was used to test whether changes in ST norm predicted the changes in children's ST behavior when comparing control, low DOI, and high DOI groups.

**Results** Preliminary results show that the ST norm decreased significantly in both DOI groups when comparing them separately to the control group ( $p < 0.05$ ). There was a significant association between change in ST norm and change in children's ST. The indirect effect of DOI to ST via the ST norm was significant for the low DOI group  $B = -2.1721$  ( $-4.4214, -0.0887$ ), and the high DOI group  $B = -2.0622$  ( $-4.3201, -0.1826$ ) compared to the control group. The total effect of DOI on children's ST was not significant.

**Conclusion** In both DOI groups, the intervention had an effect on parent's ST norm, and further a decrease in ST norm decreased children's ST. The DAGIS intervention targeted also other parental determinants for children's ST. Further analyses of the DAGIS study in which DOI is included, are needed to get a broader understanding of the change mechanisms in parent's and children's behaviors.



# Effects of a multicomponent intervention to improve movement behaviours as well as the compliance of the 24-Hour Movement Guidelines among 3- to 9-Year-Old Spanish Children

**Prof. Javier Rodrigo-Sanjoaquin<sup>1,2</sup>**, Prof. Julien Bois<sup>1</sup>, Dr. Alberto Aibar Solana<sup>2</sup>, Dr. Léna Lhuisset<sup>1</sup>, Prof. Javier Zaragoza Casterad<sup>2</sup>

<sup>1</sup>Université de Pau & Pays de l'Adour, Tarbes, France, <sup>2</sup>University of Zaragoza, Zaragoza, Spain

**S.3.41 - Interventions to optimize 24-hour movement behaviors in preschoolers and children, UKK - Main Hall (Level 6), June 17, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** G. Children and families

**Purpose** Although the 24-hour movement guidelines are well extended worldwide, there is a lack of school-based interventions about 24-hour movement behaviours conducted with children and pre-schoolers. Therefore, this study aimed to examine the effects of a school-based intervention built on the Creating Active Schools (CAS) framework, and to describe the proportion of 3 to 9-year-old children meeting the 24-hour movement guidelines at the end of the intervention.

**Methods** A quasi-experimental design without a control group was conducted. Data about 24-hour movement behaviours was collected at baseline and at the end of the 2-year intervention. A total of 139 students (M=5.9; SD=2.2; 53% girls; 55% primary school) from a Spanish school were recruited to participate in a multicomponent intervention. The study was approved by the scientific ethics committee of Aragon, Spain (CEICA PI20/009).

**Results** There was a significant improvement in LPA (21.86;  $t=2.01$ ;  $p=.049$ ), while MVPA decreased significantly on weekends (-9.97;  $t=-2.35$ ;  $p=.022$ ). No significant effect was found for screen-time and sleep. Most children met MVPA (80.2%) and sleep duration (96.3%) guidelines. Lowest compliance was found for recreational screen-time (59%). More than half of the sample met all 24-hour movement guidelines (42.1%). All children complied with at least one individual guideline. Finally, the percentage of boys meeting the MVPA guideline was higher than girls in both primary school children ( $\chi^2=5.33$ ;  $p=0.019$ ) and pre-schoolers ( $\chi^2=11.72$ ;  $p<0.001$ ).

**Conclusion** Grounded in the CAS framework, a multi-component school-based intervention implemented through two years seems to be effective to improve LPA, but not MVPA among pre-schoolers and children. Screen time, recreational screen-time and sleep remained stable across the intervention. Compliance with the three combined 24-hour movement behaviour guidelines improved. Furthermore, this school-based intervention had a limited effect on MVPA, and that issue should be further examined in future studies.

# Park features that encourage park visitation among older adults: a qualitative study

**Ms. Amber Van Puyvelde**<sup>1,2</sup>, Prof. Benedicte Deforche<sup>1,3</sup>, Dr. Lieze Mertens<sup>1,2</sup>, Ms. Elise Rivera<sup>4</sup>, Prof. Delfien Van Dyck<sup>2</sup>, Associate Professor Jenny Veitch<sup>4</sup>, Dr. Louise Poppe<sup>1</sup>

<sup>1</sup>Department of Public Health and Primary Care, Faculty of Medicine and Health Sciences, Ghent University, Ghent, Belgium, <sup>2</sup>Department of Movement and Sports Sciences, Faculty of Medicine and Health Sciences, Ghent University, Ghent, Belgium, <sup>3</sup>Department of Movement and Sport Sciences, Faculty of Physical Education and Physiotherapy, Vrije Universiteit Brussel, Brussel, Belgium, <sup>4</sup>Deakin University, Institute for Physical Activity and Nutrition (IPAN), School of Exercise and Nutrition Sciences, Geelong, Australia

**S.3.42 - Park features and their micro scale designs important for park use among adults and older adults., UKK - Level 6 Foyer, June 17, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Parks provide many opportunities for promoting physical activity and consequently also the physical, social and mental wellbeing among older adults. However, older adults are the age group least frequently observed visiting parks. To attract more older adults to parks, it is important to understand their needs and preferences for park design. The aim of this qualitative study was to gain in-depth information about the preferred park features for park visitation among older adults (60+ years).

**Methods:** Twenty-five semi-structured interviews were conducted with older adults who visited a recently renewed urban park in Ghent, Belgium at least once since its renewal. The interview questions related to which elements the older adults liked, disliked or found lacking in the park. The interviews were conducted in-park or in the nursing home adjacent to the park until saturation of information was obtained. All interviews were transcribed verbatim, pseudonymized and analyzed by inductive content analysis using NVivo 12 software.

**Results:** The most preferred park activities were walking, sitting, and watching the environment. Participants mostly talked about walking paths and liked that there were many different paths and that the paths were clean, even, broad and accessible for wheelchairs and bikes. Other park features liked by older adults were nature and vegetation, openness and structural layout of the park and the presence of sufficient and good quality sitting areas. Park features the older adults did not like mostly related to poor park maintenance which included litter, illegal dumping of domestic waste and furniture, too much green waste and wild growth, and insufficient or too small rubbish bins, or not sufficiently emptied rubbish bins. Participants missed a café, toilet, organized events, a plan of the park, nameplates for trees and plants, and would like some more vegetation, such as flowers and (berry) bushes.

**Conclusion:** This study provides an overview of park features that older adults in Belgium perceive as important for park visitation. The evidence can help urban planners, landscape architects and policymakers to (re)design attractive local parks that promote physical activity and the physical, social and mental wellbeing of older adults.

# Designing walking paths and outdoor fitness areas for older adults

**Ms. Chahana Paudel<sup>1</sup>**, Prof. Anna Timperio<sup>1</sup>, Prof. Jo Salmon<sup>1</sup>, Prof. Benedicte Deforche<sup>2,3</sup>, Dr. Venurs Lo<sup>1</sup>, Associate Professor Jenny Veitch<sup>1</sup>

<sup>1</sup>Deakin University, Institute for Physical Activity and Nutrition (IPAN), School of Exercise and Nutrition Sciences, Geelong, Australia, <sup>2</sup>Department of Public Health and Primary Care, Faculty of Medicine and Health Sciences, Ghent University, Ghent, Belgium, <sup>3</sup>Department of Movement and Sport Sciences, Faculty of Physical Education and Physiotherapy, Vrije Universiteit Brussel, Brussel, Belgium

**S.3.42 - Park features and their micro scale designs important for park use among adults and older adults., UKK - Level 6 Foyer, June 17, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Park features such as walking paths, and outdoor fitness areas are important for active and social park visits among older adults. However, little is known about the micro-level design aspects of these park features to ensure they are appealing to older adults and encourage them to be active during their park visits. This study used Adaptive Choice-Based Conjoint (ACBC) analysis to examine the relative importance of selected micro-level design features of walking paths and outdoor fitness areas preferred by older adults and examined if preferences varied by sex, park accompaniment, and mobility status.

**Method:** Cross-sectional data were collected from older adults (≥65 years) who are living independently in Australia. Participants completed an online survey that included a series of ACBC tasks related to features of walking paths (n=383, 65-93 years; 56% female) and outdoor fitness areas (n=372; 65-93 years; 57% female) in random order. Hierarchical Bayes analysis within Sawtooth Software was used to identify the relative importance and part-worth utility scores for each micro-level design feature.

**Result:** The three most important micro-level design features of walking paths were the “gradient of path” (21.3%, 95% CI=19.6, 22.9), “shady trees along the path” (21.2%, 95% CI= 20.1, 22.4), and “surface type” (13.3%, 95% CI= 12.2, 14.4). For these features, the part-worth utility scores showed that a path with gentle slopes; lots of shady trees; and rubber surfaces were preferred, respectively. The three most important micro-level design features of outdoor fitness areas were: “surface type” (21.5%, 95% CI 20, 22.9), especially rubber surface; “equipment specially designed for older adults” (18.7%, 95% CI 17.3, 20.2); and “shady trees around the fitness area” (14.0%, 95% CI 12.9, 15.0).

**Conclusion:** This study will help stakeholders in understanding which micro-level design feature to prioritise when (re)designing walking paths and outdoor fitness areas targeting older adults. The findings from this study show that paths with gentle slopes, lots of shady trees, and rubber surfaces and fitness areas with rubber under surfacing, lots of shady trees, and equipment specially designed for older adults should be prioritised when designing walking paths and fitness areas in parks.

# Understanding preferences for park features that encourage park visitation, park-based physical activity, and social interaction among adults: An adaptive choice-based conjoint analysis

**Associate Professor Jenny Veitch**<sup>1</sup>, Prof. Anna Timperio<sup>1</sup>, Ms. Elise Rivera<sup>2</sup>, Prof. Benedicte Deforche<sup>3,4</sup>, Dr. Venurs Loh<sup>1</sup>, Ms. Chahana Paudel<sup>1</sup>

<sup>1</sup>Deakin University, Institute for Physical Activity and Nutrition (IPAN), School of Exercise and Nutrition Sciences, Geelong, Australia, <sup>2</sup>Deakin University, School of Exercise and Nutrition Sciences, Geelong, Australia, <sup>3</sup>Department of Public Health and Primary Care, Faculty of Medicine and Health Sciences, Ghent University, Ghent, Belgium, <sup>4</sup>Department of Movement and Sport Sciences, Faculty of Physical Education and Physiotherapy, Vrije Universiteit Brussel, Brussel, Belgium

**S.3.42 - Park features and their micro scale designs important for park use among adults and older adults., UKK - Level 6 Foyer, June 17, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Parks are a key setting that can support the health and well-being of adults through facilitating physical activity and social interaction. This cross-sectional study examined the relative importance of park features for encouraging park visitation, park-based physical activity, and social interaction among adults (19-64 years) living in Melbourne and Sydney, Australia, and explored if preferences varied by sex and frequency of park visitation.

**Methods:** In August 2021, participants (n=260, mean age 55.8 years (12.8), 50% female) completed an online survey to derive a relative ranking of important park features for influencing choice of park for visitation, physical activity, and social interaction. They completed a series of Adaptive Choice-Based Conjoint (ACBC) analysis tasks, with responses used to identify the part-worth utilities and relative importance scores of selected park features using Hierarchical Bayes analyses within Sawtooth Software.

**Results:** Overall, a sense of safety from strangers and undesirable people was the most important feature influencing all three outcomes including choice of park to visit (20.7%; 95%CI: 18.7, 22.7), to be physically active (21.5%; 95%CI=18.9, 24.1) and be social (21.0%; 95%CI=17.9, 24.0). For visiting, good park maintenance and cleanliness (16.0%; 95%CI: 14.5, 17.4), and a peaceful and relaxed setting (14.8%; 95%CI: 13.6, 15.9) were the second and third most important park features. For physical activity, walking/cycling paths (15.5%; 95%CI=13.8, 17.3), and clean toilets (13.7%, 11.6, 15.9) were the second and third most important park features. For social interaction, the second, and third most important park features were good park maintenance and cleanliness (14.5%; 95%CI= 12.4, 16.6), and a BBQ or picnic area (13.6%; 95%CI= 11.7, 15.6). There were no noteworthy differences in results between males and females and between frequent and infrequent park visitors.

**Conclusion:** To ensure parks appeal as a setting that encourages adults to visit, engage in physical activity and interact socially, policymakers should prioritise safety, good park maintenance and cleanliness, a peaceful and relaxed setting, walking paths, clean toilets and a BBQ or picnic area.

# How theory can help to understand the potential impact of food environment policies on socioeconomic inequalities in diet: an application of Bourdieu's Capital Theory and the Scarcity Theory

**Mrs. Sanne Dijoosoparto**<sup>1</sup>, Associate Professor Carlijn Kamphuis<sup>2</sup>, Dr. Janas Harrington<sup>3</sup>, Dr. Anne Lene Lovhaug<sup>4</sup>, Prof. Gun Roos<sup>5</sup>, Dr. Alexia Sawyer<sup>6</sup>, Prof. Karien Stronks<sup>6</sup>, Dr. Laura Terragni<sup>4</sup>, Prof. Liv Elin Torheim<sup>7</sup>, Dr. Stefanie Vandevijvere<sup>8</sup>, Associate Professor Maartje Poelman<sup>9</sup>, Prof. Frank Van Lenthe<sup>10,1</sup>

<sup>1</sup>Department of Human Geography and Spatial Planning, Utrecht University, Utrecht, Netherlands,

<sup>2</sup>Department of Interdisciplinary Social Science, Utrecht University, Utrecht, Netherlands, <sup>3</sup>School of Public Health, University College Cork, Cork, Ireland, <sup>4</sup>Department of Nursing and Health Promotion, OsloMet – Oslo Metropolitan University, Oslo, Norway, <sup>5</sup>Consumption Research Norway (SIFO), Oslo Metropolitan University, Oslo, Norway, <sup>6</sup>Department of Public and Occupational Health, Amsterdam UMC, University of Amsterdam, Amsterdam, Netherlands, <sup>7</sup>Department for Physical Health and Ageing, Norwegian Institute of Public Health, Oslo, Norway, <sup>8</sup>Sciensano, Service of Lifestyle and Chronic Diseases, Brussel, Belgium, <sup>9</sup>Chair group Consumption and Healthy Lifestyles, Wageningen University & Research, Wageningen, Netherlands, <sup>10</sup>Department of Public Health, Erasmus University Medical Center Rotterdam, Rotterdam, Netherlands

**S.3.43 - The underlying mechanisms via which food environments and related policies impact on socioeconomic inequalities in diets, UKK - Hall B (Level 3), June 17, 2023, 8:15 AM - 9:30 AM**

## **SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** Government policies that promote healthy food environments are considered promising to reduce socioeconomic inequalities in diet. Empirical evidence of effects on these inequalities, however, is relatively scarce and, with a few exceptions, tends to be inconclusive.

**Methods:** We use two contemporary theories that help to understand socioeconomic inequalities in health and health-related behaviours (Bourdieu's Capital Theory and Mullainathan and Shafir's Scarcity Theory) to reason how policies influencing food environments may differentially impact lower and higher socioeconomic groups.

**Results:** In essence, these theories enable us to understand how specific elements of broader daily living conditions (e.g. social practices that lead to habitus formation, material conditions that shape experiences of scarcity) may lead to a greater benefit of certain food environment policies for the healthfulness of diets of lower or higher socioeconomic groups.

**Conclusions:** We conclude that the application of theories on the mechanisms underlying socioeconomic inequalities in health can help to guide future empirical studies in testing theory-based hypotheses on differential effects of policies, and thereby enhance the development of effective policies tackling socioeconomic inequalities in dietary intakes.

# Do financial constraint and perceived stress modify the effects of food tax schemes on food purchases: moderation analyses in a virtual supermarket

Mrs. Sanne Djojosoeparto<sup>1</sup>, Associate Professor Maartje Poelman<sup>2</sup>, Dr. Michelle Eykelenboom<sup>3</sup>, Assistant Professor Marielle Beenackers<sup>4</sup>, Prof. Ingrid Steenhuis<sup>3</sup>, Associate Professor Maartje Van Stralen<sup>3</sup>, Associate Professor Margreet Olthof<sup>3</sup>, Associate Professor Carry Renders<sup>3</sup>, Prof. Frank Van Lenthe<sup>4,1</sup>, **Associate Professor Carlijn Kamphuis<sup>5</sup>**

<sup>1</sup>Department of Human Geography and Spatial Planning, Utrecht University, Utrecht, Netherlands, <sup>2</sup>Chairgroup Consumption and Healthy Lifestyles, Department of Social Sciences, Wageningen University & Research, Wageningen, Netherlands, <sup>3</sup>Department of Health Sciences, Faculty of Science, Vrije Universiteit Amsterdam, and Amsterdam Public Health Research Institute, Amsterdam, Netherlands, <sup>4</sup>Department of Public Health, Erasmus University Medical Center Rotterdam, Rotterdam, Netherlands, <sup>5</sup>Department of Interdisciplinary Social Science, Utrecht University, Utrecht, Netherlands

**S.3.43 - The underlying mechanisms via which food environments and related policies impact on socioeconomic inequalities in diets, UKK - Hall B (Level 3), June 17, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** I. Socio-economic inequalities

**Objective** This study aimed to investigate whether financial constraint and perceived stress modify the effects of food-related taxes on the healthfulness of food purchases.

**Methods** A moderation analysis was conducted with data from a randomised controlled trial in a virtual supermarket where participants (n=394) were exposed to: (i) control condition, (ii) SSBs tax condition, or (iii) nutrient profiling tax condition. Outcome measures were: (i) overall healthiness of food purchases (proportion healthy %), (ii) energy content (kcal) and (iii) SSB purchases (liters). Effect modification was analyzed by adding interaction terms between the conditions and financial constraint or perceived stress in linear and ordinal regression models. Outcomes for each combination of condition and effect modifier were visualized.

**Results** Experiencing financial constraint or perceived stress did not significantly modify the effects of an SSBs tax or nutrient profiling tax on the outcome measures. In the control condition, the percentage of healthy food purchases and likelihood of being in a lower-level category of SSB purchases were lowest among those with moderate or high levels of financial constraint. Among those with moderate or high levels of constraint, a nutrient profiling tax increased the percentage of healthy food purchases and reduced SSB purchases.

**Conclusion** Financial constraint and perceived stress did not significantly modify the effects of food-related taxes on the healthfulness of food purchases. Patterns observed however, warrant further studies with larger samples to assess whether food-related taxes differentially affect the healthfulness of dietary intakes of subgroups



# Dynamics of the complex food environment underlying dietary intake in low-income groups: a systems map of associations extracted from a systematic umbrella literature review

**Dr. Alexia Sawyer<sup>1</sup>**, Prof. Frank Van Lenthe<sup>2, 7</sup>, Associate Professor Carlijn Kamphuis<sup>3</sup>, Prof. Laura Terragni<sup>4</sup>, Prof. Gun Roos<sup>5</sup>, Associate Professor Maartje Poelman<sup>6</sup>, Assistant Professor Mary Nicolaou<sup>1</sup>, Assistant Professor Wilma Waterlander<sup>1</sup>, Mrs. Sanne Djojosoeparto<sup>7</sup>, Dr. Mary Scheidmeir<sup>8</sup>, Associate Professor Agnieszka Neumann-Podczaska<sup>9</sup>, Prof. Karien Stronks<sup>1</sup>

<sup>1</sup>Department of Public and Occupational Health, Amsterdam University Medical Centres, University of Amsterdam, Amsterdam, Netherlands, <sup>2</sup>Department of Public Health, Erasmus Medical Centre, Rotterdam, Netherlands, <sup>3</sup>Department of Interdisciplinary Social Science, Utrecht University, Utrecht, Netherlands, <sup>4</sup>Department of Nursing and Health Promotion, Oslo Metropolitan University, Oslo, Norway, <sup>5</sup>Consumer Research Institute, Oslo Metropolitan University, Oslo, Norway, <sup>6</sup>Chair group Consumption and Healthy Lifestyles, Department of Social Sciences, Wageningen, Netherlands, <sup>7</sup>Department of Human Geography and Spatial Planning, Utrecht University, Utrecht, Netherlands, <sup>8</sup>Psychology Institute, Johannes Gutenberg University, Mainz, Germany, <sup>9</sup>Department of Geriatrics and Gerontology, Poznan University of Medical Sciences, Poznan, Poland

**S.3.43 - The underlying mechanisms via which food environments and related policies impact on socioeconomic inequalities in diets, UKK - Hall B (Level 3), June 17, 2023, 8:15 AM - 9:30 AM**

## **SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** Examining the economic, social, physical and political food environment of low-income groups as a complex adaptive system – i.e. a system of multiple, interconnected factors exerting non-linear influence on an outcome, can enhance the development and assessment of effective policies and interventions by honouring the complexity of lived reality. We aimed to develop and apply novel causal loop diagramming methods in order to construct an evidence-based map of the underlying system of environmental factors that drives dietary intake in low-income groups.

**Methods:** A systematic umbrella review was conducted on literature examining determinants of dietary intake and food environments in low-income youths and adults in high/upper-middle income countries. Information on the determinants and associations between determinants was extracted from reviews of quantitative and qualitative studies. Determinants were organised using the Determinants of Nutrition and Eating (DONE) framework. Associations were synthesised into causal loop diagrams that were subsequently used to interpret the dynamics underlying the food environment and dietary intake. The map was reviewed by an expert panel and systems-based analysis identified the system paradigm, structure, feedback loops and goals.

**Results:** Findings from forty-three reviews and expert consensus were synthesised in an evidence-based map of the complex adaptive system underlying the food environment influencing dietary intake in low-income groups. The system was interpreted as operating within a supply-and-demand, economic paradigm. Five sub-systems ('geographical accessibility', 'household finances', 'household resources', 'individual influences', 'social and cultural influences') were presented as causal loop diagrams comprising 60 variables, conveying goals which undermine healthy dietary intake.

**Conclusions:** Our findings reveal how poor dietary intake in low-income groups can be presented as an emergent property of a complex adaptive system that sustains a food environment that increases the accessibility, availability, affordability and acceptability of unhealthy foods. In order to reshape system dynamics driving unhealthy food environments, simultaneous, diverse and innovative strategies are needed to facilitate longer-term management of household finances and socially-oriented practices around healthy food production, supply and intake. Ultimately, such strategies must be supported by a system paradigm which prioritises health.

# Trial designs for sleep interventions in childhood: What works?

**Dr. Jillian Haszard<sup>1</sup>**, Dr. Justine Camp<sup>2</sup>, Prof. Barbara Galland<sup>3</sup>, Prof. Rachael Taylor<sup>2</sup>

<sup>1</sup>Biostatistics Centre, University of Otago, Dunedin, New Zealand, <sup>2</sup>Department of Medicine, University of Otago, Dunedin, New Zealand, <sup>3</sup>Department of Women's and Children's Health, University of Otago, Dunedin, New Zealand

**S.3.44 - Enhancing the design of interventions to change health behaviours, UKK - Hall C (Level 3), June 17, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Improving sleep health in children may benefit multiple aspects of their lives, including diet, body weight, wellbeing, and quality of life. To investigate how to improve sleep health, it is important to choose the best study design for the identified need.

**Methods:** We have carried out several trials on sleep health, including a crossover trial (DREAM) that aimed to understand how mild sleep deprivation in children could influence eating; a parallel RCT (POI) that showed a brief sleep intervention in infancy improved obesity at five years; and a MOST trial (Moemoeā) that looked to determine an optimised intervention for improving sleep and wellbeing in infants and their families from an indigenous-led perspective. Lessons from these trials were used to design a suite of new sleep intervention studies that we are currently planning, which include a cluster RCT and a stepped-wedge trial.

**Results:** Our DREAM study showed that mild sleep deprivation in children causes higher energy intake and lower quality of life – identifying possible benefits of sleep health interventions. The POI study showed that a brief sleep intervention in infancy improved obesity outcomes in young children, but not for all, in particular not for Māori (New Zealand indigenous population). The Moemoeā study taught us that the MOST design did not fit with the Māori world-view and that our implementation was not strong. In response to these results we have designed a Māori-led cluster RCT with implementation feasibility (hybrid 1 trial) to assess the effectiveness of a sleep intervention in infancy on family wellbeing. The cluster design allows our intervention to align with the Māori world-view as well as the structure of health providers in New Zealand. We have also planned a stepped-wedge trial to assess the influence of making school start times later for senior high school students – a design suitable for interventions that will be implemented in pre-schools or similar.

**Conclusions:** Appropriate study design is critical to be able to meet the research objectives and provide the desired outcomes for the population. However, if the design fails in some way, these lessons should be shared and built upon.

# The power of collaboration: deconstructing and learning from existing early obesity prevention interventions in the TOPCHILD Collaboration

**Dr. Brittany Johnson**<sup>1</sup>, Associate Professor Paul Chadwick<sup>2</sup>, Ms. Samantha Pryde<sup>1</sup>, Dr. Anna Lene Seidler<sup>3</sup>, Ms. Kylie Hunter<sup>3</sup>, Mr. Hei In Lau<sup>1</sup>, Prof. Rebecca Golley<sup>1</sup>, Other on behalf of the Transforming Obesity Prevention for CHILDren (TOPCHILD) Collaboration

<sup>1</sup>Caring Futures Institute, Flinders University, Adelaide, Australia, <sup>2</sup>Centre for Behaviour Change, University College London, London, United Kingdom, <sup>3</sup>NHMRC Clinical Trials Centre, The University of Sydney, Sydney, Australia

**S.3.44 - Enhancing the design of interventions to change health behaviours, UKK - Hall C (Level 3), June 17, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Over the past two decades numerous complex early obesity prevention interventions have been designed and tested. Little is known about how such interventions seek to change behaviour and which components are or are not effective. Understanding the discrete intervention components provides a first step towards examining intervention effectiveness by components, to inform design of future interventions. This study aimed to characterise early obesity prevention interventions in terms of target behaviours, delivery features and behaviour change techniques (BCTs).

**Methods:** Annual systematic searches were performed in Epub Ahead of Print/MEDLINE, Embase, Cochrane (CENTRAL), CINAHL, PsycINFO, as well as clinical trial registries from 2020-2022. Eligible randomised controlled trials of behavioural child obesity prevention interventions commencing antenatally or in the first year after birth were invited to join the Transforming Obesity in CHILDren (TOPCHILD) Collaboration. Standard frameworks and taxonomies were used to systematically code target behaviour clusters, delivery features (i.e. how an intervention is delivered) and BCTs. Narrative syntheses were performed to summarise intervention components.

**Results:** Twenty-six studies involving 31 active interventions had joined the TOPCHILD Collaboration and shared materials as of Oct 2022. Preliminary findings revealed the most frequently targeted behavioural clusters were food provision and parent feeding practices (N=28), followed by infant feeding practices (N=24). Commonly used feature categories were didactic sessions (n=31), face-to-face delivery (n=25), written materials (n=24), home setting (n=21), and monthly or greater frequency of contact (n=20). The most frequently coded BCTs from published descriptions, regardless of behavioural cluster were BCT 1.2, BCT 3.1, BCT 4.1, BCT 8.1, BCT 9.1.

**Conclusion:** This project provides the first comprehensive, systematic examination of the components of complex early child obesity prevention interventions. While there were some common components across majority of interventions, such as the delivery feature materials or procedures used, there was in general large variation in other delivery features and range of BCTs, with few interventions targeting sleep practices. We have also identified untapped intervention components to be investigated in future research. Combining the coded intervention components with individual participant outcome data will allow us to examine which components are associated with intervention effectiveness to design next generation interventions.

# Design of a micro-randomized trial to optimize just-in-time-adaptive intervention messaging to improve adherence to weight-related behaviors in young adults

**Assistant Professor Carmina Valle**<sup>1,2</sup>, Assistant Professor Brooke Nezami<sup>1</sup>, Assistant Professor Heather Wasser<sup>1</sup>, Ms. Karen Hatley<sup>2</sup>, Ms. Molly Diamond<sup>2</sup>, Dr. Kristen Polzien<sup>2</sup>, Associate Professor Nisha Gottfredson<sup>1</sup>, Prof. Deborah Tate<sup>1,2</sup>

<sup>1</sup>Gillings School of Global Public Health, University of North Carolina at Chapel Hill, Chapel Hill, USA,

<sup>2</sup>Lineberger Comprehensive Cancer Center, University of North Carolina at Chapel Hill, Chapel Hill, USA

**S.3.44 - Enhancing the design of interventions to change health behaviours, UKK - Hall C (Level 3), June 17, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** J. Young Adults

**Purpose:** Just-in-time adaptive interventions (JITAI) have the potential to improve multiple weight-related behaviors by integrating data from digital devices and providing adaptive, tailored messages that offer the “right type of support” at “the right time.” However, little empirical evidence exists regarding what types of JITAI messages are most effective and under what conditions. The purpose of this study is to systematically test the effects of 7 different types of intervention messages that target distinct behavior change techniques (i.e., BCT messages) on daily adherence to weighing, dietary, and physical activity goals among young adults of reproductive age.

**Methods:** Building on our pilot micro-randomized trial, 201 young adults with overweight and obesity will receive a 6-month behavioral weight loss intervention using our Nudge mobile app, which includes evidence-based weekly lessons, tailored feedback, self-monitoring, and daily BCT messages. Participants will have 3 daily weight-related behavioral goals: weigh daily, stay at or under a “red” food limit (energy dense foods), and meet an active minutes goal. At 3 decision points per day, participants will be micro-randomized to receive, or not receive, 1 of 7 types of BCT messages. All BCT messages have unique decision rules that evaluate an individual’s availability to receive an intervention. Candidate BCT messages have been carefully selected from empirical evidence or tested in our prior studies, or are from our pilot micro-randomized trial. Each BCT message is aimed at improving one of 3 weight-related proximal outcomes on the same day the message is delivered, or not delivered: *daily weighing* (assessed by wireless scale), *staying at or under a daily red food limit* (assessed by self-report in the app), or *meeting a daily active minutes goal* (assessed by activity tracker). Assessments will occur daily, and at 0, 3 and 6 months.

**Results:** Recruitment for the micro-randomized trial will be begin in early 2023.

**Conclusions:** Findings will expand our understanding of what BCT messages are effective, when they are effective, and for whom. Given the focus on young adults, findings may inform interventions aiming to prevent early childhood obesity through the improvement of nutrition and activity behaviors of parents of young children.

# What factors shape food environments in health care institutions? A systems dynamics approach

**Ms. Joline Wierda**<sup>1</sup>, Assistant Professor Coosje, S Dijkstra<sup>2</sup>, Ms. Tamika, M Wopereis<sup>1</sup>, Prof. Emely de Vet<sup>1</sup>, Associate Professor Maartje, P Poelman<sup>1</sup>

<sup>1</sup>Chair Group Consumption and Healthy Lifestyles, Wageningen University & Research, Wageningen, Netherlands, <sup>2</sup>Department of Health Sciences, Amsterdam Public Health Research Institute, Vrije Universiteit Amsterdam, Amsterdam, Netherlands

**S.3.45 - Towards healthy and sustainable food environments in hospitals and other health care settings: international lessons learned, UKK - Hall D (Level 2 - main floor), June 17, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** The food environment of health care institutions is complex and has to serve patients/clients, visitors and staff. Creating a healthy and sustainable food environment asks for a broad and systemic approach. The aims of this study were to 1) identify systemic factors that shape the food environment in health care organizations for patients/clients, visitors and staff and 2) formulate actions that are needed for a systemic transition towards a healthy and sustainable food environment in health care settings.

**Methods:** A group model building (GMB) approach was used during two live workshops in the spring of 2022 with different stakeholders (n=9-10) of five different health care settings in the Netherlands: a nursing home, two revalidation centres, mental health care institution and care setting for people with intellectual disabilities. During the first workshop, GMB scripts were used to facilitate stakeholders in identifying factors and positive and negative associations between those factors in a causal loop diagram (CLD). Subsequently, stakeholders were required to identify leverage points for change. In the second workshop, stakeholders were encouraged to formulate actions for change. The CLD was used to interpret the system dynamics underlying the food environment in health care settings.

**Results:** The developed CLD consisted of 35 associating factors that stimulate a healthy and sustainable diet in health care organizations and were categorised into six interrelated subsystems: the health care organization, social context, budget and procurement, media influence, the individual (patient/client) and the national government. Eleven leverage points were identified (e.g. 'vision and policy on food') and thirteen corresponding actions were formulated by the stakeholders (e.g. 'a committed management').

**Conclusions:** The developed systems map illustrates the complexity of the food environment in health care settings and the interrelatedness of the factors within different subsystems. It demonstrates that actions on different levels of different subsystems are needed to long lastingly improve food environments in health care institutions. This map can support health care institutions and policy makers to better understand the components of the food environment and to recognize where change is needed in the system to create health promoting environments in health care settings.

# Creating healthy hospital retail food environments at-scale: examining the acceptability, feasibility and effectiveness of a policy solution.

Dr. Leonie Cranney<sup>1,2</sup>, **Dr. Margaret Thomas<sup>1,2</sup>**

<sup>1</sup>School of Public Health, Faculty of Health, University of Technology Sydney, Sydney, Australia, <sup>2</sup>Charles Perkins Centre, The University of Sydney, New South Wales, Australia

**S.3.45 - Towards healthy and sustainable food environments in hospitals and other health care settings: international lessons learned, UKK - Hall D (Level 2 - main floor), June 17, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** This research determined the acceptability, feasibility and effectiveness of a hospital healthy food retail policy within a large and complex health system. The presentation will highlight the value of a pragmatic, mixed methods approach to evaluating complex, real-world food environment policy interventions.

**Methods:** A pragmatic perspective underpinned the research, which used a convergent parallel mixed methods pre-post evaluation design. The design focussed equally on effectiveness and process outcomes and used multiple data sources to examine them. Quantitative studies included census audits of food retail outlets and repeat consumer intercept surveys with 4,808 staff and visitors in 10 randomly selected hospitals. Qualitative studies using semi-structured interviews adopted a grounded theory approach to explore stakeholder implementation experiences (n=99 stakeholders). The underlying mechanisms that generated outcomes were examined, as well as the intervention and contextual factors that triggered them. Interviews were audio-recorded, transcribed, coded and thematically analysed in NVivo 11.

**Results:** Several important factors enhancing feasibility of policy implementation were identified: executive commitment to implementation and monitoring; a flexible approach to locally tailored implementation; and historical precedents. Clear practice targets within a long-term incremental approach, system-wide support, and monitoring requirements were key intervention features. These triggered sufficient accountability and autonomy to drive organisational and environmental change. Other key mechanisms that drove systemic change included stakeholder's broad acceptance of the policy premise, their desire to succeed, perceived benefits and effectiveness. Most retail outlets removed sugar-sweetened beverages from sale (58% to 96%;  $p < 0.001$ ), which was well supported by consumers (80%). Local implementers and retailers worked towards achieving further food-related benchmark criteria with intercept surveys showing strong and increasing levels of consumer support (89% to 92%;  $p = 0.01$ ), but only a slight percentage increase in healthier food purchases was observed (56 to 59 %;  $p = 0.22$ ).

**Conclusions:** Healthy food retail policy can be successfully implemented in the hospital setting, and at-scale across a large and complex health system. The pragmatic and comprehensive evaluation design was feasible and appropriate for real-world policy evaluation in this context and generated meaningful evidence for ongoing policy implementation and the broader evidence base.



# Healthy and climate-friendly menus in nursing homes in the City of Copenhagen – Development of guidelines and follow-up of implementation

**Ms. Matilda Nordman<sup>1</sup>**, Dr. Anne, D Lassen<sup>1</sup>, Dr. Ellen Trolle<sup>1</sup>

<sup>1</sup>National Food Institute, Technical University of Denmark , Kongens Lyngby, Denmark

**S.3.45 - Towards healthy and sustainable food environments in hospitals and other health care settings: international lessons learned, UKK - Hall D (Level 2 - main floor), June 17, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Shifting public food procurement is an important step for climate action but nursing homes face many nutritional challenges. Here we demonstrate by scenario analysis how diet-related greenhouse gas emissions (GHGE) can be reduced by at least 25% in nursing homes in the City of Copenhagen while at the same time providing nutritionally adequate and recognizable menus. In addition, we showcase how the City of Copenhagen is working towards these goals as part of their food strategy and present preliminary results of a mid-way evaluation of the effects on the food purchased by nursing homes.

**Methods:** We carried out a scenario analysis based on the municipality's food procurement data from 2018 to create target group-specific guidance for improved nutritional quality and lower GHGE of the food served in nursing homes. We describe how the municipality is currently implementing the guidelines in practice as part of a larger new food strategy implementation. Finally, based on 2022 food procurement data we carry out a mid-way evaluation of the effects of implementation.

**Results:** Diet models and guidelines were created to take into account both nutritional quality and sustainability (GHGE reduction 22-26%) of the food purchased by nursing homes. Compared with baseline practices, the guidelines outline changes in serving amounts of meat (decreased to no more than 500 g/person/week of cooked red meat and poultry) and a substantial increase in plant-based protein-rich foods such as pulses, nuts, and seeds. Activities of the implementation in the municipality include the provision of guidelines, the creation of a recipe database, and training and supervision of food providers by food consultants. Mid-way evaluation includes analysis of the potential changes in the composition of the food purchased, e.g., use of legumes and meat (especially ruminant meat).

**Conclusions:** This study presents how guidelines for healthy and more climate-friendly menus can be formulated and used as instrument to guide dietary transition in nursing homes. Mid-way evaluation provides status on the implementation and perspectives for further involvement of stakeholders needed to achieve the transition to a healthy and sustainable food system, all while ensuring the nutritional quality of meals in nursing homes.

# Recall, understanding, use, and perceived utility of the front-of-package warnings labels in Peru: A qualitative study with mothers of preschool children in 4 cities

**Mr. Francisco Diez-Canseco**

<sup>1</sup>Cronicas Center of Excellence in Chronic Diseases, Cayetano Heredia University, Lima, Peru

**S.3.46 - Evaluating innovative food policies to reduce consumption of unhealthy foods and drinks in Chile and Peru, UKK - K1 (+K2) (Level 3), June 17, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** In June 2019, as part of an effort to reduce the risk of overweight and NCDs among children and adolescents, Peru implemented four octagon-shaped front-of-package (FoP) warning labels to inform consumers about high levels of sugar, saturated fats, sodium, and trans fats on processed foods and beverages. A qualitative study was designed to explore the recall, understanding, use and perceived utility of the FoP among mothers of preschool children in four Peruvian cities.

**Methods:** In mid-2021, 18 virtual focus groups with mothers from different socioeconomic statuses (SES) and living in four cities of different size, geography and culture were conducted. A content analysis of the transcriptions was performed.

**Results:** Ninety-eight women (average age: 32 years old, average children: 2) participated. The warning labels were easily identified and remembered by mothers of all cities and SES and their general purpose clearly understood, although some octagons and claims were better recalled and more clearly understood than others. The warning labels were commonly used by many mothers when deciding what packaged products to buy, although the use seemed to be heterogenous, that is more valued to purchase some products than others. Most mothers reported changes in their purchasing habits due to the warning labels, mainly reducing the frequency and quantity of processed foods and beverages intake, replacing them with home-made preparations or buying other packaged products without octagons. There was a strong support to the warning labels policy in all cities and SES. Mothers perceived the warning labels informative and useful to take better decisions and protect their family health. There was also high support to ban labelled foods school cafeterias, although mothers expressed their concern about the lack of a healthier offer to replace the prohibited products.

**Conclusion:** The use of qualitative tools allowed us to understand that, among women from very different regions and SES, the FoP warning labels were well remembered, commonly used when buying packaged foods and beverages, and highly valued. The implementation of this policy seemed to have helped women to reduce the purchase and intake of products high-in sugar, sodium and fats.

# Sugary beverage purchases after the Chilean and Peruvian sugar reduction policies

**Dr. Lindsey Smith Taillie**<sup>1</sup>, Mr. Maxime Bercholz<sup>1</sup>, Dr. J. Jaime Miranda<sup>2</sup>, Mr. Francisco Diez-Canseco<sup>2</sup>, Dr. Camila Corvalan<sup>3</sup>

<sup>1</sup>University of North Carolina, Chapel Hill, Chapel Hill, USA, <sup>2</sup>CRONICAS, University of Cayetano Heredia, Lima, Peru, <sup>3</sup>INTA, University of Chile, Santiago, Chile

**S.3.46 - Evaluating innovative food policies to reduce consumption of unhealthy foods and drinks in Chile and Peru, UKK - K1 (+K2) (Level 3), June 17, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Sugary drinks are a pressing public health concern in Latin America due to their increasing sales and association with non-communicable disease (NCDs) risk. Sugary drink taxes and front-of-package labels, including “high-in sugar” warnings, are increasingly popular strategies to reduce consumption of sugary drinks, yet empirical evaluations of these policies in Latin America are sparse. This study evaluates two sets of sugar reduction policies and their association with sugary drink purchases: Peru’s sugary drink tax modifications (the first implemented in May 2018 and the second in June 2019) and ‘high-in’ warning labels (June 2019), and Chile’s ‘high in’ warning labels and advertising policy (the first phase was implemented in June 2016; the second in June 2018).

**Methods:** In each country, we used panel data on household beverage purchases aggregated to the monthly level (n=44,909 and n=92,189 household-month observations in Chile and Peru, respectively) to describe changes in the shares of calories and sugar purchased from “high-in” products between the 12-month period before the first policy implementation (“pre-policy period”) and the 12-month period after the second policy implementation (“post-policy period”). Means and household-level-cluster-robust 95% CIs were calculated for each period. Final methods will include fixed effects models controlling for seasonality, trends, and household-level covariates.

**Results:** After one year in the post-policy period, we observed reductions of 20-30 percentage points (pp) relative to the pre-policy period. In Chile, the share of calories coming from high-in beverages fell 23 pp (from 55% [95% CI 54%, 55%] to 32% [31%, 33%]), while the share of sugar coming from high-in beverages fell 25 pp (from 66% [65%, 67%] to 41% [40%, 42%]). In Peru, the share of beverage calories and sugar from high-in beverages fell by 21 pp (from 33% [33%, 34%] to 12% [11%, 12%]) and 30 pp (from 48% [48%, 49%] to 18% [17%, 18%]), respectively.

**Conclusion:** After one year, the Chilean and Peruvian sugar reduction policies were associated with reductions in calories and sugar from high-sugar beverages relative to overall calories and sugar, suggesting suggest that these policies may contribute to healthier beverage consumption.

# Chile's Food Labeling and Marketing Law: effect on children's exposure to food advertising and parents' perceptions and nutritional knowledge

Dr. Camila Corvalán<sup>1</sup>, Dr. Marcela Reyes<sup>1</sup>, Dr. Teresa Correa<sup>2</sup>, Dr. Francesca Dillman-Carpentier<sup>3</sup>, **Dr. Fernanda Mediano**<sup>5,6</sup>, Dr. Lindsey Smith Taillie<sup>4</sup>

<sup>1</sup>INTA, University of Chile, Santiago, Chile, <sup>2</sup>School of Communication, Universidad Diego Portales, Santiago, Chile, <sup>3</sup>Hussman School of Journalism and Media, University of North Carolina, Chapel Hill, Chapel Hill, USA, <sup>4</sup>Gillings School of Global Public Health, University of North Carolina, Chapel Hill, Chapel Hill, USA, <sup>5</sup>School of Psychology, Pontificia Universidad Católica de Chile, , Chile, <sup>6</sup>Carolina Population Center, University of North Carolina, North Carolina, USA

**S.3.46 - Evaluating innovative food policies to reduce consumption of unhealthy foods and drinks in Chile and Peru, UKK - K1 (+K2) (Level 3), June 17, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** In June 2019, Chile completed the implementation of the Chilean Food Labelling and Marketing Law, one of the most comprehensive policies to date to improve children's food environment. The regulation includes the use of warning label on unhealthy "high-in" food products and comprehensive marketing regulations, among other aspects. We have reported decreases on "high-in" foods TV marketing and positive changes on consumer's behaviors after initial implementation; however, we are interested in assessing long-term effects remained long-term, especially after the daytime ban on all "high-in" food advertisement that occurred in Phase 2.

**Methods:** We analyzed a random stratified sample of ads from two constructed weeks of television from pre-regulation (2016), Phase 1 child-directed restrictions (2017, 2018), and the Phase 2 high-in daytime ban (2019). Children's exposure was assessed using daily gross rating points from audience ratings data. We also conducted nine focus groups of mothers (7–10 people each) of children (2–14 yo) in Santiago, Chile in 2019 and macrocodes were developed, combining an iterative process of deductive and inductive thematic analyses.

**Results:** For TV advertisements, we observed that compared to pre-regulation, unhealthy foods ads decreased after full implementation by 64% in total, 66% between 6am-10pm, 56% after 10pm, 67% for ads with child-directed content, and 77% in programs attracting children ( $P < 0.01$ ). Children's exposure to TV unhealthy foods advertisement decreased by 73% compared to pre-regulation ( $P < 0.001$ ). In the focus groups, we found that parents' attention to warning labels decreased over time, particularly among those with lower-socioeconomic status (SES). However, mother of all SES mentioned that because of the law they have developed greater knowledge about nutrition and appreciation for natural foods. Low-SES mother complained that acquiring this knowledge was not useful if healthy foods remained financially and physically inaccessible. All mothers emphasize that schools are a key healthy promoting environment.

**Conclusions:** The Chilean Labelling and Marketing Law improved food literacy in all SES groups as well as reduce children's exposure to unhealthy food advertising. The results suggest that food environment policies can promote nutrition equity, though more attention needs to be paid to healthy food affordability.

# Adventurous play and mental health: Findings from the British Children's Play Survey.

**Dr. Rachel Nesbit<sup>1</sup>**, Dr. Lily Fitzgibbon<sup>2</sup>, Ms. Brooke Oliver<sup>3</sup>, Prof. Helen Dodd<sup>1</sup>

<sup>1</sup>Department of Public Health and Sports Sciences, University of Exeter, Exeter, United Kingdom, <sup>2</sup>University of Stirling, Stirling, United Kingdom, <sup>3</sup> University of Reading, Reading, United Kingdom

**S.3.47 - Risky play in childhood: innovative insights and future research directions, UKK - K3+4 (Level 3), June 17, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Adventurous play has been proposed to provide a positive context where children experience and learn about fear, uncertainty, decision-making, risk-judgement and coping and in turn affords children with the skills to manage future situations that may be scary or uncertain. As such, adventurous play has been theorised as a mechanism to reduce children's risk for problematic anxiety. The aims of this presentation are twofold. Using data from The British Children's Play Survey, the first aim is to examine how adventurously children in Britain play, where this play takes place and how much time children in Britain spend playing adventurously across the year. The second aim is to examine factors related to the amount of time children spend playing adventurously, including socio-demographic factors, parent attitudes towards risk and engagement and children's mental health.

**Methods:** The British Children's Play survey was conducted to provide nationally representative data on the play of primary-school aged children in Britain (N =1919). Parents and caregivers completed a range of measures reporting on their child's play and adventurous play (location, frequency, time), their attitudes towards risk in play, socio-demographics and measures of their child's mental health.

**Results:** Children in Britain were reported to have the highest levels of adventurous play in green spaces such as forests and fields and the lowest levels of adventurous play at home. Children who spent the most amount of time playing adventurously were boys, younger children, children who did not have a disability and children whose responding parent/caregiver was white and working part-time. Parents who were more tolerant of risk and who had more positive attitudes about their child engaging with risk had children who spent more time playing adventurously. Children who spent more time playing adventurously had fewer internalising symptoms and more positive affect.

**Conclusions:** Our findings provide the first empirical evidence linking adventurous play to children's mental health. Our findings highlight that providing children with opportunities to play in an adventurous way may offer benefits for children's mood and long-term mental health.

**Funding:** This research was funded by a UKRI Future Leaders Fellowship, grant number MR/S017909/1.

# ViRMa: Virtual Risk Management - exploring effects of childhood risk experiences through innovative methods

**Prof. Ellen Sandseter<sup>1</sup>**

<sup>1</sup>Queen Maud University College of Early Childhood Education, Trondheim, Norway

**S.3.47 - Risky play in childhood: innovative insights and future research directions, UKK - K3+4 (Level 3), June 17, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** G. Children and families

**Purpose** Studies suggest that through risky play, children learn to manage risks (Sandseter & Kennair, 2011; Lavrysen et al., 2015; Brussoni et al., 2015). However, most studies consist of small samples and lack the robustness of larger quantitative designs. There are also ethical issues with studies where children take real risk, while restricting children from playing freely to assess negative effects would be equally problematic. Virtual Reality (VR) (Morrongiello et al., 2015; Wang et al., 2020) is a promising method for studying aspects of risk, still meeting requirements for research ethics. The aim of this project is twofold; to develop new technological methods to measure children's willingness to take risks, their risk assessment and management skills, and to explore associations between risky play experiences and risk assessment/management skills.

**Methods** Based on common injury causes among children, three categories of risk situations were chosen: 1) Street crossing, 2) River crossing, 3) Balancing high playground equipment. VR scenarios of these risk situations, including different levels of risk, were developed as virtual spaces for children to assess and manage risk. In addition, while performing tasks in VR (VIVE Pro Eye), eye-tracking technology measure children's use of their gaze, and bodily movements are measured with motion-capturing technology (Xsens MTw Awinda). Background data from children and parents around sensation-seeking personality, perceived motor skills, parenting style and earlier risk experiences are collected through questionnaires. The methods were piloted and modified during 2022. The main data collection will be conducted during January–April 2023, including approximately 500 children and their parents.

**Results** This presentation will focus on the development of innovative methods, as well as preliminary analysis of the data from the main data collection. Data from the VR, eye-tracking technology and motion capturing will be processed in MATLAB and STATA for statistical analysis. Similarly, data from questionnaires will be imported to STATA.

**Conclusions** New technology gives opportunities to measure children's risk-taking, risk assessment and risk management in an ethical appropriate way, and insight into the relationship between children's risky play experiences and their risk assessment/management skills will be presented.

**Funding:** The Research Council of Norway (project #324155)



# PROMoting Early Childhood Outside (PRO-ECO): measuring children's outdoor and risky play at child care centres in Vancouver, BC

**Ms. Rachel Ramsden<sup>1</sup>**, Prof. Ian Pike<sup>1,2</sup>, Prof. Sally Thorne<sup>3</sup>, Prof. Mariana Brussoni<sup>1,2,4</sup>

<sup>1</sup>Department of Pediatrics, The University of British Columbia, Vancouver, Canada, <sup>2</sup>British Columbia

Children's Hospital Research Institute, Vancouver, Canada, <sup>3</sup>UBC School of Nursing, Vancouver, Canada,

<sup>4</sup>Human Early Learning Partnership, School of Population and Public Health, University of British Columbia, Vancouver, Canada

**S.3.47 - Risky play in childhood: innovative insights and future research directions, UKK - K3+4 (Level 3), June 17, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** F. Early care and education

**Purpose:** Participation in outdoor and risky play can benefit children's development, health and overall well-being. This study aims to measure outdoor and risky play affordances at childcare centres in Vancouver, Canada. Using innovative methodological approaches, the objective of this study is to understand environmental components that support children's outdoor and risky play and produce child-centred recommendations for the planning, design and modification of childcare spaces.

**Methods:** Baseline data from 8 participating childcare centres in the PROMoting Early Childhood Outside (PRO-ECO) study were used. Children aged 2.5 – 6 years attending participating childcare centres were recruited to participate in this study. The expanded *Tool for Observing Play Outdoors (TOPO)* and the *Categories of Risk-taking Behaviour* were used to measure children's observed outdoor and risky play in relation to physical location during designated outdoor play times at childcare. Descriptive maps outlining the frequency of play behaviour, activity level and risk-taking behaviour for each child care centre were produced. Using the *Mosaic Approach*, qualitative interviews, walk-along tours and map-making were also conducted with children. Thematic analysis was used to analyze children's perspectives of their outdoor and risky play in relation to outdoor affordances.

**Results:** The sample for this study consisted of 130 children. Of these participants, 23 children from two participating childcare centres were included in the qualitative component of this study. Results from quantitative and qualitative analyses demonstrate the areas of outdoor childcare spaces where children are most likely to participate in outdoor and risky play, including the sandbox, climbing structures and tricycle paths. This presentation will focus on the methodology used to measure children's outdoor and risky play behaviour and showcase the preliminary results of this study.

**Conclusions:** This research provides new methodological considerations for including children's perspectives in the measurement of outdoor and risky play as well as unique findings on outdoor and risky play affordances. The results of this study will have implications for the advancement of enhanced planning and design of outdoor childcare spaces to support outdoor and risky play.

**Funding:** The PRO-ECO study is funded by the Lawson Foundation

# Implementation of SuperFIT in preschools: facilitators and barriers according to the main stakeholders

**Dr. Sanne Gerards<sup>1</sup>**, Dr. Kelly Stewart<sup>1</sup>, Mr. Daan Pluim<sup>2</sup>, Ms. Angela Erkens<sup>3</sup>, Dr. Jessica Gubbels<sup>1</sup>

<sup>1</sup>Maastricht University, Maastricht, Netherlands, <sup>2</sup>Ecsplora, Sittard, Netherlands, <sup>3</sup>MIK-PIW groep, Beek, Netherlands

**S.3.48 - Narrowing the science-practice implementation gap in the field of physical activity and nutrition, Clarion Hotel Gillet - Room Gillesalen, June 17, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** SuperFIT is a comprehensive, integrated, preschool intervention approach aiming to improve children's energy balance-related behaviors (2-4 years). SuperFIT aims to change the physical, socio-cultural and political environment in both the preschool and home setting. An effect evaluation and a process evaluation study of SuperFIT have previously shown some promising results. Currently, the intervention is being implemented on a large scale in the southern part of the Netherlands. In the current study, we investigated the barriers and facilitators of the large-scale implementation of SuperFIT. Based on these findings, adequate implementation strategies will be developed.

**Methods:** 21 individual interviews were done with a broad range of stakeholders (i.e. preschool teachers and management, SuperFIT implementers, parents). The interviews were based on the Consolidated Framework of Implementation Research by Damschroder. The interviews were analysed using Nvivo.

**Results:** All categories of Damschroder were mentioned in the interviews as affecting the implementation of SuperFIT: the intervention, the implementer, the organisation and the socio-political context. SuperFIT was perceived as an adaptable intervention approach, which eventually felt as fitting within the working procedures. However, there is a need for additional tools to facilitate the conversation with preschool teachers and parents on SuperFIT and to exchange experiences. Implementers indicated that they needed some extra training to be able to work context-dependent. The enthusiasm of relevant stakeholders seem to be most predictive of how well SuperFIT was implemented. Regarding the organisation, although the management prioritized the implementation of SuperFIT, some challenging circumstances hindered the implementation: i.e. personnel shortages and sick leave, as well as the concurrent implementation of other programs. At the socio-political context level, regulations and national developments were stimulating, but COVID-19 had a negative impact.

**Conclusion:** The current study provided insight in perceived barriers and facilitators, which led to the development of the following implementation strategies: deploying SuperFIT ambassadors, training of SuperFIT implementers, and development of extra tools supporting the implementation of SuperFIT (e.g. an inspirational platform and a conversation tool).

# Implementing interventions in the real world - A balancing act between practice and science. Key challenges of the Familie+ project.

**Dr. Christina Niermann<sup>1</sup>, Ms. Friederike Butscher<sup>2</sup>**, Mr. Felix Arway<sup>3</sup>, Ms. Alexandra Ziegeldorf<sup>4</sup>, Prof. Martina Kanning<sup>3</sup>

<sup>1</sup>Medical School Hamburg, Hamburg, Germany, <sup>2</sup>Technical University of Munich, Munich, Germany, <sup>3</sup>University of Konstanz, Konstanz, Germany, <sup>4</sup>University of Leipzig, Leipzig, Germany

**S.3.48 - Narrowing the science-practice implementation gap in the field of physical activity and nutrition, Clarion Hotel Gillet - Room Gillesalen, June 17, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose** The aim of the Familie+ project was to evaluate the real-life implementation of a school-based intervention. Familie+ aims to promote physical activity, nutrition, sedentary behaviour and sleep behaviour simultaneously in school and family life using a collection of equivalent actions for both settings. The inclusion of community and school stakeholders and families in the development and real-life implementation processes required a collaboration between practice and science throughout all project phases. The purpose of this study was to integrate perspectives of stakeholders (community, school), implementers and users of the intervention (teachers, families) and researchers aiming to identify aspects reflecting the main challenges of the science-practice collaboration.

**Methods** Familie+ comprises three phases: 1) development, 2) implementation and evaluation, 3) translation and dissemination. The intervention was implemented in 47 classes in nine primary schools in three communities in an uncontrolled effectiveness-implementation hybrid trial. We applied a multistage mixed methods approach (questionnaires, one-to-one interviews, focus groups). Regarding qualitative data, content analyses were used to categorize manifestations of the research-practice gap. Those categories were contrasted with according aspects of the academic system. First results of manifestations of the research-practice gap are presented.

**Results** We found manifestations of the research-practice gap in the statements of teachers, school principals, families and community stakeholders. For instance, aiming to produce 'high quality' data, researchers tend to standardize and control implementation processes. This was in contrast with needs and expectations of community and school stakeholders, who both needed a highly individualized proceeding and adaption to community, school and class specific conditions. Overall the statements reflect a non-fit between the scientific Familie+ project, including e.g. applied processes such data assessments and standardized implementation on the one side and real-life conditions of teachers, families and community stakeholders on the other side.

**Conclusions** Collaboration between two inherently different 'systems' - science/academia and practice - is a huge challenge. Neither abandon science principles nor ignoring practice issues is a solution. There is a need to focus on antecedents of appropriate collaboration and uncovering the consequences of more or less adherence to science principles and more or less orientation on practice conditions, respectively.

# Practice and research-driven Dutch implementation research agenda

**Dr. Femke Van Nassau**<sup>1</sup>, Miss Anouk Driessen<sup>1</sup>, Dr. Leti van Bodegom-Vos<sup>2</sup>, Dr. Bethany Hipple Walters<sup>3</sup>, Dr. Erwin Ista<sup>4</sup>, Dr. Wouter Keijser<sup>5</sup>, Dr. Rianne van der Kleij – van der Sluis<sup>2</sup>, Dr. Christiaan Vis<sup>6</sup>, Dr. Gera Welker<sup>7</sup>, Prof. Michel Wensing<sup>8,9</sup>

<sup>1</sup>Amsterdam UMC, Amsterdam, Netherlands, <sup>2</sup>Leiden UMC, Leiden, Netherlands, <sup>3</sup>Trimbos-instituut, Utrecht, Netherlands, <sup>4</sup>Erasmus MC, Rotterdam, Netherlands, <sup>5</sup>Universiteit Twente / DIRMI Instituut, Enschede, Netherlands, <sup>6</sup>Vrije Universiteit, Amsterdam, Netherlands, <sup>7</sup>UMC Groningen, Groningen, Netherlands, <sup>8</sup>Heidelberg Universiteit, Heidelberg, Germany, <sup>9</sup>Radboudumc, Nijmegen, Netherlands

**S.3.48 - Narrowing the science-practice implementation gap in the field of physical activity and nutrition, Clarion Hotel Gillet - Room Gillesalen, June 17, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** In recent years, implementation research has gained more attention in the Netherlands. Yet, scarce funding of implementation research has resulted in mainly context specific knowledge and lacks generalizability to other contexts. Therefore, the Netherlands Implementation Collective (NIC) (*Nederlands Implementatie Collectief*, 2022) was asked by the national funding agency ZonMw to develop a Dutch implementation research agenda.

**Methods:** To do so, we 1) held interviews with Dutch implementation researchers; 2) conducted a 2-round e-Delphi study (Keeney et al., 2006); and 3) reached out to implementation professionals to share their implementation barriers in an online survey. In the e-Delphi study, panelists were asked to provide research questions in round 1, which were then merged into 31 proposed research topics. Delphi panelist scored these topics (on a 5-point Likert scale). Consensus was reached if 67% agreed with inclusion of the topic (Mokkink et al., 2010). These topics guided the thematic analyses of the input of the survey among practice professionals.

**Results:** Of the 47 invited researchers, 26 (55%) participated in round 1 (222 research questions). Twenty participants (77% of 26) completed round 2, in which consensus was reached on 14 topics. The survey among 74 practice professionals provided 230 barriers. Topics were categorised into 7 themes linked to implementation, sustainability, scale-up and de-implementation, such as knowledge on how to link determinants to strategies, tailoring of strategies, using innovative research designs. But also need for capacity for implementation and implementation research was expressed, and the need for practical tools to apply evidence-based implementation in practice.

**Conclusions:** By combining both input from implementation researchers (*how does it work*) as well as professionals (*how to apply*), the research agenda addresses topics relevant for both fields. The research agenda is widely disseminated among funding organisations, policy makers, researchers and practice to guide future implementation research

# Machine learning approaches for food categorization and nutrient profiling

**Dr. Guanlan Hu<sup>1</sup>**, Dr. Mavra Ahmed<sup>1</sup>, Dr. Mary L'Abbe<sup>1</sup>

<sup>1</sup>University of Toronto, Toronto, Canada

**S.3.49 - Artificial Intelligence as Applied Predictive Models for Food Composition Databases, Clarion Hotel Gillet - Room Akademien, June 17, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** D. e- & mHealth

**Background:** National food composition databases are expensive to develop, construct and maintain. Previous versions of food composition databases have relied on manual categorization and/or nutrient profiling, which considering the number of products in food composition databases, the number of food labels and complex calculation steps for nutrition profiling, is labour-intensive, time-consuming, and costly. Effective and generalizable automated process using machine learning is required.

**Objectives:** This study used the pre-trained language model and supervised machine learning for food label text to automate food categorization and nutrient profiling.

**Methods:** Food product information from FLIP2017 (n=17,448) and FLIP2020 (n=74,445) databases were used. Health Canada's TRA system (24 categories and 172 sub-categories) and FSANZ nutrient profiling system and nutrition quality score evaluation. A modified pre-trained language model was used to encode unstructured text from food labels into lower-dimensional vector representations, followed by an ensemble of supervised learning algorithms (i.e., elastic net, KNN, and XGBoost) for multi-class classification and regression.

**Results:** Pre-trained language model representations followed by XGBoost multi-class classification algorithm reached an overall accuracy score of > 0.95 in predicting food TRA major and sub-categories. For nutrition quality score estimation, the pre-trained language model reached a high prediction accuracy ( $R^2$  0.87 and MSE 14.4), while the performance of the structured nutrition facts machine learning model is better ( $R^2$  0.98 and MSE 2.5). The pre-trained language model also reached a high generalizable ability on the external test datasets.

**Conclusions:** Our result showed that pre-trained language model, together with ensemble learning approaches, achieved high accuracy in classifying food categories and predicting food healthfulness scores using text information found on food labels. This approach is effective and generalizable for further application in a dynamic food environment, where large sets of labelled data can be obtained from websites.

# An innovative machine learning approach to predict the dietary fiber content of packaged foods

**Mr. Tazman Davies<sup>1</sup>**, Dr. Jimmy Chun Yu Louie<sup>2</sup>, Dr. Tailane Scapin<sup>3</sup>, Dr. Simone Pettigrew<sup>1</sup>, Dr. Jason Hy Wu<sup>1</sup>, Dr. Matti Marklund<sup>4</sup>, Ms. Daisy Coyle<sup>1</sup>

<sup>1</sup>The George Institute for Global Health, Faculty of Medicine, University of New South Wales, Sydney, Australia, <sup>2</sup>The University of Hong Kong, Hong Kong, Hong Kong, <sup>3</sup>Deakin University, Melbourne, Australia, <sup>4</sup>Tufts University, Boston, USA

**S.3.49 - Artificial Intelligence as Applied Predictive Models for Food Composition Databases, Clarion Hotel Gillet - Room Akademien, June 17, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** We developed a machine learning approach for automated and systematic prediction of fiber content using nutrient information commonly available on packaged products.

**Method:** An Australian packaged food dataset with known fiber content information (FoodSwitch) was divided into training ( $n = 8986$ ) and test datasets ( $n = 2455$ ). The model was built using k-nearest neighbors (KNN). The KNN model's performance was assessed using the coefficient of determination ( $R^2$ ) and compared with the performance of an existing manual fibre prediction approach.

**Results:** Compared with the manual fibre prediction approach, the KNN approach explained a greater degree of variation in fibre content ( $R^2 = 0.68$  and  $R^2 = 0.84$ , respectively). The KNN algorithm was most at predicting fibre content for 'other cereal and grain products' ( $R^2 = 0.95$ ) and 'soup' ( $R^2 = 0.89$ ).

**Conclusions:** Our findings highlight the opportunity to use machine learning to efficiently predict the dietary fiber content of packaged products on a large scale. These predictions can be used to monitor fiber levels in the packaged food supply and can also be integrated into novel barcode-scanning phone applications to allow consumers to track fiber intake. The algorithm can also be adapted to predict other nutrients of public health interest that are often omitted on packaged products.



# Predictive Modeling for Nutrient Prediction combining data and domain-driven knowledge

**Ms. Gordana Ispirova**<sup>1</sup>, Assistant Professor Tome Eftimov<sup>1</sup>, Prof. Barbara Koroušić Seljak<sup>1</sup>

<sup>1</sup>Jozef Stefan Institute, Ljubljana, Slovenia

**S.3.49 - Artificial Intelligence as Applied Predictive Models for Food Composition Databases, Clarion Hotel Gillet - Room Akademien, June 17, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** One of the most persistent problems adding uncertainty to data analysis are missing values. The Food and Nutrition domain is no exception. Common solutions to this problem across domains include omitting the missing data, or filling in with means or medians. For Food Composition Databases (FCDBs) the solution most resort to is borrowing data from other countries. We have previously introduced a statistical method for generating rules for borrowing missing nutrient values, and we have compared all statistical methods for missing data imputation. The problem of missing data can be treated as a predictive modeling task in Machine Learning (ML). Until now, in ML the solutions include simple applications of ML algorithms. We introduce a novel method for dealing with missing data, a ML pipeline combining data and domain-driven knowledge to predict nutrient values.

**Methods:** The ML pipeline consists of three parts: representation learning (RL), unsupervised ML, and supervised ML. In the RL part, word and paragraph embeddings are learned for text descriptions (names of foods), in the unsupervised ML part the foods are separated in clusters based on two criteria (FoodEx2 classification and food category), and in the supervised ML part separate predictive models are trained for each cluster for separate nutrients. The pipeline is evaluated using domain knowledge (nutrient tolerance levels) and compared to baselines (mean and median).

**Results:** The data used in the experiments is from the FoodData Central USDA. Using four RL algorithms, and sets of different parameters we learn embeddings. The first clustering approach uses graph embeddings of the FoodEx2 hierarchy, and the second the food category labels of the foods. Predictive models are trained using six different regression algorithms, hyper-parameter tuning and cross fold validation. The results show a significant improvement from the baseline (up to 93% accuracy vs. up to 45% accuracy).

**Conclusions:** This methodology opens up many possibilities for facilitating and easing the process of calculating macronutrient content, which is crucial for dietary assessment, dietary recommendations, dietary guidelines, macronutrient tracking, and other such tasks which are key tools for doctors, health professionals, dietitians, nutritional experts, policy makers, professional sport coaches, athletes.

# Conducting exercise interventions for patients with metastatic prostate cancer: strategies and lessons learned in the CHAMP and INTERVAL-GAP4 trials

**Dr. Nicolas H. Hart<sup>1</sup>**, Dr. Stacey A. Kenfield<sup>2</sup>, Dr. Erin L. Van Blarigan<sup>2</sup>, Mr. Neil Panchal<sup>2</sup>, Dr. Anthony Luke<sup>2</sup>, Ms. Jennette Sison<sup>2</sup>, Mr. Kyle Smith<sup>3</sup>, Dr. Fred Saad<sup>4</sup>, Dr. Robert U. Newton<sup>3</sup>, Dr. June M. Chan<sup>2</sup>

<sup>1</sup>University of Technology Sydney, Sydney, Australia, <sup>2</sup>University of California, San Francisco, San Francisco, USA, <sup>3</sup>Edith Cowan University, Joondalup, Australia, <sup>4</sup>University of Montreal Hospital Center, Montreal, Canada

**S.3.50 - Randomized controlled trials of remotely delivered exercise interventions for men with prostate cancer: rationale, design, and adherence in men across the cancer spectrum from active surveillance to metastatic disease, Clarion Hotel Gillet - Room Swedenborg, June 17, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** C. Cancer prevention and management

**Background:** Physical activity may improve clinical and quality of life outcomes for men with prostate cancer. Few studies have examined the feasibility, safety, acceptability, and clinical efficacy of exercise training in men with metastatic prostate cancer.

**Methods:** The completed 3-arm 3-month pilot randomized controlled trial (RCT) called CHAMP (A Clinical Trial of High-Intensity Aerobic and Resistance Exercise for Metastatic Prostate Cancer) was conducted in 25 men with metastatic prostate cancer to assess feasibility, safety, and acceptability. It started as a supervised onsite exercise trial (1:1:1 aerobic or resistance exercise 3x/week or usual care) and transitioned to remotely monitored exercise to increase enrollment. The ongoing phase III global RCT called INTERVAL-GAP4 (Intense Exercise for Survival among Men with Metastatic Prostate Cancer) also began as a supervised exercise trial but transitioned to home-based exercise during the COVID-19 pandemic and has since expanded to offer participants a remotely monitored exercise option. Following consent, men are randomized to a 2-yr supervised or monitored exercise intervention vs. self-directed exercise (1:1). The primary endpoint is overall survival assessed every 6 months, with patient-reported outcomes assessed quarterly. We will discuss eligibility criteria, safety measures, the exercise prescription, and challenges and opportunities when implementing these studies in different countries (INTERVAL offered in 7 countries and 3 languages).

**Results:** Both trials have extensive eligibility criteria to ensure appropriate patient enrollment. No safety concerns have been identified related to exercise testing or training in either trial. Common adverse events include joint or bone pain consistent with disease status; some may be possibly related to the study. Providing exercises that are accessible to those with progressive prostate cancer symptoms (e.g., bone pain, stiffness, nausea, fatigue) is necessary, as well as continuous tailoring to participants' capabilities. Finally, when implementing the program, different team setups - for example, academic/university-led vs. clinician/hospital-led teams - must leverage the expertise and operational advantages and address the limitations and challenges of each structure.

**Conclusion:** Remotely monitored exercise interventions can be safe, feasible, and acceptable for patients with metastatic cancer. This is an attractive intervention model that will grow as survivorship support expands beyond the clinic/center.

# Effect of Remotely Monitored Aerobic Training on Cardiopulmonary Fitness among Men with Prostate Cancer on Active Surveillance

Dr. Erin L. Van Blarigan<sup>1</sup>, Dr. Stacey A. Kenfield<sup>1</sup>, Dr. Adam Olshen<sup>1</sup>, Mr. Neil Panchal<sup>1</sup>, Ms. Katriel Encabo<sup>1</sup>, Ms. Imelda Tenggara<sup>1</sup>, Dr. Rebecca E. Graff<sup>1</sup>, Dr. Katsuto Shinohara<sup>1</sup>, Dr. Matthew R. Cooperberg<sup>1</sup>, Dr. Peter R. Carroll<sup>1</sup>, Dr. Lee W. Jones<sup>2</sup>, Dr. Kerri M. Winters-Stone<sup>3</sup>, Dr. Anthony Luke<sup>1</sup>, **Dr. June M. Chan<sup>1</sup>**

<sup>1</sup>University of California, San Francisco, San Francisco, USA, <sup>2</sup>Memorial Sloan Kettering Cancer Center, New York, USA, <sup>3</sup>Oregon Health & Science University Knight Cancer Institute, Portland, USA

**S.3.50 - Randomized controlled trials of remotely delivered exercise interventions for men with prostate cancer: rationale, design, and adherence in men across the cancer spectrum from active surveillance to metastatic disease, Clarion Hotel Gillet - Room Swedenborg, June 17, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** C. Cancer prevention and management

**Purpose:** Vigorous exercise is associated with lower risk of prostate cancer-specific mortality. Scalable interventions to increase exercise among people with prostate cancer are needed. The purpose of this study was to demonstrate the feasibility and effects of remotely monitored aerobic training compared to usual care among men with prostate cancer on active surveillance.

**Methods:** We conducted a randomized controlled trial to estimate the effect of 16-weeks of remotely monitored, structured, nonlinear, aerobic training versus usual care among men with prostate cancer on active surveillance. The intervention included a heart rate monitor and aerobic training program tailored to baseline fitness (up to five 20-60-minute sessions per week with target heart rates corresponding to 45-85% of VO<sub>2</sub>max). An exercise physiologist assessed adherence weekly in the intervention arm. Adverse events (AE) were also collected from all participants at weeks 8 and 16. Our primary outcome was change in VO<sub>2</sub>max assessed using a cardiopulmonary exercise test at 0 and 16 weeks. Secondary outcomes reported here include change in weight, waist circumference, and body mass index (BMI). We used multivariable linear mixed-effects models; analyses were intent-to-treat.

**Results:** Between 2016 and 2021, 51 men (mean age: 62.9 ± 6.8 years) were randomized to intervention (n=26) or usual care (n=25). Follow-up at 16-weeks was 88% (45/51) complete, 85% (22/26) in the intervention and 92% (23/25) in the control. Four participants discontinued the intervention; one due to an AE related to the study, one due to an AE unrelated to the study, and two for personal reasons. Improvements in VO<sub>2</sub>max were greater in the intervention than usual care arm (+3.7 vs -1 mL/kg/min;  $p < 0.001$ ). The intervention arm also lost more weight (-1.7 vs. +0.23 kg;  $p = 0.05$ ) and reduced their BMI (-0.58 vs. 0.07 kg/m<sup>2</sup>;  $p = 0.05$ ) compared to usual care. There was no difference in waist circumference.

**Conclusions:** Remotely monitored aerobic training improved VO<sub>2</sub>max and lowered body weight among men with prostate cancer on active surveillance. Future analyses from this trial will examine the effect of the intervention on anxiety, adherence to active surveillance, and biomarkers of prostate cancer aggressiveness.

# A 4-arm randomized controlled trial testing remotely delivered exercise & diet, diet-only, and exercise-only interventions vs. usual care on risk of PSA recurrence, biomarkers, and patient-reported outcomes among men with prostate cancer treated via radical prostatectomy: trial in-progress

**Dr. Stacey A. Kenfield<sup>1</sup>**, Dr. Erin L. Van Blarigan<sup>1</sup>, Ms. Ada Sanchez<sup>1</sup>, Dr. Li Zhang<sup>1</sup>, Ms. Vivian Liu<sup>1</sup>, Dr. Rebecca E. Graff<sup>1</sup>, Ms. Imelda Tenggara<sup>1</sup>, Dr. Kerri M. Winters-Stone<sup>2</sup>, Dr. Matthew R. Cooperberg<sup>1</sup>, Dr. Peter R. Carroll<sup>1</sup>, Dr. June M. Chan<sup>1</sup>

<sup>1</sup>University of California, San Francisco, San Francisco, USA, <sup>2</sup>Oregon Health & Science University Knight Cancer Institute, Portland, USA

**S.3.50 - Randomized controlled trials of remotely delivered exercise interventions for men with prostate cancer: rationale, design, and adherence in men across the cancer spectrum from active surveillance to metastatic disease, Clarion Hotel Gillet - Room Swedenborg, June 17, 2023, 8:15 AM - 9:30 AM**

**SIG - Primary Choice:** C. Cancer prevention and management

**Background:** Diet and physical activity are associated with prostate cancer mortality. No randomized controlled trial (RCT) has examined the effects of long-term diet and exercise change on prostate cancer clinical, biological, or patient-reported outcomes (PRO's).

**Methods:** We are conducting a 4-arm RCT among 200 men with prostate cancer who have chosen radical prostatectomy (RP) as primary treatment. Men are enrolled prior to RP and randomized to diet + exercise, diet-only, exercise-only interventions or usual care (50/arm). The study included onsite visits; during COVID-19, the study was modified to be fully remote. The intervention arms receive a 2-year intervention delivered via website and text messages, personalized lifestyle report, quarterly coaching calls, and study materials (recipe booklet for diet; heart rate monitor and resistance bands for exercise). Exercise goals are 150 min/wk moderate or 75 min/wk vigorous aerobic, 2 strength sessions/wk, and 2 flexibility sessions/wk. Prostate-specific diet recommendations emphasize cruciferous vegetables, cooked tomatoes, healthy fats, and fish, while avoiding processed meats and whole milk. The primary endpoint is PSA recurrence. Secondary endpoints include change in a prognostic risk score and tumor mRNA expression from biopsy to RP and PROs at 0, 6, 12, and 24 months; blood and anthropometry are obtained at 0, 12, and 24 months.

**Results:** Since 2017, we have screened 693 men; 377 (54%) were not interested or did not respond and 146 (21%) were ineligible. Main reasons for ineligibility include not meeting study treatment requirements (n=80) (e.g., receiving hormones), non-English speaking (n=30), had contraindications to exercise (n=19), no local laboratory facilities (n=6), and already meeting study recommendations (n=5). 170 men have been randomized. The median (IQR) age at enrollment is 65 (60, 70) years. Follow-up is 83% (109/132) at 12 months and 78% (76/98) at 24 months.

**Conclusions:** Remotely delivered digital programs can increase access for cancer survivors. Long-term interventions must carefully balance the need for self-monitoring, particularly for diet and resistance exercise, to guide continued improvements and tailoring, while minimizing participant burden. This 4-arm remote-based randomized controlled trial will provide evidence of the impact of lifestyle change on prostate cancer recurrence, biology and quality-of-life.

# Background and rationale for the Ending Childhood Obesity (ECHO) zone programme

**Associate Professor Rønnaug Astri Ødegård<sup>1</sup>, Dr. Suzanne Ring-Dimitrio<sup>2</sup>**

<sup>1</sup>Norges teknisk-naturvitenskapelige universitet - NTNU, Trondheim , Norway, <sup>2</sup>Paris-Lodron Universitat Salzburg (University of Salzburg), Salzburg, Austria

**S.3.51 - How to unlock the power of data, cities and systems in a new way to prevent childhood obesity: The Ending Childhood Obesity (ECHO) programme, UKK - Main Hall (Level 6), June 17, 2023, 11:45 AM - 1:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Recently a whole-of-community level approach addressing complex causes of obesity have shown promising short term results. However, effects over time often diminish due to a lack of monitoring and low stakeholder integration. To engage core community stakeholders to an evidence-based practice and practice-based evidence strategy, we hypothesize that data-assisted and real-time feedback on maintaining the stakeholder engagement is a solution. The purpose of the present project is to develop and evaluate the impact of the ECHO zone model on the prevalence of childhood obesity (sustainable) and on the feasibility regarding the implementation of ECHO zone actions to any geographical area worldwide (scalable).

**Methods:** An ECHO zone operative network, consisting of two communicating pillars, the pilot ECHO zones (EZ) addressing children and their families, and the advocates for change including members of the civil society and other stakeholders, will be established.

Based on existing pre-obesity clinical data repositories and by utilizing the systems thinking community knowledge tool (STICKE), data about the wider determinants of health (WDoH) to impact the prevalence of childhood obesity will be sampled to initiate a co-creation process at ECHO zone level and to tailor interventions. The sampled data will feed the “Digital City Twin” repository to identify zone-specific intervention strategies by employing machine learning and artificial intelligence.

**Results:** The study design will be demonstrated by illustrating the platform and a first set of core data for Digital City Twins. Further, a first outline on how to integrate stakeholders at relevant WDoH-levels into the ECHO zone and the rationale for the process of scaling up will be described.

**Conclusions:** The ECHO zone network, supported by the Digital City Twin and following a stakeholder approach, seeks to identify effective and scalable interventions tailored to the living world of children aged 0-6, their families and civil society.

# Introducing the ECHO zone program and its local implementation

**Mrs. Betty Pettersen**<sup>1</sup>, Ms. Maja Engsner<sup>2</sup>

<sup>1</sup>Trondheim Municipality, Trondheim, Norway, <sup>2</sup>Uppsala University, Uppsala, Sweden

**S.3.51 - How to unlock the power of data, cities and systems in a new way to prevent childhood obesity: The Ending Childhood Obesity (ECHO) programme, UKK - Main Hall (Level 6), June 17, 2023, 11:45 AM - 1:00 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Conclusions:** The ECHO zone model developed with and driven by stakeholders will advance the understanding of co-creation processes and implementation research

**Purpose:** Child obesity prevention strategies have attempted to actively address the complex causes of obesity. Interventions on a whole-of-community level have shown promise but are challenging regarding implementation. The ECHO zone model will function as the roadmap that bridges the above defined challenge by developing and implementing childhood obesity prevention strategies with a new, wider and holistic approach driven by local stakeholders supported by the flow of digital information. The purpose of this talk is to present the model and its implementation from the local stakeholder perspective.

**Methods:** The ECHO zone model has three components: the ECHO zone with its local stakeholders, co-creation of local actions, and the DCT including data collected at all levels of the WDoH. The role of committed stakeholders is to drive and facilitate change in the local context of the ECHO zone. The model has a number of co-creation processes for the ECHO zones to implement. The processes are not aligned in a linear manner, but include: building local capacity in relation to key features of the project through capacity building workshops, mapping of the local environment, co-creating an action plan, implementing the action plan and following up the effects of the actions. These processes feed into each other so that the ECHO zone continuously adapts and evolves over time within the host city.

**Results:** The setup of the ECHO zone-structure is fundamental for reaching children, to ensure feasibility of preventative actions, and to facilitate a scaling-up of creative and engaging programs. Via the stakeholder-driven community diffusion theory, improvements in stakeholder engagement and knowledge will increase readiness for change and the model will ensure locally tailored actions in various living environments of the child and families associated with different WDoH-levels.



# A mixed-methods, comprehensive evaluation framework for the ECHO zone programme

**Miss Maja Engsner**<sup>1</sup>, Associate Professor Rønnaug Astri Ødegård<sup>2</sup>

<sup>1</sup>Uppsala University, Uppsala, Sweden, <sup>2</sup>Norwegian University of Science and Technology, Trondheim, Norway

**S.3.51 - How to unlock the power of data, cities and systems in a new way to prevent childhood obesity: The Ending Childhood Obesity (ECHO) programme, UKK - Main Hall (Level 6), June 17, 2023, 11:45 AM - 1:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** The ECHO zone programme represents a complex set of interventions, driven and informed by their Digital City Twin (DCT), that are delivered within a complex system, and across nine different cities. The methods available to evaluate such complexity are limited and we need to find novel and innovative approaches to truly capture the richness of what happened, in what context, and why. The purpose of this talk is to present the evaluation framework for the ECHO zone programme.

**Methods:** A case study approach will be taken to understand how the ECHO zone model has been implemented within each of the nine cities. The ENCOMPASS framework will guide the intentions of the evaluation, whereby we will focus on: (a) adopt a systems lens to the evaluation, (b) define the boundaries of the ECHO zone programme in each city, (c) understand the systems that the ECHO zone programme is implemented within, and (d) explore the intended, and unintended, outcomes and impacts associated with its implementation. Novel methods such as ripple effects mapping, social network analyses, and group model building will be implemented. To further understand where the ECHO zones implement action, these actions will be audited and analysed against the Wider Determinants of Health Model and the locally developed systems maps. Other data such as anthropometrics and biomarker data will also be routinely gathered in each ECHO zone. Data and findings will be triangulated to comprehensively understand what occurred within each city and why.

**Results:** The evaluation framework will enable the nuances within each ECHO zone to be fully examined, helping to understand why the model may work differently within certain contexts. Moreover, given that it adopts highly innovative methods which are underpinned by the recently published ENCOMPASS framework, the planned evaluation will be one of the first to comprehensively evaluate the design, implementation, and iterative development of a systems approach to childhood obesity prevention.

**Conclusions:** The proposed evaluation framework will ensure that the ECHO zone programme not only contributes towards significant advances in the obesity prevention field, but that it also develops the fields of complex systems evaluation and research.

# Interventions to reduce meat consumption: Evaluations of eco-labelling and meat-free availability in worksite cafeterias

**Dr. Rachel Pechey**<sup>1</sup>

<sup>1</sup>The University of Oxford, Oxford, United Kingdom

**S.3.52 - Reducing red and processed meat consumption: what works?, UKK - Level 6 Foyer, June 17, 2023, 11:45 AM - 1:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose.** Substantial reductions in meat consumption are required by 2030, if the UK is to deliver on its target of net zero carbon emissions. Labelling is one of the most acceptable policy options, but may not be the most effective. In a series of randomised controlled trials (RCTs) and evaluations of natural experiments, we investigated the impact of ecolabelling and increasing meat-free meal availability in worksite cafeterias on the environmental impact of food purchases and selection of meat-based options.

**Methods.** Two field trials and two natural experiments were evaluated in UK worksite cafeterias between 2020-2022, examining the impact of environmental impact labelling (in the form of coloured stickers indicating an A-E grade) on hot meal options (two RCTs) and increased meat-free meal availability (two natural experiments).

**Results.** In both studies within worksite cafeterias, we found no evidence that ecolabels influenced the sustainability of food purchases. In contrast, increasing the availability of meat-free options was shown to be effective at reducing meat selection and purchasing, with smaller changes in availability accompanying effects of smaller magnitude.

**Discussion.** Altering meat-free meal availability may be a more effective intervention – at least in the context of worksite cafeterias – than ecolabelling, but is less acceptable to the public, and perhaps also to catering providers. There is also a need to evaluate the wider impact of ecolabels on food provision, as well as consumer demand, given that their introduction may increase the availability of lower environmental impact options in the longer-term.

# Meat sectors and carbon footprint taxes: what is the role of firms in climate mitigation?

**Dr. Céline Bonnet<sup>1</sup>**, Dr. Zohra Bouamra-Mechemache<sup>1</sup>

<sup>1</sup>Toulouse School of Economics, Toulouse, France

**S.3.52 - Reducing red and processed meat consumption: what works?, UKK - Level 6 Foyer, June 17, 2023, 11:45 AM - 1:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose.** We want to assess the price transmission of a carbon tax on the meat sector to evaluate the role of firms in climate mitigation. The literature already tackled this question through the analysis of consumers' price response without considering the role of firms in price transmission. If prices are not perfectly transmitted along the supply chain, the effect of taxes can be partially transmitted or amplified depending on the strategic price reaction of processing and retailing firms. While the literature found a significant but limited effect of a carbon tax on meat consumption, we investigate whether this result still holds when taking into account firms' reaction to a carbon tax.

**Methods.** We use household scanner data provided by the society Kantar that provides information on animal-based product purchases of more than 12,000 French households in 2012. We consider 13 food categories of animal-based products distinguished by brand and retail stores such that our data contains more than 4 million purchases for 420 animal food products. We develop a structural econometric approach to model the demand for animal-based products and manufacturers - retailers relationships. Using the estimated behavior of consumers and firms, we implement simulations to analyze the effect of a carbon tax of €100 per ton of CO<sub>2</sub> eq. Given our empirical framework, we analyze how manufacturers and retailers adapt their pricing strategy to the carbon tax and then how consumers react to price changes.

**Results.** We show that manufacturers and retailers over transmit the carbon tax by more than 30% on average above the increase in costs implied by the tax and then amplify the expected effect on demand. Considering the role of firms, we expect a 40% decrease in carbon footprint when all animal-based products are taxed, a 30% decrease when only red meat is taxed, and a 15% decrease when only beef is taxed.

**Conclusions.** In France, our results suggest that given the over transmission of price by firms, climate change could be mitigated through price policies.

# Health effects of reductions in red and processed meat consumption in the United States: A microsimulation study

**Dr. Joe Kennedy<sup>1</sup>**, Dr. Peter Alexander<sup>1</sup>, Dr. Lindsey Taillie<sup>2</sup>, Prof. Lindsay Jaacks<sup>1</sup>

<sup>1</sup>The University of Edinburgh, Midlothian, United Kingdom, <sup>2</sup>The University of North Carolina, Chapel Hill, Chapel Hill, USA

**S.3.52 - Reducing red and processed meat consumption: what works?, UKK - Level 6 Foyer, June 17, 2023, 11:45 AM - 1:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** The US population simultaneously has among the highest rates of chronic disease and highest levels of red and processed meat consumption globally. Given that red and processed meat consumption has been associated with an increased risk of developing multiple chronic diseases, quantifying the health benefits from reducing consumption of these foods may guide policy aimed at alleviating the burden of chronic disease in the United States.

**Methods:** Microsimulations have become an increasingly popular method to study population-level health outcomes following dietary change. Rather than using population-wide indicators, microsimulations assess the impact of an intervention on a population of simulated individuals who collectively form a representative sample of the whole population. In this study, we developed a microsimulation model, mSHIFT: micro-Simulation of the Health Impact of Food Transformations, to quantify the prevented cases of diabetes, cardiovascular disease and colorectal cancer in the United States following fixed percentage reductions in red meat intake, processed meat intake, or both, annually over a 10-year period.

**Results:** A 30% reduction in red and processed meat consumption was found to prevent 189,000 diabetes cases, 34,000 cardiovascular disease cases and 7,000 colorectal cancer cases in the first year. Even modest (e.g. 10%) reductions in red and processed meat consumption were found to lead to statistically significant reductions in chronic disease incidence. In addition, nonlinear relationships between the percentage reduction and prevented disease cases demonstrated how, in some instances, health gains are amplified with large reductions in meat consumption.

**Conclusions:** This is the first study to examine the impact of reducing red and processed meat consumption on multiple health outcomes in the United States. Our results demonstrate the potential for significant health benefits and provide additional motivation beyond the environmental consequences to reduce red and processed meat consumption in countries where consumption levels are high.

# Characterising the Healthiness of Out-of-Home Food Outlets in Great Britain using Online Menus

**Ms. Yuru Huang<sup>1</sup>**, Dr. Thomas Burgoine<sup>1</sup>, Mr. Tom Bishop<sup>1</sup>, Prof. Jean Adams<sup>1</sup>

<sup>1</sup>University of Cambridge, Cambridge, United Kingdom

**S.3.54 - Characterising the out-of-home food environment using big data sources, UKK - Hall C (Level 3), June 17, 2023, 11:45 AM - 1:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Background:** Food environment research predominantly focuses on the spatial distribution of food outlets, while the healthiness of food choices available within outlets has been understudied. Traditional methods of assessing the healthiness of out-of-home food outlets are time and resource consuming, resulting in a dearth of data on consumer nutrition environment across large geographical areas. In this study, we proposed an innovative approach to characterise the healthiness of out-of-home food outlets at scale. We also aimed to investigate if the healthiness of out-of-home food outlets is socioeconomically patterned across neighbourhoods.

**Methods:** We calculated menu healthiness scores (0-12, 12 being the healthiest) for food outlets on *JustEat* in Great Britain (GB) based on menu attributes (e.g., diversity of vegetables). Using this data, we trained a deep learning model to predict healthiness scores of all physical food outlets in GB based on food outlet names. We used linear mixed models with random intercepts to examine the relationship between area-level deprivation and food outlet healthiness, accounting for clustering on the lower-layer super output area (LSOA) level.

**Results:** In August 2021, we identified 54,575 food outlets available on *JustEat* in GB and calculated their healthiness scores. Our best performing deep learning model — trained with the Universal Language Model Fine-Tuning Approach - achieved a mean absolute error of 0.82. Using this model, we extrapolated the healthiness of all out-of-home food outlets available ( $N = 177,926$ ) in GB in 2021. We found that in more deprived areas, individuals had greater access to out-of-home food outlets ( $p < 0.001$ ), and these out-of-home food outlets were less healthy ( $p < 0.001$ ). The pattern was consistent across all types of out-of-home food outlets.

**Conclusions:** The development of menu healthiness scores added more granularity to the existing classification of out-of-home food outlets in food environment research, differentiating healthier and less healthy outlets of the same type. The proposed method can be automated to understand the healthiness landscape of out-of-home food outlets in large geographical areas. Our findings also highlight the “double burden” of the unhealthy food environment in deprived areas where there tend to be both more outlets and less healthy outlets.

# Nutrition assessment of restaurants using consumer-posted food images

**Dr. Xiang Chen<sup>1</sup>**, Dr. Caiwen Ding<sup>1</sup>, Dr. Ran Xu<sup>1</sup>

<sup>1</sup>University of Connecticut, Storrs, USA

**S.3.54 - Characterising the out-of-home food environment using big data sources, UKK - Hall C (Level 3), June 17, 2023, 11:45 AM - 1:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** Existing methods to evaluate the nutrition level of a restaurant employ store audit tools, such as the Nutrition Environment Measures Survey. However, these store audit tools cannot be easily implemented on a large scale because of their cost-and-labor-intensive nature in data collection and surveyor training. Recently, advances in image recognition technologies provide a new opportunity for nutrition assessment. Through computer-aided deep learning models, the nutrition information can be estimated using a food image.

**Methods:** This study employs an image recognition model to perform the nutrition assessment of restaurants using food images posted on restaurant review websites in two US cities. Manual coding is used to validate the model accuracy based on the Food and Nutrient Database for Dietary Studies. The estimated restaurant nutrition information is visualized at both the restaurant level and the census tract level using a geographic information system.

**Results:** The model-assisted nutrition assessment achieves 75.1% accuracy compared with that of manual coding. The model generates more accurate labels for ethnic foods but cannot identify portion sizes, certain food items (e.g., specialty burgers and salads), and multiple food items in an image. The spatial inequities of restaurant nutrition are revealed in GIS maps. Further correlation analysis shows moderate positive correlations between the tract-level restaurant nutrition and neighborhood deprivation variables.

**Conclusions:** The study proposes a new method for large-scale nutrition assessment of restaurants across a city. It shows that the computer-aided nutrition assessment can be empowered by consumer-posted food images through gathering dietary data at a minimum cost and acceptable data quality. The pilot nutrition assessment model can help identify issues of health inequity by exploring the different levels of nutritional provisioning across communities. Eventually, it is expected that the model-derived restaurant nutrition information can serve as evidence for developing an information system for nutrition education and health promotion.



# Monitoring the healthiness and accessibility of food outlets across Australia on the leading meal delivery application: Initial results from the DIGIFOOD Dashboard Study

**Miss Sisi Jia**<sup>1</sup>, Dr. Stephanie Partridge<sup>1</sup>, Dr. Alice Gibson<sup>1</sup>

<sup>1</sup>University of Sydney, Sydney, Australia

**S.3.54 - Characterising the out-of-home food environment using big data sources, UKK - Hall C (Level 3), June 17, 2023, 11:45 AM - 1:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Background:** The rising use of online food delivery services (OFDS) enable individuals to conveniently access foods from over 3km away, which is beyond traditional neighbourhood food environments. This increased accessibility may have implications on the consumption of healthful or unhealthful foods. Using a purpose-built dashboard with data extracted via web-scraping, we aimed to map and evaluate the differences in the healthiness of food outlets accessible online, across varying socioeconomic areas in Australia.

**Methods:** The data-driven DIGIFOOD dashboard mapped 816 food outlets across 2725 postcodes in Australia serviced by the leading meal delivery application. Data for the dashboard was collected via web scraping in January 2021 and the healthiness of food outlets at a category level was determined using the validated Food Environment Score. A paired t-test was applied to compare the healthiness of food outlets that are *locally available within a specified postcode* (physical food environment) versus food outlets that *could deliver to any specified postcode* via OFDS (online food environment). A linear regression model was used to test the trend of healthiness scores of food outlets (physical and online) across quintiles of Index of Relative Socio-economic Advantage and Disadvantage (IRSAD; 1-most disadvantaged and 5 - most advantaged), adjusting for the density of physical outlets.

**Results:** Food outlets accessed online via OFDS have a healthier score than outlets that can be physically accessed in Australia (Mean difference  $0.11 \pm 0.88$ ,  $p=0.0003$ ). Mean healthiness scores of physical food outlets ( $p < .0001$ ) and online food outlets ( $p < .0001$ ) improved from the most advantaged (IRSAD 1) to the least advantaged (IRSAD 5). When IRSAD 1 was compared to IRSAD 5, this difference in mean healthiness scores between physical and online was significant ( $p=0.0049$ ).

**Conclusions:** OFDS may be increasing accessibility to healthier food outlets by providing more options than what can be physically accessed within an individual's residential postcode in Australia. It is critical to consider the impact of OFDS on the food environment and improving accessibility to healthy food should be a high priority for policy makers. The DIGIFOOD Dashboard can be a useful monitoring tool for the evolving digital food environment.

# Combining physical activity data with contextual information: PALMSplusR

**Dr. Tom Stewart<sup>1</sup>**, Dr. Michal Vorlicek<sup>2</sup>, Prof. Jasper Schipperijn<sup>3</sup>

<sup>1</sup>AUT University, Auckland, New Zealand, <sup>2</sup>Palacký University, Olomouc, Czech Republic, <sup>3</sup>University of Southern Denmark, Odense, Denmark

**S.3.55 - “Where, when, and how much? How to measure physical activity behaviors in the urban environment, UKK - Hall D (Level 2 - main floor), June 17, 2023, 11:45 AM - 1:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose** Combining accelerometers and GPS to measure physical activity context is important. However, converting these data into usable metrics can be complex and time-consuming. The purpose of this presentation is to demonstrate an automated data processing pipeline for both merging GPS/accelerometer data and summarizing these data into meaningful metrics across different contexts. Data from several countries will be used as examples.

**Methods** Data were collected from 315 adolescents (aged 12–18 years) in New Zealand and the Czech Republic. Each of these participants wore an accelerometer (Actigraph) and a GPS (Qstarz BT-Q1000X or Holux RCV-3000) for 7 days. Data were merged using HABITUS, before being summarized using the PALMSplusR package. This package allows researchers to summarize these data within different spatial (within a particular area) and temporal (during a particular time of day) domains, and isolate specific transportation behaviors (such as commuting to and from school or work).

**Results** Data were summarized across six different domains: home, school, transportation, playgrounds, greenspace, and other. The time spent within each domain, and the intensity of physical activity within each domain varied, and was different between countries. Most higher-intensity physical was achieved in the transportation domain. This domain encompasses a combination of walking, cycling, and vehicle trips, the patterns of which varied substantially across different neighborhoods.

**Conclusions** Processing accelerometer and GPS data is traditionally complex and time-consuming, but new automated tools like HABITUS and PALMSplusR make this work much more straightforward and feasible. Summarizing these data across different contextual domains can provide greater insight into the nuances of human behavior and increase the precision and sensitivity of physical activity measures in future research.

# Variation in physical activity by commuting mode to and from school in Spanish adolescents: using accelerometer and GPS data

**Mr. Pablo Campos-Garzón<sup>1</sup>**, Dr. Thea Toft Amholt<sup>2</sup>, Dr. Daniel Molina-Soberanes<sup>1</sup>, Ms. Ximena Palma-Leal<sup>1,3</sup>, Dr. Ana Queral<sup>4</sup>, Dr. Amador Lara-Sánchez<sup>5</sup>, Dr. Tom Stewart<sup>6</sup>, Dr. Jasper Schipperijn<sup>2</sup>, Dr. Yaira Barranco-Ruiz<sup>1,7</sup>, Dr. Palma Chillón<sup>1</sup>

<sup>1</sup>PROFITH "PROmoting FITness and Health through physical activity" Research Group, Sport and Health University Research Institute (iMUDS), Department of Physical Education and Sports, Faculty of Sport Sciences, University of Granada. , Granada, Spain, <sup>2</sup>Active Living, Department of Sports Science and Clinical Biomechanics, University of Southern Denmark, Campusvej 55, 5230. , Odense, Denmark, <sup>3</sup>IRyS Group, School of Physical Education, Pontificia Universidad Católica de Valparaíso. , Viña del Mar, Chile, <sup>4</sup>AFIPS Research Group, Department of Nursing, University of Valencia, Valencia, Spain, <sup>5</sup>Department of Didactics of Musical, Plastic and Corporal Expression. University of Jaen , Jaén, Spain, <sup>6</sup>Human Potential Centre, Auckland University of Technology., Auckland, New Zealand, <sup>7</sup>Department of Physical and Sports Education, Faculty of Education and Sport Sciences, University of Granada. , Melilla, Spain

**S.3.55 - "Where, when, and how much? How to measure physical activity behaviors in the urban environment, UKK - Hall D (Level 2 - main floor), June 17, 2023, 11:45 AM - 1:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose** The first aim was to examine the characteristics of home-school and school-home trips. The second aim was to analyse the physical activity (PA) and physical activity energy expenditure (PAEE) related to commuting to/from school, as well as the contribution to the achievement of PA guidelines.

**Methods** A total of 185 adolescents (50.8% girls) aged 14.4±0.6 wore a belt attached on their hip with an accelerometer and a Global Positioning System (GPS). The software HABITUS was used to clean GPS data, combine them with accelerometer data, and predict the mode of commuting (i.e., walking or motorized-vehicle). Then, the PALMSplus R package was used to identify trip characteristics (i.e., speed, duration, and distance), PA levels (i.e., light and moderate to vigorous [MVPA]) and PAEE during home-school and school-home trips. Mixed model analysis was used to examine the differences in trip characteristics, PA levels, and PAEE between the trip directions and the modes of commuting.

**Results** A total of 507 trips were identified, 318 walking trips and 189 vehicle trips. Motorized-vehicle trips showed higher distance and speed and shorter duration than walking trips to/from school (all, p<0.001). Regarding PA and PAEE, walking trips showed higher MVPA (home-school trips: 7.4 min vs 2.2 min; school-home trips: 7.0 min vs 2.8 min) and PAEE (home-school trips: 2.4 METs vs 1.8 METs; school-home trips: 2.3 METs vs 1.9 METs) than motorized-vehicle trips to/from school (all, p<0.001). There were no significant differences between walking and motorized-vehicle trips to/from school for light PA. Moreover, walking to/from school contributed almost 25% of the PA guidelines (i.e., 60 daily minutes of MVPA), whereas motorized-vehicle trips only contributed 8.4%.

**Conclusion** The characteristics of the trips differed between walking and motorized-vehicle trips to/from school. In addition, walking trips to/from school seem to have a positive impact on MVPA, PAEE, and contributing to the PA recommendations compared to motorized-vehicle trips. Future strategies to increase daily MVPA may focus on promoting the use of active modes of commuting to/from school.

# Using accelerometer and GPS to measure physical activity in its context

**Prof. Jasper Schipperijn<sup>1</sup>**, Miss Line Matthiesen<sup>1</sup>, Dr. Thea Toft Amholt<sup>1</sup>

<sup>1</sup>University of Southern Denmark, Odense, Denmark

**S.3.55 - “Where, when, and how much? How to measure physical activity behaviors in the urban environment, UKK - Hall D (Level 2 - main floor), June 17, 2023, 11:45 AM - 1:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose** Daily physical activity is not one behavior that takes place in one location; it consists of many different behaviors occurring in different locations. It is essential to know where the physical activity occurs, and what the specific determinants of the behavior are. The purpose is to explain how accelerometer and GPS data can be used to measure key aspects of physical activity: where (space), when (time) and how much (type and intensity). A series of projects in Denmark will be used as examples.

**Methods** Data were collected among schoolchildren (9–12 yrs old) and adults (18–80) in Denmark using an accelerometer (Axivity) and a GPS (Qstarz BT-Q1000X) for 7 days (5 week days, 2 weekend days) to determine where and when which activity took place. The GPS position was recorded every 15 seconds and their activity level was recorded at 100 Hz and compiled into 15 second epochs. Data were merged and processed using HABITUS, an online tool available via the University of Southern Denmark ([www.habitus.eu](http://www.habitus.eu)). The worst locational GPS errors were removed using filters for excessive speed and changes in altitude. Walking, cycling and vehicle trips were classified based on the 90<sup>th</sup> percentile average speed during a trip. Activity intensity levels were classified using classic accelerometer count cut-points.

**Results** For children, physical activity occurred in schoolyards, neighborhoods, sports facilities and shared backyards between multistory social housing complexes. Furthermore, for many children, a large share of their daily activity occurred during transportation. There were large individual differences in where and when children were active.

For adults, the differences in activity profiles were even more pronounced with some adults almost entirely sedentary during weekdays, while very active at sports facilities during the weekend. Others gained most of their activity during weekday transportation, with little leisure time activity at sport facilities.

**Conclusions** Collecting and processing accelerometer and GPS data is time-consuming, but the data provides unique possibilities to identify physical activity patterns in time and space. Having this type of data easy to determine, at an individual as well as population level, in which contexts interventions may have most potential.

# Perspectives of staff and pupils in English secondary schools on national school food policy relating to food provision and support for healthy eating

**Dr. Marie Murphy<sup>1</sup>**, Dr. Clare Rawdin<sup>1</sup>, Dr. Rachel Adams<sup>1</sup>, Prof. Peymane Adab<sup>1</sup>, Dr. Miranda Pallan<sup>1</sup>

<sup>1</sup>University of Birmingham, Birmingham, United Kingdom

**S.3.56 - Improving the school food environment: challenges and solutions for children aged 5 to 18 years, UKK - K1 (+K2) (Level 3), June 17, 2023, 11:45 AM - 1:00 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose** This qualitative study was nested within a larger observational study evaluating the implementation and impact of the national school food standards (SFS) and related school food plan (SFP), a resource outlining a whole school approach to healthy eating, in secondary schools in England. We explored how the SFS, SFP and local school policy/initiatives were implemented in schools.

**Methods** We used a qualitative case study approach, selecting four secondary school sites from the main study sample (n=36), aiming for representation of schools with a high proportion of pupils eligible for free school meals (FSM) and varying catering models (external/in-house). We aimed to recruit 4-6 relevant school staff (catering managers, senior leadership, teachers and governors) to interviews and 18-24 pupils (aged 11-16) to focus groups per site. Data from interviews and focus groups were coded inductively using framework analysis. We also deductively coded data relating to an *a priori* code for implementation of the SFS and SFP.

**Results** 21 staff/governors and 137 pupils participated across four sites, with variation across the school sample in FSM eligibility (9-53%) and catering model (50% external). In relation to the SFS, school staff described patchy implementation, acknowledging some standards were difficult to adhere to, especially at breakfast/breaktime. Staff described balancing priorities around maintaining viable levels of school food uptake, cost/profit, pupil preferences, and competition from outside. Challenges to school food uptake included negative pupil perceptions of the lunchtime experience. Key drivers behind pupils' school food choices included convenience, speed and taste. Some school staff felt limited in their influence upon pupils' food choices as a result of social and environmental contexts e.g. ease of access to unhealthy food; levels of food poverty. School staff/governors had a low awareness of the SFP and were generally not taking steps to implement it. Healthy eating education had a relatively low status within timetables, despite staff acknowledging its importance.

**Conclusions** These findings provide insights into the challenges in implementing the SFS and SFP in secondary schools, providing greater direction for policymakers in considering how to best support secondary schools in delivering national school food policy.

# Outcomes of a sensory food education intervention in 4-7 year old children: a cluster-randomised controlled trial

**Dr. Nicholas Wilkinson**<sup>1</sup>, Dr. Srimathi Kannan<sup>2,3</sup>, Dr. Harish Ganguri<sup>4,5</sup>, Prof. Marion Hetherington<sup>1</sup>, Dr. Charlotte Evans<sup>1</sup>

<sup>1</sup>University of Leeds, Leeds, United Kingdom, <sup>2</sup>University of Michigan, Michigan, USA, <sup>3</sup>University of Texas, Austin, USA, <sup>4</sup>Icahn School of Medicine, New York, USA, <sup>5</sup>University of Cumberland, Kentucky, USA

**S.3.56 - Improving the school food environment: challenges and solutions for children aged 5 to 18 years, UKK - K1 (+K2) (Level 3), June 17, 2023, 11:45 AM - 1:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose** We will present a cluster-randomised controlled trial examining outcomes of a sensory food education intervention in primary school children aged 4-7 years.

**Methods** We evaluated a sensory food education programme (6 weekly sessions), delivered by classroom teachers, who attended a training session and were given 6 lesson plans. The control group went on a waiting list for the programme. We conducted a repeated measures cluster-RCT (n=195, 12 clusters) to assess (a) willingness-to-taste (WTT) (reported here) and (b) facially expressed enjoyment and engagement, in a fun 'sensory' vegetable and fruit tasting activity to evaluate the intervention. We video recorded children taking part in the tasting activity at baseline and follow up, and analysed children's tasting behaviour and the facial expressions which accompanied tasting. For a subset of children (n=68), we obtained parental ratings of children's eating behaviour.

**Results** Baseline results from 181 children indicated high WTT in the tasting activity before the intervention. In total, 113 children (62.4) tasted all 9 samples, 59 (32.6%) tasted some (1-8) and 9 (5.0%) did not taste any of the foods (mean 7.6, SD 2.4). Fourteen children were absent. Baseline WTT was similar for the seven children rated fussy/neophobic by caregivers on all relevant survey questions, with 4 out of 7 tasting all 9 samples. Facial expression measures were variable across subjects, but were stable within-subjects across the repeated measures. Mean WTT at follow up increased in both groups and the difference between groups was small and not significant when adjusted for baseline (mean difference 0.01, 95% CI -0.4 to 0.4). One child tasted zero samples at follow-up. Most children were willing to taste vegetables and fruit at baseline, and even more so at follow-up, regardless of intervention.

**Conclusions** WTT may be highly dependent on context. 'Sensory' tasting activities at school offer a powerful way to engage 4-7 year old children in tasting vegetables. The intervention did not increase WTT more than the control. The primary benefits of sensory food education may be providing context which is conducive to tasting, rather than in changing children's tasting behaviour, which needed little changing in our context.



# Systematic reviews investigating the impact of free school meals and cooking programmes on a range of outcomes in children

**Ms. Karen Vaughan<sup>1</sup>, Prof. Elling Bere<sup>2</sup>, Prof. Janet Cade<sup>1</sup>, Dr. Arnfinn Helleve<sup>2</sup>, Prof. Marion Hetherington<sup>1</sup>, Dr. Ingrid Hovdenak<sup>2</sup>, Dr. Annlaug Selsto<sup>2</sup>, Dr. Charlotte Evans<sup>1</sup>**

<sup>1</sup>University of Leeds, Leeds, United Kingdom, <sup>2</sup>Norwegian Institute of Public Health, Oslo, Norway

**S.3.56 - Improving the school food environment: challenges and solutions for children aged 5 to 18 years, UKK - K1 (+K2) (Level 3), June 17, 2023, 11:45 AM - 1:00 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose** We will present our findings from two systematic reviews related to improving diet in childhood. The first looks at the benefits of offering free school meals on health and wellbeing. A recent international review concluded that universal free school meals may have multiple benefits for students including diet quality, reducing social inequality and higher academic performance, and this review will focus on the benefits in Nordic countries. The second review looks at the impact of school-based cooking and food preparation education on dietary habits, cooking skills and food literacy of children.

**Methods** Review 1 searched Medline, Embase, Web of Science and Education Information Centre (ERIC) through September 2022. Review 2 searched Medline, CINAHL, Embase and ERIC through January 2022. Both used a range of relevant search terms matched to subject headings. For example review 2 used 'cooking' or 'food preparation' or 'food literacy' or 'food technology'. Eligible study designs included were randomised controlled trials (RCT), cluster RCTs, and quasi-experimental designs.

**Results** After duplicates were removed and articles screened against eligible criteria, 17 studies were included in review 1 and 24 studies were included in review 2. In review 1, compared to the international review, the results from the Nordic studies were more mixed; and a large number of studies had low quality. Most Nordic studies reported that a free school meal (breakfast or lunch) had a positive effect on diet quality and could contribute to reduce social dietary inequalities. No probable effect was found for academic performance or absenteeism. In review 2, six studies from the USA, UK, Spain and Japan reported data on cooking self-efficacy and attitudes towards cooking. Cooking hours for these interventions ranged from 1 to 28 hours in total. A small increase (median difference between arms of 0.18) was reported in cooking confidence. Three studies reported small increases in food literacy with a median difference of 1.21 between arms.

**Conclusions** Results of school based policies and programmes may vary by region and are highly dependent on contextual factors. It is important that implementation of a policy or programme is followed by high quality evaluation research.

# The impact of selected methodological factors on data collection outcomes in observational studies of device-measured physical behaviour in adults: A systematic review

**Dr. Richard Pulsford<sup>1</sup>**, Dr. Laura Brocklebank<sup>2</sup>, Dr. Sally Fenton<sup>3</sup>, Dr. Esmée Bakker<sup>4</sup>, Dr. Gregore Mielke<sup>5</sup>, Dr. Li-Tang Tsai<sup>6</sup>, Associate Professor Andrew Atkin<sup>7</sup>, Dr. Danielle Harvey<sup>7</sup>, Dr. Joanna Blodgett<sup>2</sup>, Dr. Matthew Ahmadi<sup>8</sup>, Ms. Le Wei<sup>8</sup>, Associate Professor Alex Rowlands<sup>9</sup>, Prof. Aiden Doherty<sup>10</sup>, Prof. Vegar Rangul<sup>11</sup>, Associate Prof. Annemarie Koster<sup>12</sup>, Prof. Lauren Sherar<sup>13</sup>, Prof. Andreas Holtermann<sup>14</sup>, Prof. Mark Hamer<sup>2</sup>, Prof. Emmanuel Stamatakis<sup>8</sup>

<sup>1</sup>University of Exeter, Exeter, United Kingdom, <sup>2</sup>University College London, London, United Kingdom, <sup>3</sup>University of Birmingham, Birmingham, United Kingdom, <sup>4</sup>Radboud university Medical Centre, Amsterdam, Netherlands, <sup>5</sup>University of Queensland, Brisbane, Australia, <sup>6</sup>University of Zurich, Zurich, Switzerland, <sup>7</sup>University of East Anglia, Norwich, United Kingdom, <sup>8</sup>University of Sydney, Sydney, Australia, <sup>9</sup>University of Leicester, Leicester, United Kingdom, <sup>10</sup>University of Oxford, Oxford, United Kingdom, <sup>11</sup>Norwegian University of Science and Technology, Levanger, Norway, <sup>12</sup>Maastricht University, Maastricht, Netherlands, <sup>13</sup>Loughborough University, Loughborough, United Kingdom, <sup>14</sup>National Research Centre for the Working Environment, Copenhagen, Denmark

**S.3.57 - The Prospective Physical Activity, Sitting and Sleep consortium (ProPASS): First Results and Future Directions, UKK - K3+4 (Level 3), June 17, 2023, 11:45 AM - 1:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** Accelerometer measures of physical behaviours (physical activity, sedentary behaviour and sleep) in observational studies offer detailed insight into associations with health and disease. Maximising recruitment and accelerometer wear, and minimising data loss remain key challenges. How varying methods used to collect accelerometer data influence data collection outcomes is poorly understood. In order to inform best practice for at-scale accelerometer assessment of physical behaviours we examined the influence of accelerometer placement and other methodological factors on participant recruitment, adherence and data loss in observational studies of adults.

**Methods:** The review was in accordance with the Preferred Reporting Items for Systematic Reviews and Meta Analyses (PRISMA). Observational studies of adults including accelerometer measurement of physical behaviours were identified using database (MEDLINE (Ovid), Embase, PsychINFO, Health Management Information Consortium, Web of Science, SPORTDiscus and Cumulative Index to Nursing & Allied Health Literature) and supplementary searches to May 2022. Information regarding study design, accelerometer data collection methods and outcomes were extracted for each accelerometer measurement (study wave). Random effects meta-analyses and narrative syntheses were used to examine associations of methodological factors with participant recruitment, adherence and data loss.

**Results:** 123 accelerometer data collection waves were identified from 95 studies (92.5% from high-income countries). In-person distribution of accelerometers was associated with a greater proportion of invited participants consenting to wear an accelerometer (+30% [95% CI 18%, 42%] compared to postal distribution), and adhering to minimum wear criteria (+15% [4%, 25%]). The proportion of participants meeting minimum wear criteria was higher when accelerometers were worn at the wrist (+14% [5%, 23%]) compared to waist. Daily wear-time tended to be higher in studies using wrist-worn accelerometers compared to other wear locations. Reporting of information regarding data collection was inconsistent.

**Conclusion:** Methodological decisions including accelerometer wear-location and method of distribution may influence important data collection outcomes including recruitment and accelerometer wear-time. Consistent and comprehensive reporting of accelerometer data collection methods and outcomes is needed to support development of future studies and international consortia. Review supported by the British Heart Foundation (SP/F/20/150002) and registered (Prospero CRD42020213465)

# ActiPASS – A tool for processing thigh-worn accelerometer data in PROPASS

**Dr. Peter J. Johansson**<sup>1</sup>, Dr. Pasan Hettiarachchi<sup>1</sup>, Dr. Patrick Crowley<sup>2</sup>, Prof. Magnus Svartengren<sup>1</sup>

<sup>1</sup>Department of Medical Sciences, Occupational and Environmental Medicine, Uppsala University, Uppsala, Sweden, <sup>2</sup>The National Research Centre for the Working Environment, Copenhagen, Denmark

**S.3.57 - The Prospective Physical Activity, Sitting and Sleep consortium (ProPASS): First Results and Future Directions, UKK - K3+4 (Level 3), June 17, 2023, 11:45 AM - 1:00 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** To develop and evaluate a tool for processing raw data, from different brands of thigh-worn accelerometers, which produces variables according to the ProPASS 24-hour physical behaviour construct.

**Methods:** The validated, decision-based Acti-4 algorithm, which identifies sitting, standing, moving, walking, running, stair walking, and bicycling with high precision was used as a starting point (1). Additional automatic functions were added: to calibrate the accelerometer devices; adjust if the accelerometer has been placed upside-down or inside-out; adjust for minor deviations in the placement of the accelerometer on the thigh. Algorithms to identify lying down and sleep were also added to Acti-4. The lying-down algorithm was evaluated in a dataset where 47 participants wore two Axivity-AX3 devices for 7 days, one on the thigh and one on the back as a reference (2).

The sleep algorithm was developed and optimized on a dataset consisting of 23 single-night polysomnography registrations (PSG). Then this algorithm was evaluated on another dataset, in which, 71 adult males (age 57 ± 11 years) wore ambulatory PSG equipment and one Axivity-AX3 on the thigh simultaneously, while sleeping one night in their homes (3).

**Results:** The mean difference between the total identified lying down time/day, between the refined algorithm and the back accelerometer was +2.9 (95% limits-of. Agreement (LoA); -135 to +141) minutes per day (2). Sleep intervals were slightly underestimated by -21 (95% LoA -86 to +44) minutes. Total sleep time was underestimated by -32 (95% LoA -148 to +85) minutes (3).

**Conclusions** All these functions are now integrated into ActiPASS, which is a new streamlined, automated tool for processing raw accelerometer data in large batches that fits the need for the ProPASS consortium.

1. Skotte J, et al. Detection of physical activity types using triaxial accelerometers.

<https://doi.org/10.1123/jpah.2011-0347>

2. Hettiarachchi P, et al. Validity of a Non-Proprietary Algorithm for Identifying Lying Down Using Raw Data from Thigh-Worn Triaxial Accelerometers. <https://doi.org/10.3390/s21030904>

3. Johansson PJ, et al. Development and performance of a sleep estimation algorithm using a single accelerometer placed on the thigh: an evaluation against polysomnography. <https://doi.org/10.1111/jsr.13725>

# Findings from ProPASS' proof -of-concept IPD analyses: device-measured movement behaviours and cardiometabolic outcomes

**Dr. Joanna Blodgett<sup>1</sup>**, Dr. Matthew Ahmadi<sup>2</sup>, Dr. Andy Atkin<sup>3</sup>, Dr. Hsiu Wen Chan<sup>4</sup>, Dr. Sari Stenholm<sup>5</sup>, Dr. Thijs Eijssvogels<sup>6</sup>, Prof. Andreas Holtermann<sup>7</sup>, Associate Professor Annemarie Koster<sup>8</sup>, Prof. Emmanuel Stamatakis<sup>2</sup>, Prof. Mark Hamer<sup>1</sup>

<sup>1</sup>Institute of Sport Exercise & Health, UCL, London, United Kingdom, <sup>2</sup>Charles Perkins Centre, School of Health Sciences, Faculty of Medicine and Health, The University of Sydney, Sydney, Australia, <sup>3</sup>School of Health Sciences, University of East Anglia, Norwich, United Kingdom, <sup>4</sup>University of Queensland, Queensland, Australia, <sup>5</sup>University of Turku, Turku, Finland, <sup>6</sup>Radboud University Medical Center, Nijmegen, Netherlands, <sup>7</sup>National Research Centre for the Working Environment, Copenhagen, Denmark, <sup>8</sup>Department of Social Medicine, CAPHRI Care and Public Health Research Institute, Maastricht University, Maastricht, Netherlands

**S.3.57 - The Prospective Physical Activity, Sitting and Sleep consortium (ProPASS): First Results and Future Directions, UKK - K3+4 (Level 3), June 17, 2023, 11:45 AM - 1:00 PM**

**SIG - Primary Choice:** N. Other

**Purpose:** Using a novel algorithm for identifying movement behaviours, we investigated: i) interdependent associations of moderate-vigorous physical activity(MVPA), light intensity PA(LIPA), sedentary behaviour(SB) and sleep with cardiometabolic outcomes; and ii) dose-response associations between activity type(i.e. standing, walking, stair climbing, fast walking/running) and cardiometabolic outcomes.

**Methods:** We harmonised data from up to 15,285 participants across six cohort studies: 1970 British Cohort Study, Australian Longitudinal Study on Women's Health, Finnish Retirement and Aging Study, the Maastricht Study, Nijmegen Exercise Study and Danish PHysical ACTivity cohort with Objective measurements. Outcomes included body mass index(BMI), waist circumference, high-density lipoprotein(HDL) cholesterol, total cholesterol, triglycerides and HbA1c. Covariates included sex, age, cohort, alcohol consumption, smoking, self-reported health, medication use, cardiovascular disease history, occupational class, education and ethnicity. For aim i, we conducted compositional logistic regression to examine associations between different compositions of time spent in movement behaviours and each outcome. For aim ii, we used generalised linear models with splines to examine dose-response associations between each activity type and each outcome.

**Results:** In compositional analyses, more time spent in MVPA and less time spent in SB, relative to other behaviours, was associated with lower BMI, waist circumference, hbA1c and triglycerides and with higher HDL and total cholesterol levels. Associations were similar for LIPA, however effect sizes were substantially smaller and there were weaker associations with HbA1c and total cholesterol. There were inconsistent associations between time spent sleeping and adiposity and lipid outcomes. In generalised linear models, more time spent stair climbing or fast walking/running was associated with lower BMI, waist circumference, hbA1c and triglycerides and with higher HDL and total cholesterol levels, with substantial impact over a 15 minute duration. Smaller associations were observed for walking (greatest benefit obtained in the first 90minutes), while three times longer standing time was required to observe an equivalent association to walking

**Conclusions:** Higher PA levels were associated with favourable cardiometabolic outcomes, however greatest benefits were seen with higher intensity activities(e.g. fast walking/running, stair climbing). Reducing time spent sedentary was associated with better cardiometabolic health. Finally, more research is needed to better understand the complex association between sleep and health.

# The Nutrition Now project- implementing digital dietary interventions in Norway targeting diet in the first 1000 days of life

**Prof. Nina Cecilie Øverby<sup>1</sup>**, Prof. Elisabet R Hillesund<sup>1</sup>, Associate Professor Anine C Medin<sup>1</sup>, Prof. Frøydis Vik<sup>1</sup>

<sup>1</sup> Department of Nutrition and Public Health, University of Agder, Agder, Norway

**S.3.58 - Implementation of digital health interventions promoting healthy lifestyle behaviours in the first 2000 days of life, Clarion Hotel Gillet - Room Gillesalen, June 17, 2023, 11:45 AM - 1:00 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** Poor diet quality is a leading cause of non-communicable diseases and nutrition in early life strongly influences health throughout life. Still, there is a lack of public health response to these insights. There is also a lack of action on the existing evidence-to-practice gap; that successful interventions are not implemented at scale. The overall aim of the *Nutrition Now project* is to improve dietary care in the first 1000 days of life. We will do so by implementing previously evaluated digital dietary interventions (combined into the *Nutrition Now resource*) in a municipality, in co-creation with stakeholders.

Specific project objectives are to a) evaluate the effectiveness of the resource on child dietary outcomes, b) gather information on how the implementation strategies perform to inform forthcoming scale-up and c) perform trial-and model-based economic evaluations.

**Methods:** The study is a hybrid type 1 implementation study. A quasi-experimental design with pre-and post-tests, where one municipality gets access to the resource (n~800), while a matched non-equivalent control municipality (n~800) does not, will be used. The resource will be implemented in kindergartens and made available to pregnant women and parents through the Norwegian system of maternal and child health (MCH) care. The implementation process includes iterative adjustments and strategies from the implementation framework Expert Recommendations for Implementing Change informed by dialogues with stakeholders. Implementation outcomes (e.g., acceptability, adoption) will be assessed through questionnaires and interviews with parents, kindergarten and MCH staff.

**Results:** Nutrition Now recruits participants during 2022-23. We will present preliminary results including 1) the development and adaptations done to the digital resource in response to insights from midwives, health care nurses and kindergarten personnel, 2) results from the iterative processes used when implementing the resource and how this affected the implementation and 3) experiences from the implementation process e.g. assessing barriers and facilitators.

**Conclusion:** Nutrition Now will bridge the existing evidence-to-practice gap through rigorous scientific effectiveness evaluation of municipal scale-up and inform subsequent county scale-up. The study is one of the first to implement efficacious digital nutrition interventions in early life targeting both parental and MCH dietary guidance and kindergarten practice.



# From efficacy to large-scale implementation (MINISTOP 1.0 - 3.0): Promoting healthy lifestyle behaviours in the first 2000 days of life using a mHealth intervention

**Associate Professor Christine Delisle Nyström<sup>1</sup>**, Mrs. Christina Alexandrou<sup>1,2</sup>, Associate Professor Kristin Thomas<sup>2</sup>, Prof. Marie Lof<sup>1,2</sup>

<sup>1</sup>Department of Biosciences and Nutrition, Karolinska Institutet, Stockholm, Sweden, <sup>2</sup>Department of Health, Medicine and Caring Sciences, Linköping University, Linköping, Sweden

**S.3.58 - Implementation of digital health interventions promoting healthy lifestyle behaviours in the first 2000 days of life, Clarion Hotel Gillet - Room Gillesalen, June 17, 2023, 11:45 AM - 1:00 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** The overall aim is to present the Mobile-based intervention intended to stop obesity in preschoolers (MINISTOP) studies from efficacy to large-scale implementation within Swedish primary child healthcare.

**Methods:** The MINISTOP app consists of a 6-month comprehensive program with information grounded in evidence-based recommendations for healthy eating, physical activity, and screen time for parents of preschoolers. MINISTOP 1.0 was a randomized controlled trial (RCT) which utilized objective measures to assess body composition (BodPod), physical activity (ActiGraph), and diet (food pictures) and was delivered under controlled conditions (n=315). MINISTOP 2.0 was a type I implementation-effectiveness trial delivered by nurses within primary child healthcare (n=521). Children's weight and height were collected at primary child healthcare and questionnaires were used to assess key dietary indicators and physical activity/sedentary behaviours. MINISTOP 3.0 is a type III hybrid implementation-effectiveness trial that will test two different implementation strategies 'MINISTOP basic' vs. 'MINISTOP plus'. Child healthcare centers will be randomized in a 1:1 ratio and the implementation outcomes that will be assessed are: acceptability, appropriateness, feasibility, fidelity, adoption, costs, sustainability, and reach (measured quantitatively and qualitatively) and data on children's health behaviours will be collected at intervention start and 6-months later through the MINISTOP app.

**Results:** The MINISTOP 1.0 trial showed that the intervention group (MINISTOP app) compared to the control group significantly improved their composite score including body composition, dietary, and physical activity variables compared to the control group (p=0.021). Preliminary results from the MINISTOP 2.0 trial are showing that the intervention group compared to the control group has increased their consumption of fruits and vegetables (p=0.032) and decreased their consumption of sweet and savoury snacks as well as sweetened beverages (p<0.03). Children in the intervention group also reduced their screen time compared to the control group (p=0.009). Data collection for MINISTOP 3.0 will begin in January 2023 and preliminary findings will be presented in June 2023.

**Conclusions:** Following the MINISTOP 3.0 trial, MINISTOP has great potential to be implemented in primary child healthcare across Sweden to support all parents to create healthy lifestyle behaviours in their children, in order to prevent overweight and obesity.



# Development and formative usability intervention of the Let's Grow mobile web app

Dr. Katherine L Downing<sup>1</sup>, Ms. Brittany R Markides<sup>1</sup>, Dr. Harriet Koorts<sup>1</sup>, Prof. Jo Salmon<sup>1</sup>, **Prof. Kylie D Hesketh<sup>1</sup>**

<sup>1</sup>Institute for Physical Activity and Nutrition (IPAN), School of Exercise and Nutrition Sciences, Deakin University, Geelong, Australia

**S.3.58 - Implementation of digital health interventions promoting healthy lifestyle behaviours in the first 2000 days of life, Clarion Hotel Gillet - Room Gillesalen, June 17, 2023, 11:45 AM - 1:00 PM**

## **SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** To describe the development and formative usability evaluation of a mobile web application (app) for parents to improve the composition of movement behaviours in 2-year-olds.

**Methods:** The development of Let's Grow was an iterative process, with content developed with user input for acceptability and utility and stakeholder input on delivery to ensure future scalability. During development, parents were engaged in a series of focus groups and interviews. Four samples of parents of young children were recruited between November 2019 and October 2020 (n=53 total; 92% female). Parents participated in focus groups or one-on-one interviews and provided feedback on an app prototype, including technical functionality, educational module contents, and the content and timing of notifications. A formal Stakeholder Group (n=22; comprising government from various jurisdictions, health and care delivery, and community facing not-for-profit organisations) was established during the development phase. The group participated in an online PRACTIS workshop to ascertain their views on effective dissemination, requirements to ensure future sustainable promotion in the community, aspects of the app that should remain intact when scaling up, and how it could align with each organisation's missions, values or existing infrastructure. Focus groups, interviews and the PRACTIS workshop were recorded and transcribed verbatim.

**Results:** Feedback from parents on the app content and utility was mostly positive; parents liked that it was engaging, easy to navigate, and contained a combination of information, videos, and activities. Suggestions for improvement, which were used to inform iterative refinements to the app prototype, included allowing more flexibility and personalisation for some activities, incorporating additional information around sleep, and making the language around screen time less judgemental. There was strong support from the Stakeholder Group, with suggestions for aligning or embedding the app content with already existing offerings or programs and disseminating through a centralised source (e.g., national government).

**Conclusions:** We have taken an innovative approach to developing Let's Grow by incorporating not only iterative end-user input for acceptability and utility, but also early stakeholder input to ensure future scalability. Throughout the trial (ending December 2023), we are continuing to engage with the Stakeholder Group around future scalability pathways.

# The development of an online platform for lifestyle professionals to support the use of e-coaching

**Dr. Joan Dallinga<sup>1,2,4</sup>**, Dr. Daniel Bossen<sup>1</sup>, Dr. Katja Braam<sup>2</sup>, Ms. Monique Bak<sup>1</sup>, Ms. Colette van het Schip<sup>1</sup>, Mr. Luke Boerdijk<sup>1</sup>, Dr. Jasmijn Holla<sup>2,3</sup>, Dr. Bart Visser<sup>1</sup>

<sup>1</sup>Faculty of Health, Centre of Expertise Urban Vitality, Amsterdam University of Applied Sciences, Amsterdam, Netherlands, <sup>2</sup>Faculty of Health, Sports and Social Work, Inholland University of Applied Sciences, Haarlem, Netherlands, <sup>3</sup>Amsterdam Rehabilitation Research Center, Amsterdam, Netherlands, <sup>4</sup>Centre of Expertise Health Innovation, The Hague University of Applied Sciences, The Hague, Netherlands

**S.3.59 - Supporting the lifestyle professional in the application of (digital) tools for supporting lifestyle change, Clarion Hotel Gillet - Room Akademien, June 17, 2023, 11:45 AM - 1:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** The aim was to develop an online platform for lifestyle coaches to support the use of e-coaching in their guidance trajectory for overweight clients.

## **Research questions:**

1. - How can online- and offline behavior change techniques (BCT's) be applied in the guidance of overweight clients?
2. - What are the wishes and needs of lifestyle coaches in regard to e-coaching?
3. - How to integrate e-coaching in the coaching trajectory of lifestyle coaches?

**Methods:** A mixed method approach was used. Qualitative methods included interviews with lifestyle coaches with focus on online and offline BCT's (n= 38), two focus groups with lifestyle coaches on wishes and needs (n=10) and three co-creation sessions with lifestyle coaches, clients and stakeholders (n=9;7;8) to develop an online platform. The qualitative data were transcribed and analyzed through an inductive thematic approach. Quantitative studies included online surveys with lifestyle professionals (n=79).

**Results:** Monitoring and feedback are fundamental BCTs in online lifestyle interventions but less used in offline interventions. Also, shaping knowledge and social support are commonly used online BCT's. Coaches who work predominantly offline use goal setting, action planning and shaping knowledge as techniques. Online group sessions were perceived as less effective. Almost all lifestyle coaches (91%) indicate that they were not educated to apply technology. They need insight in available e-coaching tools, in how to use them and are open to experiences of other professionals. Specifically, there is need for information how to assist clients with limited health literacy. In the co-creation sessions researchers, lifestyle coaches and clients worked towards a prototype of an online platform. As a result, the online platform *eCoachGids* was developed which will be presented.

**Conclusions:** The *eCoachGids* provides an overview of e-coaching tools per phase of behavior change, suggestions how to use online tools and e-coaching experiences of lifestyle professionals. The platform can be used by lifestyle coaches and should be improved further through usability testing. In the next step, we will implement the platform in practice. Also, we will study how to apply blended coaching and how clients with low health literacy can benefit most from e-coaching tools.

# Experiences, needs, and wishes of healthcare professionals with supporting behavior change maintenance

**Dr. Berber Dorhout<sup>1,2</sup>**, Dr. Di-Janne Barten<sup>1</sup>, Prof. Cindy Veenhof<sup>1,3</sup>, Dr. Amber Ronteltap<sup>1</sup>

<sup>1</sup>Research group Innovation of Movement Care, Utrecht University of Applied Sciences, Utrecht, Netherlands,

<sup>2</sup>Department of Human Nutrition and Health, Wageningen University and Research, Wageningen, Netherlands,

<sup>3</sup>Department of Rehabilitation, Nursing Science and Sports, UMC Utrecht, Utrecht, Netherlands

**S.3.59 - Supporting the lifestyle professional in the application of (digital) tools for supporting lifestyle change, Clarion Hotel Gillet - Room Akademien, June 17, 2023, 11:45 AM - 1:00 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Combined lifestyle interventions (CLIs) aim to improve health-related behaviors such as exercise, nutritional intake, and smoking. Although support of *initial* behavior change is well addressed in CLIs, *maintenance* of behavior change remains challenging. In addition, research indicates that effects of lifestyle interventions decrease over time, and that relapse is a prevalent issue. Therefore, the aim of this study was to identify experiences, needs, and wishes of CLI-providers (physiotherapists, dietitians, lifestyle coaches,) regarding the support of adults in maintaining their healthier behavior.

**Methods:** Semi-structured interviews (n=12) and one finalizing focus-group (n=3) were held with physiotherapists, dietitians, and lifestyle coaches who offer CLIs focused on improved nutritional intake and physical activity. Topics in the interview guide included experiences with and insights in behavior change maintenance, current support and use of tools aimed at behavior change maintenance, and needs and opportunities to support behavior change maintenance. Data were analyzed following an inductive thematic approach.

**Results:** Participants confirmed that the main focus of CLIs is initial behavior change and maintenance on the short term. They lack insights into the maintenance of their clients' behavior change after finishing a CLI. The support of professionals usually ends after the intervention has finished, although some professionals keep seeing their clients afterwards on an irregular basis. However, practical (digital) tools and theoretical models focused on supporting sustained behavior change are lacking. Opportunities indicated by participants included increasing the focus on behavior change maintenance during the CLI, incidental meeting in the final phase of the CLI, tracking clients after finishing the CLI, increasing self-management of clients, and developing tools, models or a platform focused on support during behavior change maintenance. In addition, professionals emphasize the need of practical guidance to implement tools or models in their daily practice.

**Conclusions:** These results show the lack of insights, tools and theoretical models focused on supporting healthy behavior maintenance. Future research should focus on indicating or developing suitable (blended) tools and models in cooperation with professionals as well as clients to support clients in maintaining their behavior change. Special attention should be given to the implementation of these tools in practice.

# Wishes and needs of children, parents and healthcare professionals for blended care for children with overweight.

**Dr. Machteld van Lieshout<sup>1</sup>**, Mrs. Wendy Scholtes-Bos<sup>1,2</sup>, Mrs. Maria F. Arias-Arias<sup>1</sup>, Prof. Sanne I. de Vries<sup>1</sup>

<sup>1</sup>The Hague University of Applied Sciences, The Hague, Netherlands, <sup>2</sup>Medical Delta Living Lab VIT for Life, Rotterdam, Netherlands

**S.3.59 - Supporting the lifestyle professional in the application of (digital) tools for supporting lifestyle change, Clarion Hotel Gillet - Room Akademien, June 17, 2023, 11:45 AM - 1:00 PM**

## **SIG - Primary Choice:** D. e- & mHealth

Overweight children experience barriers to incorporate healthy lifestyle recommendations and assignments given by healthcare professionals into their daily life. In return, it is difficult for healthcare professionals to keep track of compliance to their recommendations and assignments. Bridging the gap between the health care centre (on site) and home (off site) could support the care process. Digital support through an application is a logical tool for blending on site and off site support. Therefore, we studied the needs and wishes of children, their parents and healthcare professionals for such an application.

We used desing thinking in two simultaneous processes to gather data from different contexts: the household and healthcare setting. For understanding user needs, a total of six diary studies and six semi-structured interviews were executed with parents, children, dieticians and physiotherapists. Convergence was sought through looking at overlapping needs using an affinity diagram. These needs were translated into a hi-fi clickable prototype with separate interfaces for professionals and children. In addition, the perspectives of healthcare professionals about the use and implementation of such digital applications were identified. Furthermore, the value and relevance of designed prototypes was studied qualitatively in semi-structured interviews with three physiotherapists and four dieticians. A thematic content analysis, based on relevance and feasibility, was used to validate a series of user needs by five individuals including users, knowledge, and design experts in an online focus group.

In the prototypes theoretical knowledge was translated into functional design, resulting in positive feedback from the professionals. One of them stated “the prototype has a beautiful appearance and already includes some of my wishes”. Some wishes and needs were viewed very differently by experts in different fields. Further research and development is required to include practical tools such as diaries to record food intake and mood, enable monitoring of compliance and progress by parents and healthcare professionals. Given the positive respons of all involved, we conclude digital support through an application is a logical tool for blending on site and off site support. Provided, it fulfils the needs of all involved.

# Trajectories of physical activity before and after a cancer diagnosis in persons with type 2 diabetes

**Dr. Emerald G. Heiland**<sup>1,2</sup>, Dr. Stanley Teleka<sup>1</sup>, Prof. Ingrid Glimelius<sup>3</sup>, Prof. Karl Michaëlsson<sup>1</sup>, Prof. Liisa Byberg<sup>1</sup>, Associate Professor Hannah L. Brooke<sup>1</sup>

<sup>1</sup>Department of Surgical Sciences, Uppsala University, Uppsala, Sweden, <sup>2</sup>Department of Physical Activity and Health, The Swedish School of Sport and Health Sciences (GIH), Stockholm, Sweden, <sup>3</sup>Department of Immunology, Genetics and Pathology, Experimental Oncology, Uppsala University, Uppsala, Sweden

**S.3.60 - Using routinely collected physical activity and cardiorespiratory fitness data for longitudinal studies within cancer epidemiology, Clarion Hotel Gillet - Room Swedenborg, June 17, 2023, 11:45 AM - 1:00 PM**

**SIG - Primary Choice:** C. Cancer prevention and management

**Purpose** Physical activity (PA) is a known preventative and rehabilitative approach for cancer and diabetes. Identifying PA patterns before and after cancer diagnosis can provide important information regarding high risk groups, but patterns remain unknown. We identified PA trajectories pre- and post-cancer diagnosis in persons with type 2 diabetes, using routinely collected data, and explored determinants of these trajectories.

**Methods** We included 26 258 persons with type 2 diabetes, who had a cancer diagnosis (from January 1, 2004, onwards). Data were retrieved from the Swedish National Diabetes Register and National Cancer Register. Annual (2000-2021) self-reported PA (frequency of walking 30 min or equivalent) collected at healthcare centers was used, excluding the year immediately before and after cancer diagnosis. Trajectories were identified using group-based trajectory modelling. Multivariable logistic regression was used to assess associations of potential determinants of trajectory membership.

**Results** Seven trajectories emerged pre-diagnosis: average maintainers (50.0%), high maintainers (12.3%), increasers (11.1%), very high maintainers (11.0%), decreasers (6.3%), low maintainers (6.0%), and low decreasers (3.3%). Six similar trajectories emerged post-diagnosis. Pre-diagnosis decreasers, compared with average maintainers, were more likely to be older, women, single, with lower education, higher HbA1c and body mass index (BMI), and smokers. Increasers were more likely to be older, men, married/cohabiting, low HbA1c and BMI, and non-smokers. Post-diagnosis decreasers compared with average maintainers were more likely to start with high PA, and be married/cohabiting men, with low HbA1c and BMI, and non-smokers. Post-diagnosis increasers initially had low PA, and were more likely to be older, women, with lower education, single, more advanced diabetes treatment, higher BMI, and smokers compared with average maintainers. Those who were post-diagnosis decreasers were more likely to be in the high PA trajectories pre-cancer diagnosis, whereas those who were post-diagnosis increasers were more likely to have had been in the low PA trajectories at pre-diagnosis.

**Conclusions.** The majority of patients were in the average or high PA groups before and after a cancer diagnosis. PA behaviour may depend on sociodemographic factors, glycemic control, and body composition. Register data can provide high resolution, long-term information to answer research questions in innovative ways.

# Physical activity before and after a cancer diagnosis in relation to total and cancer-specific mortality among individuals with diabetes

**Dr. Stanley Teleka<sup>1</sup>**, Dr. Emerald G. Heiland<sup>1,2</sup>, Prof. Ingrid Glimelius<sup>3</sup>, Prof. Karl Michaëlsson<sup>1</sup>, Prof. Liisa Byberg<sup>1</sup>, Associate Professor Hannah L. Brooke<sup>1</sup>

<sup>1</sup>Department of Surgical Sciences, Uppsala University, Uppsala, Sweden, <sup>2</sup>Department of Physical Activity and Health, The Swedish School of Sport and Health Sciences (GIH), Stockholm, Sweden, <sup>3</sup>Department of Immunology, Genetics and Pathology, Experimental Oncology, Uppsala University, Uppsala, Sweden

**S.3.60 - Using routinely collected physical activity and cardiorespiratory fitness data for longitudinal studies within cancer epidemiology, Clarion Hotel Gillet - Room Swedenborg, June 17, 2023, 11:45 AM - 1:00 PM**

**SIG - Primary Choice:** C. Cancer prevention and management

**Purpose** Diabetes and physical inactivity have been associated with risk of cancer at specific anatomical sites. However, the impact of physical activity (PA) before and after a cancer diagnosis on total cancer and cancer-specific mortality remains unclear, especially among individuals with type 2 diabetes (T2D). We investigated the association of pre-cancer diagnosis PA, post-cancer diagnosis PA, and change in PA from pre- to post-cancer diagnosis, with mortality among individuals with T2D.

**Methods** We analysed participants diagnosed with T2D using large-scale, high-quality data from the Swedish National Diabetes Register with incident cancer, recorded in the national cancer register, from 2004 to 2021. PA (30 minutes/day of walking or equivalent) was routinely collected annually. It was categorised as never, less than once/week, 1-2 times/week, 3-5 times/week, daily and recorded >12 months before cancer diagnosis and >12 months after cancer diagnosis. Change in PA was categorised as low maintainers, increasers, decreasers and high maintainers. Cox regression was used to calculate hazard ratios (HR) and 95% confidence intervals (CI) for total cancer mortality and cancer-specific mortality adjusted for relevant confounders including body mass index, smoking, age at diagnosis, types of diabetes treatment and several socio-economic factors.

**Results** We found an inverse association between PA and total cancer mortality for both pre-diagnostic PA and post-diagnostic PA; HR (95% CI) for those performing daily PA were 0.81 (0.78-0.85) and 0.70 (0.66-0.74), respectively, compared to those performing no PA. Compared with those who had low PA both before and after cancer diagnosis, individuals with higher levels of PA prior to diagnosis had lower total cancer mortality even if they decreased their PA after diagnosis [maintained high PA: 0.77 (0.71-0.84), decreased PA: 0.81 (0.72-0.90)].

**Conclusions** Higher levels of PA before and after cancer diagnosis were associated with lower total cancer mortality. For some cancer types, higher levels of PA before cancer diagnosis seem to represent a health 'buffer' with regards to mortality.



# The association between change in fitness and prostate cancer incidence and mortality in 59197 men

**Dr. Emil Bojsen-Møller**<sup>1</sup>, Dr. Kate A. Bolam<sup>1,2</sup>, Dr. Peter Wallin<sup>3</sup>, Prof. Magnus Lindwall<sup>1,4</sup>, Dr. Helene Rundqvist<sup>5</sup>, Associate Professor Elin Ekblom-Bak<sup>1</sup>

<sup>1</sup>Department of Physical Activity and Health, The Swedish School of Sport and Health Sciences (GIH), Stockholm, Sweden, <sup>2</sup>Department of Neurobiology, Care Sciences and Society, Karolinska Institute, Huddinge, Sweden, <sup>3</sup>Research Department, HPI Health Profile Institute, Stockholm, Sweden, <sup>4</sup>Department of Psychology, University of Gothenburg, Gothenburg, Sweden, <sup>5</sup>Department of Laboratory Medicine, Karolinska Institute, Stockholm, Sweden

**S.3.60 - Using routinely collected physical activity and cardiorespiratory fitness data for longitudinal studies within cancer epidemiology, Clarion Hotel Gillet - Room Swedenborg, June 17, 2023, 11:45 AM - 1:00 PM**

**SIG - Primary Choice:** C. Cancer prevention and management

**Purpose:** Low cardiorespiratory fitness (CRF) is a well-known risk factor for cancer incidence and mortality. However, limited evidence exists about how changes in CRF relates to incidence and mortality of specific cancer types. We aim to investigate the association of changes in CRF in midlife with subsequent diagnosis of incident prostate cancer and prostate cancer mortality in men.

**Methods:** Data was obtained from the unique, high-quality Health Profile Institute (HPI) database containing health profile assessments at Swedish companies from 1982 until 2019. The assessment consists of questionnaires on lifestyle factors, measurements of anthropometry, and a submaximal bike CRF test. We identified 59,197 men from the routinely collected data, who had performed at least two CRF tests. Cancer outcomes subsequent to CRF tests were retrieved from the Swedish National Cancer Register. Cox proportional hazards models will be used to examine the association between changes in CRF and prostate cancer incidence and mortality. To help account for time varying confounding, inverse probability treatment weights will be applied. Models will be performed for both estimated relative and absolute CRF and adjusted for age, socioeconomic position, smoking, and co-morbidities.

**Results:** The HPI database in combination with cancer registers gives unique opportunities to study changes in lifestyle factors and cancer related outcomes using routinely collected, objective measures of CRF. The time between CRF tests was on average 4.8 (standard deviation [SD] 3.6) years. Among prostate cancer cases risk time was on average 6.1 (SD 4.1) years. The individuals included were a mean age of 41 years, had a body mass index of 26 kg/m<sup>2</sup>, and a CRF level of 37 mL · kg<sup>-1</sup>·min<sup>-1</sup>. Of the 59,197 men included, 608 prostate cancer cases were identified.

**Conclusions:** The results of this study will add to our limited knowledge of the association between change in CRF and prostate cancer specific incidence and mortality. Understanding the role of change in cardiovascular fitness over a lifetime will allow us to develop more nuanced and targeted preventative strategies that more accurately reflect the natural changes in a person's health over their life, and the effects of these changes on cancer outcomes.

# SHORT ORAL PRESENTATIONS

## Sedentary behaviours of children during the COVID-19 pandemic and their association with maternal employment in Bangladesh: a cross-sectional study

**Mrs. Sabiha Afrin**<sup>1</sup>, Prof. Amy B. Mullens<sup>2</sup>, Prof. Stuart J.H. Biddle<sup>1</sup>

<sup>1</sup>University Of Southern Queensland, Centre for Health Research, Springfield Central, Brisbane, Australia,

<sup>2</sup>University of Southern Queensland, School of Psychology and Wellbeing, Ipswich, Australia

**SO.1.01 - Latest findings in Epidemiology and COVID-related studies, UKK - Main Hall (Level 6), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** To prevent the spread of COVID-19, a country-wide lockdown was instigated in Bangladesh. School closures during the COVID-19 pandemic are likely to have had a substantial impact on young people's sedentary behaviour. This study aims to investigate the patterns of sedentary behaviour among children (aged 6-18 years old) in Bangladesh during the pandemic and their relationship with maternal employment.

**Methods:** A cross-sectional study was undertaken with 383 children (50.4% female) between February-September 2021. We used the 7-day Adolescent Sedentary Activity Questionnaire (ASAQ) to assess children's screen activities and times in inactive sitting. Mothers were the proxy respondents. Logistic regression estimates the association using odds ratios (OR) and 95% confidence intervals (CI). Statistical significance was considered at  $p < 0.05$ .

**Results:** During the pandemic, about 81% of children had high recreational sedentary behaviour (>2 hours/day), 49% had high 'productive' sedentary behaviour of >369 min/day and 50% had high 'less productive' sedentary behaviour (>257 min/day). Multivariate logistic regression showed that age [adolescents (13-18 years)] and sex [boys] were significant predictors of recreational, productive, and less productive sedentary behaviour. During weekdays, recreational sedentary behaviour was less likely among boys (OR: 0.31; 95% CI: 0.19-0.52); productive sedentary behaviour was more likely among adolescents (OR: 2.21; 95% CI: 1.37-3.56), and less productive sedentary behaviour was more likely among adolescents (OR: 1.71; 95% CI: 0.99-2.61) and less likely among boys (OR: 0.49; 95% CI: 0.32-0.74). During weekend days, for productive sedentary behaviour OR for boys was 1.82 (95% CI: 1.21-2.77) and for adolescents OR: 2.35 (95% CI: 1.47-3.75). For less productive sedentary behaviour OR for boys was 2.29 (95% CI: 1.50-3.48) and for adolescents OR: 1.61 (95% CI: 0.99-2.61). Sex [boy] was the only predictor of weekend recreational sedentary behaviour [OR: 1.81 (95% CI: 1.07-3.07)]. Children's sedentary behaviour was not associated with maternal employment status.

**Conclusion:** Children and adolescents in Bangladesh exhibited high levels of sedentary behaviour during COVID-19 lockdowns, with older children and boys being more sedentary than younger children and girls. Schools and parents need to consider implementing effective interventions to minimize the detrimental effects of excessive sedentary behaviour on children and adolescents.

# Child and parent accelerometer-measured physical activity and sedentary time post-lockdown: a natural experiment comparison with pre-pandemic data

**Prof. Russell Jago<sup>1</sup>**, Dr. Danielle House<sup>1</sup>, Dr. Lydia Emm-Collison<sup>1</sup>, Dr. Robert Walker<sup>1</sup>, Dr. Ruth Salway<sup>1</sup>  
<sup>1</sup>University of Bristol, Bristol, United Kingdom

**SO.1.01 - Latest findings in Epidemiology and COVID-related studies, UKK - Main Hall (Level 6), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** The COVID-19 pandemic resulted in marked impacts on children's physical activity, with large reductions in MVPA reported during lockdowns. We have showed that children's activity levels were lower and their sedentary time higher immediately post-pandemic. In contrast, there was little change in parental physical activity. We need to know if these patterns persist beyond the short-term.

**Methods:** Active-6 is a repeated cross-sectional natural experiment conducted in two waves. Accelerometer data were collected on 393 children aged 10-11 and their parents from 23 schools in Wave 1 (May to December 2021), and 436 children and parents from 27 schools in Wave 2 (January to July 2022). These were compared to a pre-COVID-19 comparator group of 1296 children and parents in the same schools in March 2017-May 2018. Mean minutes of accelerometer-measured moderate-to-vigorous physical activity (MVPA) were derived for week- and weekend-days and compared across waves via linear multilevel models. We also explored how the post-COVID-19 differences changed over time via generalised additive mixed models (GAMMs).

**Results:** There was no difference in children's mean MVPA in Wave 2 (weekdays: -2.3 min; 95% CI: -5.9 to 1.3 and weekends: 0.6 min; 95% CI: -3.5 to 4.6) when compared to the pre-covid data. Sedentary time remained higher than pre-pandemic at 13.2 min (95% CI: 5.3 to 21.1) on weekdays. Parents' sedentary time and weekday MVPA was similar to pre-COVID-19 levels, with MVPA higher than pre-pandemic by 7.7 min (95% CI: 1.4 to 14.0) on weekends. The COVID-19 difference changed over time, with children's MVPA decreasing over winter and coinciding with COVID-19 outbreaks, and only returning to pre-pandemic levels towards May/June 2022.

**Conclusions:** Children's MVPA has returned to pre-pandemic levels, while sedentary time remained higher. Parents' MVPA remained higher, especially at weekends. The recovery in physical activity is precarious and potentially susceptible to future COVID outbreaks or changes in provision, and so robust measures to protect against future disruptions are needed. Furthermore, many children are still inactive, with only 41% meeting UK physical activity guidelines, and so there is still a need to increase children's physical activity.

# Changes in movement behaviours among Canadian toddlers and preschoolers throughout two years of the COVID-19 pandemic

**Dr. Valerie Carson<sup>1</sup>**, Dr. Zhiguang Zhang<sup>1</sup>, Mrs. Madison Boyd<sup>1</sup>, Mrs. Morgan Potter<sup>1</sup>, Mr. Joshua Li<sup>1</sup>, Dr. Nicholas Kuzik<sup>1,2</sup>, Dr. Stephen Hunter<sup>1</sup>

<sup>1</sup>University of Alberta, Edmonton, Canada, <sup>2</sup>Children's Hospital of Eastern Ontario - Research Institute, Ottawa, Canada

**SO.1.01 - Latest findings in Epidemiology and COVID-related studies, UKK - Main Hall (Level 6), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** To examine the changes in movement behaviours (i.e., organized physical activity, outdoor play, screen time, sleep time) across two years of the COVID-19 pandemic among Canadian toddlers and preschoolers.

**Methods:** Participants were 359 parents of toddlers and preschoolers (1-4 years at baseline) from across Canada. Participants were asked to complete an online questionnaire at 5 time-points representing unique time-points in the pandemic. Time-point 1 (T1) was completed retrospectively and corresponded with pre-COVID-19 pandemic (Before March 11, 2020; average Canadian restriction severity index (RSI)= 4.7/100). Time-point 2 (T2) corresponded with wave 1 (April 15, 2020; RSI=72.8/100). Time-point 3 (T3) corresponded with post-wave 1 (October 1, 2020; RSI=36.7/100). Time-point 4 (T4) corresponded with wave 2 (January 17, 2021; RSI =48.8/100). Time-point 5 (T5) corresponded to post-Omicron waves or post-waves 5 and 6 (April 14, 2022; RSI=11.7/100). Parents reported on their children's organized physical activity, outdoor play, screen time, and sleep time using tools with established psychometric properties. Linear mixed models were conducted.

**Results:** Organized physical activity was on average 62, 44, 37 minutes/day lower at T2, T3, T4, respectively, compared to pre-COVID-19 (T1). However, no significant differences were observed in organized physical activity between T5 and pre-COVID-19. Outdoor play at T2 and T3 was on average 30 minutes/day higher compared to pre-COVID-19. Outdoor play at T4 and T5 were not significantly different compared to pre-COVID-19. Screen time was on average 67, 17, 38, 52 minutes/day higher at T2, T3, T4, T5, respectively, compared to pre-COVID-19. Sleep time was 30, 36, 82 minutes/day lower at T3, T4, T5, respectively, compared to pre-COVID-19. However, no significant differences in sleep were observed between T2 and pre-COVID-19.

**Conclusions:** Changes were observed in all movement behaviours across two years of COVID-19 but patterns were behaviour-specific. Findings suggests organized sport and outdoor play may have returned to pre-pandemic levels. However, screen time remains significantly higher compared to pre-COVID-19. Though sleep remains lower than pre-pandemic levels, this finding may reflect typical developmental changes in sleep. Future research is needed to understand the moderators of change in movement behaviours among this age group to support an equitable COVID-19 recovery.

# A prospective look at the influence of parenting practices on children's physical activity before and during the pandemic

**Prof. Louise C. Mâsse<sup>1,2</sup>**, Dr. Olivia De-Jongh González<sup>2,1,2</sup>, Mrs. Karen Sauve<sup>1,2</sup>

<sup>1</sup>University of British Columbia, Vancouver, Canada, <sup>2</sup>BC Children's Hospital Research Institute, Vancouver, Canada

**SO.1.01 - Latest findings in Epidemiology and COVID-related studies, UKK - Main Hall (Level 6), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** G. Children and families

**Background:** Parents play a critical role in supporting many aspects of children's behaviours including their engagement in physical activity (PA). Their parenting practices may change as children age and become more independent. Moreover, evidence suggests the pandemic decreased the PA level among children, but familial influences during the pandemic remain unknown.

**Purpose:** This paper examined longitudinally whether child engagement in PA during the transition into secondary school is influenced by PA parenting practices in elementary school or by the change in PA parenting practices that occurs with the transition to secondary school. These associations were examined in a pre-pandemic and a pandemic cohort.

**Methods:** In total, 689 parent-child dyads ([parent age=46.0(5.4) & 79% mothers; child age=12.9(0.3) & 54% female] from British Columbia, Canada, completed questionnaires when children were in elementary school (grade 7) and in secondary school (grade 8). The pre-pandemic cohort (43% of the sample) had all their data collected before the pandemic, and the pandemic cohort had all their data collected during the pandemic. At both time points, parents and children self-reported their PA parenting practices and PA, respectively and 57% of children wore AX3 accelerometers for 1 week to measure their involvement in moderate-vigorous PA (MVPA). Linear regressions were used to address the main study question.

**Results:** Overall, PA significantly decreased when children transitioned to secondary school but the level of PA (measured with self-report and accelerometry) did not differ between the pandemic and pre-pandemic samples. Positive PA parenting practices were significantly associated with higher levels of PA in elementary and secondary schools. In addition, an increase in positive PA parenting practices during the transition was associated with more involvement in PA in secondary school in both samples. These effects were mainly observed with children's self-reported (versus accelerometry) data.

**Conclusions:** This study highlights the role that parents play in supporting PA of children and that parental influence was not altered during the pandemic. However, the steep decline in PA resulting from the transition to secondary school remains a concern as this can set children on a lifelong pattern of inactivity as they grow.



# Children's and Parents' Perspectives of the Impact of the COVID-19 Pandemic on Ontario Children's Physical Activity, Play, and Sport Behaviours

**Ms. Monika Szpunar**<sup>1</sup>, Dr. Leigh Vanderloo<sup>2,3</sup>, Dr. Brianne Bruijns<sup>3</sup>, Dr. Stephanie Truelove<sup>4</sup>, Dr. Shauna Burke<sup>5,6</sup>, Dr. Jason Gilliland<sup>5,6,7,8,9</sup>, Dr. Jennifer Irwin<sup>5</sup>, Dr. Patricia Tucker<sup>3,5,6</sup>

<sup>1</sup>Health and Rehabilitation Sciences, University of Western Ontario, London, Canada, <sup>2</sup>ParticipACTION, Toronto, Canada, <sup>3</sup>School of Occupational Therapy, University of Western Ontario, London, Canada, <sup>4</sup>Member Interest Groups Section, Professional Development and Practice Support, College of Family Physicians of Canada, Mississauga, Canada, <sup>5</sup>School of Health Studies, Faculty of Health Sciences, University of Western Ontario, London, Canada, <sup>6</sup>Children's Health Research Institute, Lawson Health Research Institute, London, Canada, <sup>7</sup>Department of Geography and Environment, University of Western Ontario, London, Canada, <sup>8</sup>Department of Pediatrics, University of Western Ontario, London, Canada, <sup>9</sup>Department of Epidemiology & Biostatistics, University of Western Ontario, London, Canada

**SO.1.01 - Latest findings in Epidemiology and COVID-related studies, UKK - Main Hall (Level 6), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** The COVID-19 pandemic and associated public health measures have had an impact on children's health behaviours, including opportunities for physical activity and play/sport. This study examined parents' and children's perspectives of the impact of COVID-19 on children's physical activity behaviours, return to play/sport, as well as barriers/facilitators to re-engaging in physical activity.

**Methods:** Parents of children (0-12 years) living in Ontario, Canada were invited to participate in online interviews. Twelve parent and 9 child interviews were conducted via Zoom between December 2020 and January 2021, were digitally recorded, and transcribed verbatim. Deductive and inductive thematic content analysis using NVivo was undertaken to identify pronounced themes.

**Results:** Three pronounced themes emerged from the parent and child interviews: 1) barriers and facilitators for getting children active amid COVID-19 restrictions; 2) changes in children's physical activity levels; and 3) perspectives on return to play/sport during and post-pandemic. Various subthemes were identified, which varied between parents and children. The most common facilitator for promoting children's activity voiced by parents was getting active outdoors, while screen-time was often mentioned as a prominent barrier. Parents noted their willingness to have their children return to play/sport in the community once deemed safe by public health officials, and children's willingness to return stemmed primarily from missing their friends and other important authority figures (e.g., coaches, recreation staff) and sporting events (e.g., tournaments, club meets). Finally, children who returned to sport/play reported having no issues with following health protocols (e.g., masking).

**Conclusions:** Findings from this study could inform families of pragmatic strategies for increasing children's physical activity during community closures. Results could also provide public health experts with information regarding which supports, or infrastructure changes may be required during future lockdown periods and/or pandemics to support active behaviours among pediatric populations



# Longitudinal trends in movement behaviors among Singaporean children aged, 5.5, 8, and 10 years old

Ms. Claire Marie Jie Lin Goh<sup>1</sup>, Ms. Natarajan Padmapriya<sup>1,2</sup>, Prof. Lynette Pei Chi Shek<sup>3,4,5</sup>, Prof. Yap Seng Chong<sup>2,3</sup>, Prof. Kok Hian Tan<sup>6,7</sup>, Associate Professor Shiao-Yng Chan<sup>2,3</sup>, Dr. Fabian Yap<sup>6,7,8</sup>, Prof. Keith M. Godfrey<sup>9,10</sup>, Prof. Yung Seng Lee<sup>3,4,5</sup>, Prof. Johan G. Eriksson<sup>2,3,11</sup>, Dr. Jonathan Y. Bernard<sup>3,12</sup>, **Dr. Falk Müller-Riemenschneider<sup>1,13</sup>**

<sup>1</sup>Saw Swee Hock School of Public Health, National University of Singapore, Singapore, Singapore,

<sup>2</sup>Department of Obstetrics & Gynaecology and Human Potential Translational Research Programme, Yong Loo Lin School of Medicine, National University of Singapore, Singapore, Singapore, <sup>3</sup>Singapore Institute for Clinical Sciences, Agency for Science, Technology and Research (A\*STAR), Singapore, Singapore,

<sup>4</sup>Department of Paediatrics, Yong Loo Lin School of Medicine, National University of Singapore, Singapore, Singapore, <sup>5</sup>Khoo Teck Puat-National University Children's Medical Institute, National University Health System, Singapore, Singapore, <sup>6</sup>Division of Medicine, KK Women's and Children's Hospital, Singapore, Singapore, <sup>7</sup>Duke-National University of Singapore, Singapore, Singapore, <sup>8</sup>Lee Kong Chian School of Medicine, Nanyang Technological University, Singapore, Singapore, <sup>9</sup>Medical Research Council Lifecourse Epidemiology Centre, University of Southampton, Southampton, United Kingdom, <sup>10</sup>NIHR Southampton Biomedical Research Centre, University of Southampton and University Hospital Southampton NHS Foundation Trust, Southampton, United Kingdom, <sup>11</sup>Department of General Practice and Primary Health Care, University of Helsinki and Folkhälsan Research Center, Helsinki, Finland, <sup>12</sup>Université Paris Cité, Centre for Research in Epidemiology and Statistics (CRESS), Inserm, Inrae, F-75004 Paris, France, <sup>13</sup>Berlin Institute of Health, Charité University Medical Centre, Berlin, Germany

**SO.1.01 - Latest findings in Epidemiology and COVID-related studies, UKK - Main Hall (Level 6), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Engaging in moderate-to-vigorous physical activity (MVPA), adequate sleep and limiting screen viewing (SV) are important for children's health and development. We aimed to describe the trends in the 24-hour movement behaviors in Singaporean children from age 5.5 to 10 years.

**Methods:** Children from the Growing Up in Singapore Towards healthy Outcomes (GUSTO) cohort were asked to wear an accelerometer (Actigraph-GT3X+) for seven consecutive days to measure their movement behaviors at ages 5.5, 8, and 10 years. Mean time spent in MVPA and sleep were estimated using the R-Package GGIR 2.0. SV time was reported by parents/caregivers at the same timepoints. Adherence to the guidelines was defined as  $\geq 60$  min of MVPA/day,  $\leq 2$  h of screen time/day, and 9–11 h of sleep/night.

**Results/findings:** 321 children with valid accelerometer and questionnaire data at 5.5, 8, and 10 years engaged on average in 72.2 ( $\pm 23.9$ ), 71.3 ( $\pm 28.8$ ) and 50.5 ( $\pm 24.8$ ) minutes of MVPA, 543.2 ( $\pm 40.8$ ), 525.8 ( $\pm 44.0$ ), 516.2 ( $\pm 51.8$ ) minutes of sleep, and 110.6 ( $\pm 97.5$ ), 174.21 ( $\pm 128.9$ ) and 253.7 ( $\pm 139.4$ ) minutes of SV per day, respectively. The proportion of children meeting guidelines decreased as children grew older for MVPA (age 5.5: 70.4%, age 8: 61.1%, age 10: 28.66%), sleep (age 5.5: 52.7%, age 8: 36.8%, age 10: 26.8%) and SV (age 5.5: 64.8%, age 8: 40.8%, age 10: 14.6%). The proportions of children meeting all guidelines at ages 5.5, 8 and 10 were 26.2%, 6.2% and 2.8% respectively.

**Conclusions:** Worrying trends in movement behaviors were observed as the children grew older, with fewer adhering to the 24-hour movement guidelines. The decline was particularly pronounced between age 8 and 10. Developing and implementing evidence-based interventions to promote children's health and development is a key public health challenge.

# Physical activity, sedentary behaviour, sleep sufficiency and health-related quality of life among primary school children in regional Victoria, Australia, pre- and post-COVID-19 restrictions (2019-2022)

**Dr. Michelle Jackson<sup>1</sup>**, Ms. Denise Becker<sup>2</sup>, Dr. Josh Hayward<sup>1</sup>, Ms. Monique Hillenaar<sup>1</sup>, Mr. Andrew Brown<sup>1</sup>, Dr. Victoria Brown<sup>1</sup>, Prof. Colin Bell<sup>1</sup>, Prof. Liliana Orellana<sup>2</sup>, Dr. Jill Whelan<sup>1</sup>, Dr. Lena D Stephens<sup>1</sup>, Ms. Hayley Jensen<sup>1</sup>, Ms. Isobel Gribben<sup>3</sup>, Prof. Steven Allender<sup>1</sup>, Dr. Claudia Strugnell<sup>1</sup>

<sup>1</sup>Deakin University - Global Centre for Preventative Health and Nutrition, Geelong, Australia, <sup>2</sup>Deakin University - Biostatistics Unit, Melbourne, Australia, <sup>3</sup>Department of Rural Health - University of Melbourne, Shepparton, Australia

**SO.1.01 - Latest findings in Epidemiology and COVID-related studies, UKK - Main Hall (Level 6), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** This study aimed to examine changes over time on weight status and associated health behaviours of Australian primary school-aged children living in North-East Victoria involved in a community-based systems intervention. During Victorian COVID-19 pandemic restrictions, residents could only leave home for essential reasons including, among others, exercise ( $\leq 2$  hrs/day within 5km of home), work/education, and for vaccinations. While the intervention was disrupted due to COVID-19, there is opportunity to examine health measures measured pre- and post-COVID-19 restrictions (2019 and 2022), including self-reported physical activity (PA), sedentary behaviour (SB), sleep behaviours, health-related quality of life (HRQoL) and objectively measured obesity prevalence.

**Methods:** This is a secondary analysis of data collected from RESPOND (Reflexive Evidence and Systems Interventions to Prevent Obesity and Non-Communicable Disease), a cluster-randomised trial. Primary schools across the Goulburn Valley and Ovens Murray regions participated between April-June 2019 (n=91/162 schools, n=3702 students) and April-August 2022 (n=54/161 schools, n=1694 students). Participant students in grades 2, 4 and 6 (aged 7-12y) were invited to have their height and weight measured; grade 4 and 6 students completed an online self-report health behaviours questionnaire. Mixed logistic or linear models with school as random effect and controlling for intervention, gender, grade, and socioeconomic status, were fitted to estimate changes between 2019 and 2022 in: prevalence of overweight and obesity (WHO), adherence to PA (>60min moderate-to-vigorous PA/day), SB (<2hr screen-time for recreation/day), and sleep duration (9-11hrs/night) recommendations and self-rated HRQoL.

**Results:** Preliminary adjusted results showed no evidence of change in the prevalence of combined overweight and obesity between 2019 (35.9%) and 2022 (37.6%); (change=1.7 percentage points; 95%CI:-1.3, 4.6; p=0.28). Adherence to moderate-to-vigorous PA recommendation significantly decreased between 2019 (23.2%) and 2022 (15.4%); (change=-7.8 percentage points; 95%CI:-10.7, -4.9; p<0.01). Similarly, adherence to sedentary screen-time recommendations decreased between 2019 (54.8%) and 2022 (46.5%); (change=-8.3 percentage points; 95%CI:-12.1, -4.5; p<0.01). Global HRQoL scores were statistically, and clinically, significantly lower in 2022 than in 2019 ( $\beta$ =-4.77, 95%CI:-5.90,-3.64).

**Conclusions:** Health behaviours and HRQoL significantly deteriorated in this population of Australian children between 2019-2022 with the COVID-19 pandemic response being one of the main factors that could explain these results.

# Has COVID-19 led to changes in physical activity patterns, screen time and sleep among Swedish adolescents? - A cohort study

**Dr. Björg Helgadóttir**<sup>1,2</sup>, Associate Professor Andreas Fröberg<sup>3</sup>, Ms. Karin Kjellenberg<sup>1</sup>, Prof. Örjan Ekblom<sup>1</sup>, Associate Professor Gisela Nyberg<sup>1,2</sup>

<sup>1</sup>Swedish School of Sport and Health Sciences, Stockholm, Sweden, <sup>2</sup>Karolinska Institutet, Stockholm, Sweden, <sup>3</sup>University of Gothenburg, Gothenburg, Sweden

**SO.1.01 - Latest findings in Epidemiology and COVID-related studies, UKK - Main Hall (Level 6), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** The COVID-19 pandemic has had an impact on daily life around the world though in Sweden the restrictions have been rather mild. The aim is to explore whether the pandemic has led to changes in physical activity (PA) patterns, including sedentary time, Light Physical Activity (LiPA) and Moderate-to-Vigorous-Physical Activity (MVPA) during weekdays and weekends, as well as screen time and sleep. The potential predictors explored include gender, parental education, anthropometrics, and cardiovascular fitness (CVF).

**Methods:** Data were collected in the fall of 2019 and the spring of 2021. The participants were 13-14 years-old at baseline and lived in the Stockholm area. In total 585 participated at both baseline and follow-up. PA and sedentary time were measured with accelerometers and sleep and screen time with questionnaires at baseline and follow-up. The exposure variables were collected at baseline: gender and parental education via questionnaire, anthropometrics (BMI and body fat percentage measured with standard methods by researchers) and CVF with a submaximal test. Multilevel linear regression analyses were performed.

**Results:** MVPA remained unchanged while LiPA decreased by 25.5 minutes on weekdays and 10.3 minutes on weekends (both  $p < 0.001$ ) and sedentary time increased by 9.4 minutes on weekdays ( $p = 0.023$ ). Sleep duration decreased by 27.4 minutes on weekdays and 19.1 minutes on weekends (both  $p < 0.001$ ) and screen time increased by around 45 minutes both on weekdays and weekends ( $p < 0.001$ ). Girls, adolescents with overweight/obesity (BMI and percent body fat), and those with lower CVF at baseline had less favourable changes in PA patterns, sleep and screen time.

**Conclusions:** Previous self-reported data seems to suggest a decrease in physical activity due to the pandemic; this study only found such changes to be present in the lower intensity levels of physical activity but not in the MVPA. It is possible that more strenuous physical activity is more often part of organized sport which seems to have prevailed in Sweden despite the pandemic while habitual less intense activity decreased. Some groups were found to be more vulnerable and might need more support to maintain their physical activity levels, both now in the post-pandemic periods and during future pandemics.

# The relationship between home environment factors and paternal snack and food parenting practices during the COVID-19 pandemic

**Dr. Elena Jansen<sup>1</sup>**, Dr. Susan Carnell<sup>1</sup>

<sup>1</sup>Johns Hopkins School of Medicine, Baltimore, USA

SO.1.01 - Latest findings in Epidemiology and COVID-related studies, UKK - Main Hall (Level 6), June 15, 2023, 12:00 PM - 1:15 PM

**SIG - Primary Choice:** G. Children and families

**Purpose:** The role of fathers in child feeding interactions is not well understood. While parents do not act in isolation from environmental contexts, it is currently unclear how home environment factors relate to how fathers feed their young children, particularly during the COVID-19 pandemic where more parents and children stayed at home and thus shared more meal occasions together.

**Methods:** In August 2021, fathers of 2-12-year-old children (n=60) completed a survey investigating reported changes in food parenting practices and associated factors in comparison to a survey completed earlier during the pandemic. Associations between home environment factors (i.e., household chaos, family dysfunction, marital conflict, parental burnout, parenting stress, social support) and both snack-specific and general food parenting practices, including structure-related practices, were examined.

**Results/findings:** For snack parenting, challenges within the home (family dysfunction, chaos, parental burnout, parenting stress) were mainly associated with less monitoring of healthy snacks while social support was associated with more monitoring. For food parenting, challenges (chaos, marital conflict, parental burnout) were similarly associated with more non-responsive practices such as using food to manage emotions and behaviors, while social support was associated with lower levels of these practices. Only family dysfunction and household chaos were related to lower implementation of structure-related snack and food parenting practices such as using snack rules and limits or structuring the meal setting and timing, while social support fostered the implementation of structure.

**Conclusion:** Home environment factors appear to be related to fathers' general food parenting and snack-specific parenting practices, potentially due to their impact on the capacity and energy that fathers can bring to mealtime interactions. Social support, either from within or outside the family, could function as a buffer preventing home environment challenges from translating into non-responsive practices that could promote unhealthy eating behaviors and growth in children.

# Results from the Ireland North and South Report Card on Physical Activity for Children and Adolescents

**Dr. Angela Carlin**<sup>1</sup>, Ms. Sinead Connolly<sup>1</sup>, Dr. Tamsyn Redpath<sup>1</sup>, Dr. Sarahjane Belton<sup>2</sup>, Dr. Tara Coppinger<sup>3</sup>, Dr. Conor Cunningham<sup>4</sup>, Prof. Alan Donnelly<sup>5</sup>, Dr. Kieran Dowd<sup>6</sup>, Dr. Deirdre Harrington<sup>7</sup>, Dr. Helen McEvoy<sup>4</sup>, Dr. Elaine Murtagh<sup>5</sup>, Dr. Kwok Ng<sup>5,8</sup>, Ms. Lauren Rodriguez<sup>4</sup>, Prof. Catherine Woods<sup>5</sup>, Prof. Marie Murphy<sup>1</sup>

<sup>1</sup>Centre for Exercise Medicine, Physical Activity and Health, Sports and Exercise Sciences Research Institute, Ulster University, Derry, United Kingdom, <sup>2</sup>School of Health and Human Performance, Dublin City University, Dublin, Ireland, <sup>3</sup>Department of Sport, Leisure & Childhood Studies, Faculty of Business & Humanities, Munster Technological University, Cork, Ireland, <sup>4</sup>Institute of Public Health in Ireland, Dublin, Ireland, <sup>5</sup>Department of Physical Education & Sport Sciences, Health Research Institute, University of Limerick, Limerick, Ireland, <sup>6</sup>Department of Sport and Health Sciences, Athlone Campus, TUS Midlands Midwest, Athlone, Ireland, <sup>7</sup>Psychological Sciences and Health, University of Strathclyde, Glasgow, United Kingdom, <sup>8</sup>School of Educational Sciences and Psychology, University of Eastern Finland, Joensuu, Finland, <sup>9</sup>School of Education, Sports Studies and Physical Education Programme, University College Cork, Cork, Ireland

**SO.1.01 - Latest findings in Epidemiology and COVID-related studies, UKK - Main Hall (Level 6), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** The Ireland North and South Report Card on Physical Activity (PA) for Children and Adolescents is produced as part of the Active Healthy Kids Global Alliance (AHKGA) and aims to monitor change across a range of PA indicators. The Report Card will provide an update on grades from 2016, and will, for the first time, include an indicator on 'Physical Fitness' and a set of grades specific to children and adolescents with disabilities.

**Methods:** Available data were extracted and collated for each indicator and graded following the harmonised AHKGA Report Card process. Grades were produced for 10 common indicators related to PA and sedentary behaviour. Indicators were awarded a grade A-F (including '+' or '-') or 'Incomplete' (INC). A separate set of grades were produced for children and adolescents with disabilities.

**Results:** Overall, 5 grades stayed the same, 2 increased, and 2 indicators ('Family and Peers,' and 'Government') were awarded grades for the first time, previously graded as incomplete (INC). 'Physical fitness' was included for the first time, but graded as INC. Grades were assigned as follows: 'Overall physical activity', C- (increase); 'Organised Sport and Physical Activity', C; 'Active Play', INC; 'Sedentary Behaviours', C-; 'Physical Fitness', INC; 'Family and Peers', D+; 'School', C- (increase); 'Community and Environment', B+ and 'Government', B. Separate grades were awarded for disability as follows; 'Overall physical activity', F; 'Organised Sport and Physical Activity', D; 'Sedentary Behaviours', C-; 'Family and Peers', C; 'School', C- and 'Government', B. 'Active Play', 'Physical Fitness' and 'Community and Environment' were all graded INC.

**Conclusions:** Positive trends were observed across several indicators, with grades for 'Overall physical activity', and 'School' increasing. Grades specific to children and adolescents with disability were generally lower for each indicator, with <20% of children and adolescents meeting the benchmark for 'Overall PA'. Findings have indicated there is a need to prioritise research specifically designed to measure levels of activity in children and adolescents with disabilities. Data obtained since the implementation of COVID-19 public health measures were not included, therefore future report cards will consider the impact of the pandemic on PA for children and adolescents



# The NOURISHING and MOVING policy indexes: assessing nutrition and physical activity policy areas in 27 European countries

**Dr. Ioana Vlad**<sup>1</sup>, Miss Jennifer O'Mara<sup>1</sup>, Mrs. Kate Oldridge-Turner<sup>1</sup>, Dr. Arnfinn Helleve<sup>2</sup>, Dr. Janetta Harbron<sup>3</sup>, Dr. Knut-Inge Klepp<sup>2</sup>, Dr. Kate Allen<sup>1</sup>

<sup>1</sup>World Cancer Research Fund International, London, United Kingdom, <sup>2</sup>Norwegian Institute for Public Health, Oslo, Norway, <sup>3</sup>University of Cape Town, Cape Town, South Africa

**SO.1.02 - Policies for healthy environments, UKK - Level 6 Foyer, June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Nutrition and physical activity policies play a key role in creating healthier environments where population health is prioritised. This research presents the results of the NOURISHING and MOVING policy indexes, that assess and compare physical activity and nutrition policy areas in 27 European countries.

**Methods:** National-level nutrition and physical activity policy actions in 27 European countries were identified through a comprehensive scan, with a set methodology. The policy actions, which are available online in the NOURISHING and MOVING databases, were benchmarked to assess the strength of policy design, based on evidence-informed and aspirational attributes and the results were presented in a policy index.

**Results:** The NOURISHING and MOVING policy index produced an assessment of nutrition and physical activity policy areas across 27 European countries. No country took a comprehensive approach to diet-related policies, and only about a third of the European countries included had a comprehensive approach to physical activity policies.

In the MOVING policy index, the weakest policy design is seen for policy actions targeting built environment and infrastructure policy. The strongest policy across the 27 European countries was found for policies supporting physical activity in schools and the community.

In the NOURISHING index, key weaknesses are identified across the 27 countries for policy areas related to food taxes and other economic tools to address food affordability and availability as well as policies to ensure coherence between food systems and health, such as nutrition standards for public procurement. In contrast, the strongest policy design is seen in policy areas that aim to inform people about food and nutrition through public awareness.

**Conclusion:** The NOURISHING and MOVING policy indexes show that greater action is needed to implement adequate policies across the 27 European countries. Key gaps on structural policies, such as health-related food taxes, food systems and active environments were identified. The policy indexes also highlight where greater action is needed in each country. Thus, the policy indexes results can be used by policymakers, researchers, and civil society at European or country level to inform advocacy for and design of policies in nutrition and physical activity.



# Supporting Companies to Reform Nutrition Policies and Practices (REFORM): A Multi-centre Cluster Randomised Controlled Trial

**Prof. Cliona Ni Mhurchu**<sup>1</sup>, Dr. Gary Sacks<sup>2</sup>, Ms. Jasmine Chan<sup>2</sup>, Ms. Sally Schultz<sup>2</sup>, Miss Stephanie Shen<sup>1</sup>, Ms. Josephine Marshall<sup>2</sup>, Ms. Jacqui Grey<sup>1</sup>, Dr. Yannan Jiang<sup>1</sup>, Dr. Helen Eyles<sup>1</sup>, Dr. Leanne Young<sup>1</sup>

<sup>1</sup>University of Auckland, Auckland, New Zealand, <sup>2</sup>Deakin University, Melbourne, Australia

**SO.1.02 - Policies for healthy environments, UKK - Level 6 Foyer, June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Unhealthy food environments are major drivers of obesity and diet-related diseases. Improving the healthiness of food environments requires a widespread organised response from governments, civil society, and industry. However, current actions often rely on voluntary participation by industry, such as opt-in nutrition labelling schemes, school/workplace food guidelines, and food reformulation programmes. The aim of the REFORM study is to determine the effects of the provision of tailored support to companies on their nutrition-related policies and practices, compared to food companies that are not offered the programme (the control).

**Methods:** REFORM is a two-country, parallel cluster randomised controlled trial. 150 food companies were randomly assigned (2:1 ratio) to receive either a tailored support intervention programme or no intervention. Randomisation was stratified by country (Australia, New Zealand), industry sector (fast food, other packaged food/beverage companies), and company size. The primary outcome is the nutrient profile measured using the Health Star Rating (HSR) of foods and drinks produced by participating companies at 24 months post-baseline. Secondary outcomes include company nutrition policies and commitments, the nutrient content (sodium, sugar, saturated fat) of products produced by participating companies, display of HSR labels, and engagement with the intervention.

**Results:** 82/132 eligible intervention companies were invited to take part in the REFORM programme and 21 (25.6%) accepted and were enrolled. Over 100 meetings were held with company representatives between September 2021 and December 2022. Resources and tailored reports were developed for 6 touchpoints covering product composition and benchmarking, nutrition labelling, consumer insights, nutrition policies, and incentives for companies to act on nutrition. Detailed information on programme resources and preliminary 12-month findings will be presented at the conference.

**Conclusion:** The REFORM programme will assess if provision of tailored support to companies on their nutrition-related policies and practices incentivises the food industry to improve their nutrition policies and actions.

# Food and drink availability in New Zealand hospitals 2021/22: Alignment with a voluntary National Healthy Food and Drink Policy

**Prof. Cliona Ni Mhurchu**<sup>1</sup>, Miss Stephanie Shen<sup>1</sup>, Mr. Bruce Kidd<sup>1</sup>, Dr. Yannan Jiang<sup>1</sup>, Mrs. Elaine Umali<sup>1</sup>, Dr. Sarah Gerritsen<sup>1</sup>, Dr. Sally Mackay<sup>1</sup>, Associate Professor Lisa Te Morenga<sup>2</sup>, Miss Magda Rosin<sup>1</sup>

<sup>1</sup>University of Auckland, Auckland, New Zealand, <sup>2</sup>Massey University, Wellington, New Zealand

**SO.1.02 - Policies for healthy environments, UKK - Level 6 Foyer, June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Unhealthy food environments are major drivers of obesity and diet-related diseases. Improving the healthiness of food environments requires a widespread organised response from governments, civil society, and industry. However, current policies and programmes are often voluntary, such as opt-in healthy food guidelines for schools or hospitals. The aim of the HYPE study was to assess the implementation and impact of the National Healthy Food and Drink Policy (the Policy), a voluntary Policy introduced in 2016 that supports and encourages provision of healthier food and drink options in New Zealand hospitals and public sector organisations.

**Methods:** Comprehensive audits of food and beverage availability were undertaken between March 2021 and June 2022 across New Zealand. In total, 39 hospital sites/organisations were audited, comprising 230 retail settings (staff canteens, shops, vending machines etc.). Information was collected for >8500 foods and drinks available across all sites and settings. The primary outcome was alignment of on-site food availability with the Policy guidelines ( $\geq 55\%$  green category items,  $\leq 45\%$  amber category items, and 0% red category items). Secondary outcomes were proportions of green, amber, and red category items; average nutrient profile (Health Star Rating) of foods and drinks available, food marketing and promotion practices, and average price of food/drink items.

**Results:** Across all sites audited, 39.6% of food/drink items were rated red, 38.7% amber, and 22.7% green. No organisation met the Policy target of 0% red items, with the prevalence of red food/drinks ranging from 24% to 65%. Organisations that reported adopting the Policy ( $n=8$ ) did better than those who did not ( $n=12$ ), but 33% of foods and drinks available at those sites were still rated red (versus 48% at sites with their own policies). Drink only vending machines had the least red items (13.5%) compared with other retail settings (27% in sushi outlets to 91% in on-site fundraisers)

**Conclusion:** A voluntary National Healthy Food and Drink Policy was not effective in ensuring provision of healthier food and drink options in New Zealand hospitals and public sector organisations. A uniform mandatory national policy should be implemented.

# Policy evaluation on the whole-of-school investment in physical activity promotion in Thailand

**Miss Nattaporn Nilwatta**<sup>1,2</sup>, Dr. Dyah Anantalia Widyastari<sup>1,2</sup>, Associate Professor Piyawat Katewongsa<sup>1,2</sup>

<sup>1</sup>Institute for Population and Social Research , Mahidol University, Salaya, Phutthamothon, Nakhon Pathom , Thailand, <sup>2</sup>Thailand Physical Activity Knowledge Development Centre (TPAK), Nakhon Pathom, Thailand

**SO.1.02 - Policies for healthy environments, UKK - Level 6 Foyer, June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Whole-of-school (WoS) has been widely acknowledged as one of the policies/investments that are effective in increasing physical activity (PA) of children. However, evidence is lacking on how this investment may or may not actually be implemented and benefit the population. This study aims to evaluate the WoS policy in terms of its availability, implementation and public participation.

**Methods:** Desk review was employed to evaluate policy availability. We scored the policy documents using the Comprehensive Analysis of Policy on Physical Activity (CAPPA) framework in terms of the stage of policy cycle, policy sector, type of policy and policy level - whether its covered international, national, subnational, regional or institutional/local. Data for evaluating policy implementation and public participation was driven from Thailand Report Card Survey 2021. A total of 5,460 national representative samples of children and youth aged 5-17 years were included in the analysis. Policy implementation and public participation was assessed from the students' perception and those who reported participated in the WoS program.

**Results:** From the CAPPA policy evaluation framework, WoS policy scored 73.5% for its availability, which means, there have been adequate amounts of policies/programs, available either in national or community level, in various policy stages (agenda setting, formulation, endorsement/ legitimization, implementation, evaluation, maintenance or termination), and in any forms (formal written, unwritten). However, only 11.6% of the beneficiaries reported to have access to the WoS, and 26.9% participated in the programs. Girls (OR 0.670, p-value 0.000) and older adolescents in secondary schools (OR 0.654, p-value 0.000) are less likely to participate in the WoS programs compared to boys and primary school students. Students who resided in the rural areas participated more than their urban counterparts (32.1% vs 24.1), and students who lived in Bangkok and the Central region reported to have the least access to the WoS policy.

**Conclusions:** The gaps in the implementation and participation indicate there is an inequality of access to the WoS investments. To have impact at the population level, the WoS program must be widespread and sustained until daily MVPA becomes an ingrained habit of the students and, hopefully, a social norm.

# The association between unhealthy dietary behaviors and SNAP (Supplemental Nutrition Assistance Program) participation: A test of the self-selection hypothesis

Dr. Francesco Acciai<sup>1</sup>, Ms. Sarah Uehara<sup>1</sup>, Dr. Punam Ohri-Vachapsati<sup>1</sup>

<sup>1</sup>Arizona State University, Phoenix, USA

SO.1.02 - Policies for healthy environments, UKK - Level 6 Foyer, June 15, 2023, 12:00 PM - 1:15 PM

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** SNAP participants typically have worse dietary behaviors compared to eligible non-participants. It has been conjectured that individuals who enroll in (i.e., self-select into) SNAP may already have unhealthier diets prior to program participation. We examined the association between adults' SNAP participation status and prior dietary behaviors to empirically test the argument of selection of unhealthy individuals into SNAP.

**Methods:** A sample of households from lower-income cities in the U.S. were surveyed at baseline (T1) and at follow-up (T2), on average 3 years later. Analyses were restricted to households (n=170) that did not participate in SNAP at T1 and that had an income < 200% of the federal poverty line at both time points. Respondents were adults responsible for household food shopping and were grouped into two categories based on their household's SNAP participation at T2: Never participants (n=132) and T2 participants (n=38). Respondents self-reported their daily consumption frequency of whole fruits, fruit juice, vegetables, sugar-sweetened beverages (SSBs), and energy dense snacks. To observe dietary differences prior to SNAP participation, T1 dietary behaviors of the two groups were compared via a series of multivariable negative binomial models—one for each of the food groups examined—that controlled for relevant individual and family level variables.

**Findings:** Results from the regression analysis show that there were no differences ( $p>0.05$ ) in consumption at T1 between the never participants and the T2 participants; in fact, the two groups reported very similar consumption frequencies at T1 for all five dietary measures.

**Conclusions:** The longitudinal cohort design of the current study provided a unique opportunity to compare dietary behaviors of low-income individuals before some of them self-selected into SNAP. This study found no empirical evidence to support the hypothesis that individuals with pre-existing unhealthier behaviors are more likely to participate in SNAP. While these null findings do not rule the possibility of self-selection into the program, it is highly likely that explanations for the unhealthier dietary patterns of SNAP participants lie elsewhere. To help improve dietary behaviors of SNAP participants, future policies and research should examine the impact of restricting unhealthy food and beverage purchases using SNAP benefits.

# UK Government's new placement legislation is a “good first step”: A rapid qualitative analysis of consumer, business, enforcement and health stakeholder perspectives

**Prof. Christina Vogel**<sup>1,2</sup>, Mrs. Preeti Dhuria<sup>2</sup>, Prof. Emma Roe<sup>2</sup>, Dr. Wendy Lawrence<sup>2</sup>, Prof. Janis Baird<sup>2</sup>, Dr. Sarah Muir<sup>2</sup>

<sup>1</sup>City, University of London, London, United Kingdom, <sup>2</sup>University of Southampton, Southampton, United Kingdom

**SO.1.02 - Policies for healthy environments, UKK - Level 6 Foyer, June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** The current food system in England promotes a population diet that is high in fat, sugar and salt (HFSS). To address this, the UK government will implement legislation to restrict the promotion of HFSS products in prominent locations (e.g., store entrances, checkouts) in qualifying retailers from October 2022. This study investigated the perceived impact of the legislation for affected stakeholders.

**Methods:** A pre-implementation rapid qualitative evaluation of stakeholder interviews. 108 UK stakeholders participated in the study including 34 consumers, 24 manufacturers and retailers, 22 local authority enforcement officers, and 28 academic and charitable health representatives. A participatory conference was used to enable policy recommendations to be confirmed by stakeholders.

**Results:** Stakeholders perceived the legislation to be a “good first step” towards improving population diet but recognised this needed to be considered amongst a range of long-term obesity policies. Areas of further support were identified and these are presented as six recommendations for government to support successful implementation of the legislation: 1) provide a free central HFSS calculator, 2) refine legislation to enhance intent and clarity, 3) conduct a robust evaluation to assess intended and unintended outcomes, 4) provide greater support for smaller businesses, 5) provide ring-fenced resources to local authorities, and 6) create and communicate a long-term roadmap for food and health.

**Conclusions:** This legislation has potential to reduce impulse HFSS purchases and makes a solid start towards creating healthier retail outlets for consumers. Immediate government actions to create a freely accessible HFSS calculator, support smaller businesses and provide additional resources to local authorities would support successful implementation and enforcement. Independent evaluation of the implementation of the legislation will enable monitoring of potential unintended consequences identified in this study and support refinement of the legislation. A long-term roadmap is necessary to outline strategies to support equal access to healthier and sustainable food across the whole food-system within the next 20-30 years.

# Obesogenic environment and the prevalence of cardiovascular disease risk factors in the Netherlands: A pooled analysis of 5 cohort studies.

**Mr. Paul Meijer**<sup>1,2</sup>, Mrs. Thao Lam<sup>1,2,3,4</sup>, Associate Professor Ilonca Vaartjes<sup>1</sup>, Prof. Joline Beulens<sup>1,3,4</sup>, Prof. Diederick Grobbee<sup>1</sup>, Prof. Eric Moll van Charante<sup>4,5</sup>, Dr. Henrike Galenkamp<sup>4,5</sup>, Associate Prof. Annemarie Koster<sup>6</sup>, Dr. Katja van den Hurk<sup>7</sup>, Dr. Femke Rutters<sup>3,4</sup>, Dr. Trynke de Jong<sup>8</sup>, Dr. Jeroen Lakerveld<sup>2,3,4</sup>

<sup>1</sup>Julius Center for Health Sciences and Primary Care, University Medical Center Utrecht, Utrecht, Netherlands,

<sup>2</sup>Upstream Team, Amsterdam UMC, VU University Amsterdam, Amsterdam, Netherlands, <sup>3</sup>Amsterdam

University Medical Centers location Vrije Universiteit, Epidemiology and Data Science, Amsterdam,

Netherlands, <sup>4</sup>Amsterdam Public Health, Health Behaviours and Chronic Diseases, Amsterdam, Netherlands,

<sup>5</sup>Amsterdam University Medical Centers location University of Amsterdam, Public and Occupational Health,

Amsterdam, Netherlands, <sup>6</sup>Department of Social Medicine, CAPHRI Care and Public Health Research

Institute, Maastricht University, Maastricht, Netherlands, <sup>7</sup>Department of Donor Studies, Sanquin Research,

Amsterdam, Netherlands, <sup>8</sup>Lifelines Cohort and Biobank Study, Roden, Netherlands

**SO.1.03 - Hot topics on metabolic health, UKK - Hall B (Level 3), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** To examine the combined effect of obesogenic neighbourhood characteristics on the prevalence of hypertension and dyslipidaemia in Dutch adults.

**Methods:** Observational cross-sectional design using baseline data from five Dutch cohort studies: Donor InSight (DIS-III), Healthy Live in an Urban Setting, Lifelines, New Hoorn Study, and The Maastricht Study (n total = 183,871). The Obesogenic Built-environmental Characteristics (OBCT) index was calculated for 1000m circular buffers around participants' home addresses. Components of the index included: healthiness of the food environment, walkability, driveability, and sports facilities. Componential z-scores were averaged, and rescaled between 0 (leptogenic) and 100 (obesogenic). In each cohort, standardized blood pressure measurements were conducted and venous blood samples were collected. Prevalence of hypertension and dyslipidaemia was determined by guideline-based classification, reported diagnosis, or medication use. Furthermore, continuous measures of systolic blood pressure in mmHg and LDL-cholesterol in mmol/L were analysed. Poisson regression models were adjusted for age, sex and education level. Linear regression models were additionally adjusted for blood pressure lowering and lipid lowering medication use. Cohort-specific estimates were pooled using random-effects meta-analyses.

**Results:** Median age varied from 44.0 to 61.0 across cohorts. The percentage of female sex varied from 49.6% to 58.5%, high level of education from 25.6% to 37.1%, and percentage of overweight/obese from 46.0% to 64.5%. The preliminary pooled analysis results show that a 10% increase in OBCT index score was significantly associated with a higher prevalence of hypertension (Prevalence ratio (PR): 1.03; 95% CI: 1.01 to 1.05), but not with dyslipidaemia (PR: 1.00; 95% CI: 0.99 to 1.01). A 10% increase in OBCT index score also showed a non-significant association with higher levels of systolic blood pressure ( $\beta$ : 0.24; 95% CI: -0.08 to 0.57), but no association was observed for LDL-cholesterol ( $\beta$ : 0.01; 95% CI: 0.00 to 0.01). Sensitivity analyses showed that a change in buffer size to 500m or 3000m produced similar results.

**Conclusions:** This large-scale pooled analysis of five Dutch cohort studies provides evidence that a higher obesogenic score is associated with a higher prevalence of hypertension, but not dyslipidaemia.



# Clinical practice guidelines employing multimodal behavioural, pharmacological, and surgical treatments for the management of overweight and obesity: Where have we come from, and where are we going?

**Dr. Lena D. Stephens<sup>1,2</sup>**, Dr. Cadeyrn J. Gaskin<sup>1,2</sup>, Ms. Kelly Cooper<sup>1</sup>, Prof. Anna Peeters<sup>2</sup>, Prof. Jo Salmon<sup>1</sup>, Prof. Judi Porter<sup>1</sup>

<sup>1</sup>School of Exercise and Nutrition Sciences, Institute for Physical Activity and Nutrition, Deakin University, Burwood, Victoria, Australia, <sup>2</sup>School of Health and Social Development, Institute for Health Transformation, Deakin University, Burwood, Victoria, Australia

**SO.1.03 - Hot topics on metabolic health, UKK - Hall B (Level 3), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** With global obesity rates tripling since 1975, many countries have responded by implementing clinical practice guidelines to support patients, health practitioners, and policy makers in managing overweight and obesity. Guidelines must continue evolving to align with contemporary ideologies and practice. This scoping review identified target populations and modalities included in contemporary guidelines for obesity management.

**Methods:** Four databases (Ovid MEDLINE, Google, Google Scholar, and Guidelines International Network library) and other grey literature were searched to identify guidelines published January 2010-August 2022. Inclusion criteria: overweight and obesity clinical management guidelines employing multimodal treatments (e.g., nutrition, physical activity, sedentary behaviour, sleep, psychology, pharmaceuticals, surgery) in any age group and setting. Exclusion criteria: guidelines only for use by people with overweight or obesity or for the prevention or treatment of obesity-related conditions. Data extracted included citation details, guideline development methodology, target populations, overweight/obesity measures, and treatment modalities and settings.

**Results:** From n=696 records, 47 documents (representing 38 guidelines) were identified. WHO regions represented: Europe (n=13;34%), Americas (n=12;32%), Western Pacific (n=7;18%), Eastern Mediterranean (n=4;11%), and South-East Asia (n=2;5%). Most guidelines were age-based (n=30;79%), with remaining guidelines focused on pregnancy (n=6;16%), midlife women (n=1;3%), and adults with end-stage kidney disease (n=1;3%). The 30 age-based guidelines covered infants (n=9;30%), children (n=17;57%), adolescents (n=18;60%), and adults (n=23;77%). Guidance for specific sub-populations including pregnant women; older adults; Indigenous People; and people with eating disorders, mental disorders, disabilities, or from culturally and linguistically diverse backgrounds was identified. Treatment modalities included nutrition (n=38;100%), physical activity (n=38;100%), behavioural/psychological interventions (n=37;97%), pharmacotherapy (n=32;84%), and bariatric surgery (n=31;82%). Sedentary behaviour (n=24;63%), family-centred interventions (n=16;42%), and sleep (n=13;34%) were included less frequently.

**Conclusions:** Modernising is essential to ensure future guidelines represent the perspectives of people with lived experience of overweight and obesity, and sub-populations (e.g., Indigenous People, people with disabilities, people with mental health disorders, older adults) and reflect scientific advances (e.g., emerging behavioural and pharmacological approaches). In addition to pharmacological and surgical treatments, non-stigmatising and supported multimodal treatments including nutrition, physical activity, psychology, sedentary behaviour, sleep, and family-centred interventions in various settings that health practitioners can feasibly promote and implement are needed.

# A Four-Year Follow-Up of Treatment for Young Children with Obesity: A Randomized Clinical Trial

**Dr. Anna Ek**<sup>1</sup>, Dr. Markus Brissman<sup>1,2</sup>, Mrs. Karin Nordin<sup>1,2</sup>, Dr. Karin Eli<sup>3,4</sup>, Prof. Paulina Nowicka<sup>1,5</sup>

<sup>1</sup>Karolinska Institutet, Stockholm, Sweden, <sup>2</sup>Karolinska University Hospital, Stockholm, Sweden, <sup>3</sup>University of Oxford, Oxford, United Kingdom, <sup>4</sup>University of Warwick, Warwick, United Kingdom, <sup>5</sup>Uppsala University, Uppsala, Sweden

**SO.1.03 - Hot topics on metabolic health, UKK - Hall B (Level 3), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose** To assess change in weight status after 4 years in children who started obesity treatment as 4- to 6-year-olds within a randomized controlled trial (RCT).

**Methods** 177 families recruited from 68 child health care centers to a 12-month RCT, the More and Less (ML) study, were eligible to participate in this 4-year follow-up. The ML study was conducted in Sweden 2012–2017, comparing 3 treatment approaches: a 10-week parent support program (1.5 h/w) with (PGB) or without (PGNB) telephone-based follow-up booster sessions, and standard treatment (ST) in an outpatient pediatric clinic. Treatment effects on primary outcome (BMI-SDS) and secondary outcomes (BMI, %IOTF25 i.e., weight status described as percent above cut-off for overweight) were assessed using linear mixed models. Clinically significant reduction of BMI-SDS ( $\geq 0.5$ ) was assessed with risk ratio. Sociodemographic factors and attendance were examined by three-way interactions.

**Results** 171 families (migrant origin 59%, parental university degree 40%) were included in the intention-to-treat analyses. After 4 years, BMI-SDS was reduced in all groups, PGB -0.45 (95% CI -0.18 to -0.73,  $p < 0.001$ ), PGNB -0.34 (95% CI -0.13 to -0.55,  $p < 0.001$ ), ST -0.25 (95% CI -0.10 to -0.40,  $p < 0.001$ ), with no difference between groups. A clinically significant reduction of BMI-SDS  $\geq 0.5$  was obtained in 36% of the children in PGB and thus, over two times more likely compared to 15% in the ST children, 2.0 (95% CI 1.27 to 3.27)  $p = 0.003$ . In PGNB, 23% of the children reached a clinically significant reduction, however, this was non-significant. Similarly, weight status expressed as %IOTF25 was unchanged for PGB 4.5 (95% CI -1.6 to 10.6), significantly lower compared to ST 11.9 (95% CI 8.4 to 15.4)  $p = 0.043$ . Sociodemographic factors or attendance did not affect change in weight status.

**Conclusion** This is the first RCT to demonstrate that an early obesity intervention is effective over a 4-year period. Support in parenting practices with regular booster sessions was particularly powerful in maintaining healthier weight status. Our findings show that the preschool age provides a critical window to treat childhood obesity.

# The effectiveness of a light-intensity physical activity intervention on cardiovascular health in people with type 2 diabetes: a randomized controlled trial

**Ms. Evelien Vandercappellen**<sup>1,2,3</sup>, Dr. Ronald Henry<sup>1,2,4</sup>, Ms. Yu Fan Chen<sup>1</sup>, Dr. Petra Niessen<sup>1,2</sup>, Dr. Michiel Minten<sup>5</sup>, Dr. Armand Linkens<sup>1,2</sup>, Dr. Pomme Simons<sup>1,2</sup>, Assistant Professor Shahab Jolani<sup>3,6</sup>, Prof. Hans Savelberg<sup>7,8</sup>, Prof. Nicolaas Schaper<sup>1,2,3</sup>, Associate Professor Alfons Houben<sup>1,2</sup>, Dr. Tos Berendschot<sup>9</sup>, Assistant Professor Koen Reesink<sup>2,10</sup>, Prof. Jean Muris<sup>3,11</sup>, Prof. Coen Stehouwer<sup>1,2</sup>, **Associate Professor Annemarie Koster**<sup>3,12</sup>

<sup>1</sup>Department of Internal Medicine, Maastricht University Medical Center+, Maastricht, Netherlands, <sup>2</sup>CARIM School for Cardiovascular Diseases, Maastricht University, Maastricht, Netherlands, <sup>3</sup>CAPHRI Care and Public Health Research Institute, Maastricht University, Maastricht, Netherlands, <sup>4</sup>Heart and Vascular Center, Maastricht University Medical Center+, Maastricht, Netherlands, <sup>5</sup>MEMIC, Maastricht University, Maastricht, Netherlands, <sup>6</sup>Department of Methodology and Statistics, Maastricht University, Maastricht, Netherlands, <sup>7</sup>Department of Nutrition and Movement Science, Maastricht University, Maastricht, Netherlands, <sup>8</sup>NUTRIM School for Nutrition and Translational Research in Metabolism, Maastricht University, Maastricht, Netherlands, <sup>9</sup>Department of Ophthalmology, Maastricht University Medical Center+, Maastricht, Netherlands, <sup>10</sup>Department of Biomedical Engineering, Maastricht University Medical Center+, Maastricht, Netherlands, <sup>11</sup>Department of Family Medicine, Maastricht University, Maastricht, Netherlands, <sup>12</sup>Department of Social Medicine, Maastricht University, Maastricht, Netherlands

**SO.1.03 - Hot topics on metabolic health, UKK - Hall B (Level 3), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose** Individuals with type 2 diabetes have an increased risk to develop cardiovascular diseases, which possibly can be modified by physical activity. It is already known that moderate-to-vigorous and vigorous intensity physical activity can reduce the risk by improvement of the macro- and microvascular function. However, if this is also the case for light intensity physical activity remains unclear. We investigated the effects of increasing light intensity physical activity and reducing sedentary time on vascular stiffness and other markers in individuals with type 2 diabetes.

**Methods** Individuals with type 2 diabetes aged 40-70 years were randomly assigned to a intervention (n=65) or control group (n=67) in the Light intensity Physical Activity Trial (LiPAT). The RCT (single-blind) had 6 months intervention and 6 months follow-up. The intervention group received a wrist-worn activity tracker and a custom-made application on their phone with a personal goal (steps/day) to motivate them to perform more light intensity physical activity and less sedentary time and received tips during the workshops. Both groups got workshops (topics: healthy lifestyle) in month 1, 2, 3, and 6. Study measurements took place at baseline, 3, 6, and 12 months. Outcome measures included macro- and microvascular function, physical activity/function, lipid profile, kidney function, fasting glucose, HbA1c, body composition, depressive symptoms, and quality of life. We used mixed-effects regression analyses with a random intercept model.

**Results** There was no difference in total, light, or moderate-to-vigorous and vigorous intensity physical activity between the control and intervention group at any of the measurement moments. Sedentary time also did not differ between the groups except for a small difference after 12 months. After 6 and 12 months, there was no difference in macrovascular function (primary outcome) nor most of the secondary outcome measures.

**Conclusion** This comprehensive study mostly indicates that modifying physical activity as such appears rather difficult. Even with encouragement and personalized goals, we did not find any difference between the control and intervention group. Possible explanation could be: too complex intervention, compensation behavior after more physical activity, and no supervised physical activity

# Do weekly and seasonal fluctuations in weight vary between weight maintainers, gainers and losers?

**Prof. Carol Maher**<sup>1</sup>, Dr. Rachel Curtis<sup>1</sup>, Prof. Tim Olds<sup>1</sup>, Dr. Dot Dumuid<sup>1</sup>, Dr. Francois Frayssé<sup>1</sup>, Dr. Gilly Hendrie<sup>2</sup>, Dr. Adrian Esterman<sup>1</sup>, Dr. Ben Singh<sup>1</sup>, Mr. Ty Ferguson<sup>1</sup>

<sup>1</sup>University of South Australia, Adelaide, Australia, <sup>2</sup>CSIRO, Adelaide, Australia

**SO.1.03 - Hot topics on metabolic health, UKK - Hall B (Level 3), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** Growing evidence links weight gain to temporal events, such as weekends, Christmas, and winter. This study aimed to examine annual weight change in a sample of Australian adults, and examine whether temporal patterns in weight change differed between people who maintained, gained or lost weight.

**Methods:** Participants (n=315) were encouraged to weigh themselves, preferably daily, but at least weekly, using Fitbit smart scales. Participants were categorised as weight maintainers (12-month weight change within 2% of baseline, n=144), gainers (weight gain >2%, n=84) or losers (weight loss >2%, n=87). Data were visually inspected to see the overall yearly pattern in weight change. To do this, data were de-trended by calculating a line of best fit for each individual's annual weight change and subtracting this from each participant's daily weight data. Multi-level mixed-effects linear regression was used to compare weight across the days of the week, season, at Christmas and Easter.

**Results:** Across the 12-month period, participants gained a median of 0.26% (218g) body weight. On average, detrended weight fluctuated by 0.3% (252g) each week, with Mondays and Tuesdays the heaviest days of the week, and Friday the lightest (p<0.001). Weight losers' weight fluctuated within a narrower weekly range (0.1% ;70g) relative to weight gainers and maintainers. Overall, participants were the heaviest in summer (significantly heavier than all other seasons (p<0.001), lightest in autumn (-0.47%, p<0.001), regaining some weight in winter (-0.23% relative to summer, p=0.001), and were lighter in spring (-0.27%, relative to summer, p<0.001). Participants' weight increased sharply at Christmas (+0.65%, 546g, p<0.001) and Easter (+0.29%, 244g, p<0.001). When examined by weight change subgroup, all subgroups showed a steep spike in weight at Christmas, of similar magnitude of around +0.8 to 1.0% (i.e., 672-840g). The weight gainers showed a relatively larger winter weight gain, whilst the weight losers showed no winter weight gain.

**Conclusion:** Gainers' weight appeared to "yo-yo" by a greater amplitude each week and across seasons. Results highlighted weekends, winter and Christmas (which occurs in summer in Australia) as key periods of weight gain, suggesting they could be targeted in weight-gain prevention interventions.

# Impact of Ongoing COVID-19 Symptoms on Physical Activity Participation in People with Type 2 Diabetes

**Dr. Emily R Cox**<sup>1,2</sup>, Prof. Ronald Plotnikoff<sup>1,2,3</sup>, Prof. Peter G Gibson<sup>2,4,5</sup>, Dr. Shelley E Keating<sup>6</sup>, Associate Professor Shamasunder Acharya<sup>7</sup>, Dr. Hayley L Lewthwaite<sup>2,4,5</sup>

<sup>1</sup>Active Living Research Program, Hunter Medical Research Institute, Newcastle, Australia, <sup>2</sup>University of Newcastle, Newcastle, Australia, <sup>3</sup>Centre for Active Living and Learning, University of Newcastle, Newcastle, Australia, <sup>4</sup>Asthma and Breathing Research Program, Hunter Medical Research Institute, Newcastle, Australia, <sup>5</sup>Treatable Traits Centre for Research Excellence, University of Newcastle, Newcastle, Australia, <sup>6</sup>Centre for Research on Exercise, Physical Activity and Health, School of Human Movement and Nutrition Sciences, Brisbane, Australia, <sup>7</sup>John Hunter Hospital, Newcastle, Australia

**SO.1.03 - Hot topics on metabolic health, UKK - Hall B (Level 3), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** While people with type 2 diabetes (T2D) are no more likely to be infected with COVID-19 than the general population, they are twice as likely to develop critical COVID-19 illness if infected. This places them at greater risk of having ongoing symptoms, the presence of which will not only impact their ability to complete their activities of daily living, but also their ability and willingness to participate in exercise. Therefore, the aim of this research was to understand the impact of ongoing COVID-19 symptoms on physical activity participation and T2D management in people with T2D.

**Methods:** This study was an online survey (RedCap) of adults with T2D who had confirmed COVID-19 ≥12 weeks ago, in Australia.

**Results/Findings:** 327 people with T2D responded (age  $39.6 \pm 13.0$  years, 37% female, 60% male, 3% non-binary/transgender, BMI  $27.6 \pm 16.2$  kg/m<sup>2</sup>, time since COVID-19 infection  $35.9 \pm 22.3$  weeks), across all Australian states and territories. 60% of respondents reported ongoing symptoms, with respiratory (59%), fatigue (46%), and mental health (35%) symptoms being most prevalent; 27% reported trouble controlling their blood glucose. More than 85% of respondents reported that these symptoms moderately to severely impact their ability to perform activities of daily living, work, and/or exercise, with 15% unable to exercise. Median weekly exercise duration was 65 mins [IQR 0, 200]; ≥60% reported reducing the frequency, duration, and/or intensity of exercise since their COVID-19 infection, with 80% citing ongoing symptoms as the primary reason for this. 38% of respondents reported a worsening of their T2D management since their COVID-19 infection.

**Conclusions:** Physical activity is a crucial component of T2D management. However, the high prevalence of ongoing COVID-19 symptoms is hindering participation in this population, as well as influencing T2D management. Therefore, developing strategies to support people with T2D and ongoing COVID-19 symptoms to recommence safe levels of physical activity is of critical importance



# An almond-enriched energy restricted diet has potential to improve appetite-regulating hormones in adults with overweight and obesity

**Dr. Sharayah Carter**<sup>1</sup>, Dr. Alison Hill<sup>1</sup>, Prof. Jonathan Buckley<sup>1</sup>, Dr. Sze-Yen Tan<sup>2</sup>, Prof. Geraint Rogers<sup>3, 4</sup>, Prof. Alison Coates<sup>1</sup>

<sup>1</sup>University of South Australia, Adelaide, Australia, <sup>2</sup>Deakin University, Geelong, Australia, <sup>3</sup>South Australian Health and Medical Research Institute (SAHMRI), Adelaide, Australia, <sup>4</sup>Flinders University, Bedford Park, Australia

**SO.1.03 - Hot topics on metabolic health, UKK - Hall B (Level 3), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** To examine the effects of almonds (AL) or carbohydrate-rich snack bars (SB) on postprandial appetite and energy intake pre- and post-weight loss (WL) and post-weight maintenance (WMx).

**Methods:** Participants (25-65yrs, BMI 27.5-34.9kg/m<sup>2</sup>) were randomised to consume isoenergetic AL (n=68) or SB (n=72). Appetite-regulating hormones and appetite ratings were measured prior to, and every 30mins for 120mins following snack consumption, after which a buffet meal was freely consumed, and energy intake measured. Testing occurred at baseline, after 3 months of WL (8% WL) and after 6 months of WMx (additional 1.3% WL). Area under the curve (AUC) was calculated and mixed model analyses used to determine treatment and time differences.

**Results/findings:** There were no group by time differences, however AL were consistently higher at each timepoint compared to the SB for postprandial glucagon and pancreatic polypeptide (PP) AUC; +66% and +83% respectively at preWL (both  $p<0.001$ ), +91% and +87% respectively at postWL (both  $p<0.001$ ) and +65% and +72% respectively at postWMx (both  $p<0.001$ ). Glucose-dependent insulintropic polypeptide (GIP) and glucagon-like peptide-1 (GLP-1) were also higher with AL compared to SB; GIP preWL (+18%  $p=0.016$ ) and both GIP and GLP-1 postWL (+16%,  $p=0.042$  and +66%,  $p=0.017$  respectively). There were time differences for cholecystokinin (CCK), glucagon and leptin where AUC decreased by 11%, 15% and 46% respectively postWL (all  $p<0.001$ ) and by 9%, 14% and 35% respectively overall (postWMx-preWL) (CCK  $p=0.007$ , others  $p<0.001$ ) in both groups. Hunger AUC increased by 12% postWL in both groups ( $p=0.030$ ). Less total energy and discretionary food energy was consumed at the buffet postWL (16%,  $p=0.002$  and 25%,  $p=0.034$  respectively).

**Conclusions:** Postprandial responses of CCK, glucagon and leptin decreased over the intervention, indicating an increase in appetite-stimulating mechanisms, supported by increased hunger ratings. Despite this, reduced energy consumption occurred and there were no adverse effects on other appetite ratings. When comparing snack groups, almonds attenuated some of the appetite-stimulating effects occurring over time. The heightened response of appetite-inhibiting hormones GIP, GLP-1, glucagon and PP in the almond group suggest almonds could offer appetite benefits long-term.



# Wearable ring measured 24-hour activity cycle and association with cardiometabolic health in adults

**Dr. Maisa Niemelä**<sup>1,2,3</sup>, Ms. Anna Maijala<sup>1</sup>, Ms. Laura Nauha<sup>4,5</sup>, Prof. Timo Jämsä<sup>1,3</sup>, Prof. Raija Korpelainen<sup>2,3,4</sup>, Dr. Vahid Farrahi<sup>1,6</sup>

<sup>1</sup>Research Unit of Health Sciences and Technology, University of Oulu, Oulu, Finland, <sup>2</sup>Department of Sports and Exercise Medicine, Oulu Deaconess Institute Foundation sr., Oulu, Finland, <sup>3</sup>Medical Research Center, Oulu University Hospital and University of Oulu, Oulu, Finland, <sup>4</sup>Research Unit of Population Health, University of Oulu, Oulu, Finland, <sup>5</sup>Nucu, Oulu, Finland, <sup>6</sup>Centre of Machine Vision and Signal Analysis, University of Oulu, Oulu, Finland

**SO.1.03 - Hot topics on metabolic health, UKK - Hall B (Level 3), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose** Physical activity (PA), sedentary time and sleep associate with cardiometabolic health. Activity behaviors occurring within a day are codependent and studying them independently can lead to biased findings. We aimed to determine the association of time composition of sleep, sedentary behavior (SB), light PA (LPA), and moderate-to-vigorous PA (MVPA) with cardiometabolic health in adults.

**Methods** Study population consisted of the Northern Finland Birth Cohort 1986 members who participated in follow-up in 2019-2020 with 2 weeks PA and sleep recording with Oura ring (Gen2, Oura Health) were not pregnant and were free of prior cardiovascular disease and diabetes (N=1,139). Sleep metrics of Oura ring have been validated against polysomnography. Oura ring quantifies physical activity with accelerometry. Duration of sleep, SB, LPA and MVPA was analyzed from the ring data. Average duration of PA levels and sleep period was calculated over valid days defined as  $\geq 10$ h of wear time during waking hours when  $\geq 4$  valid days with recorded sleep were available. Average sleep efficiency (ratio of sleep period spent asleep) was calculated. Compositional means were transformed to isometric log-ratio coordinates.

In study visit, after overnight fasting, blood samples were drawn for the analysis of glucose, low-density lipoprotein (LDL) and high-density lipoprotein (HDL) cholesterol. Blood pressure was measured at rest while seated. Cardiorespiratory fitness (CRF) was measured with a four-minute sub-maximal step test and expressed as peak heart rate during the test. Multivariable linear regression models were conducted to estimate the association between activity composition and cardiometabolic health markers. Models were adjusted for sex, smoking, alcohol consumption, marital status, employment, education, sleep efficiency and CRF. Standardized betas are reported.

**Results** More time in SB relative to other behaviors was associated with higher triglycerides ( $\beta=0.139$ ,  $p=0.013$ ) and lower HDL ( $\beta=-0.206$ ,  $p<0.001$ ) after adjustments. More time in sleep relative to other behaviors was associated with higher HDL ( $\beta=0.106$ ,  $p=0.024$ ).

**Conclusion** Higher SB was associated with poorer lipid profile after accounting for the 24-hour activity composition, sleep efficiency, CRF and confounders. Higher sleep duration was associated with higher HDL cholesterol. Substituting time from SB to sleep might be beneficial for better cardiometabolic health in adulthood.

# Active-to-sedentary transitions and their associations with subjective memory complaints in middle-aged and older adults

**Señor. Borja Del Pozo Cruz**<sup>1,2,3,4</sup>, Prof. Rosa M. Alfonso-Rosa<sup>4,5</sup>, Prof. Jesus del Pozo Cruz<sup>4,6</sup>

<sup>1</sup>Centre for Active and Healthy Ageing, Department of Sports Science and Clinical Biomechanics, University of Southern Denmark, Odense, Denmark, <sup>2</sup>Faculty of Education, University of Cadiz, Cadiz, Spain, <sup>3</sup>Biomedical Research and Innovation Institute of Cádiz (INiBICA) Research Unit, Puerta del Mar University Hospital, University of Cádiz, Cadiz, Spain, <sup>4</sup>Epidemiology of Physical Activity and Fitness Across the Lifespan (EPAFit) Research Group, Faculty of Education, University of Seville, Seville, Spain, <sup>5</sup>Department of Human Motricity and Sport Performance, University of Seville, Seville, Spain, <sup>6</sup>Department of Physical Education and Sport, Faculty of Education, University of Seville, Seville, Spain

**SO.1.04 - Improving measurement of diet and physical activity, UKK - Hall C (Level 3), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Aim:** In the current study we explored the association between probability of transitioning from an active to a sedentary behaviour and subjective memory complaints (SMC) in middle-aged and older adults.

**Methods:** We used data from 3820 participants in the National Health and Nutrition Examination Survey (2003-2006) with valid accelerometer SMC data. An active-to-sedentary transition probability was calculated as the number of physical activity bouts (i.e., consecutive minutes registering 100+ counts/min) divided by the total sum of minutes spent in physical activity. A multivariable ordinal logistic regression model was conducted to examine the association between active-to-sedentary transition probability (scaled) and SMC (yes/no).

**Results:** A higher active-to-sedentary transition probability was associated with an increased likelihood of self-reported SMC in the study population (Odd Ratio [95% Confidence Interval] = 1.335 [1.067, 1.669]; Average Marginal Effect [95%CI] = 0.029 [0.006, 0.052]; p-value = 0.021). This association was independent of total physical activity volume and sedentary time.

**Conclusions:** The findings provide support that studying sedentary patterns can be useful in identifying those at risk for SMC, over and above total volume of physical activity and sedentary time. Future longitudinal studies are required to establish causality and the temporal order of the observed association. Nevertheless, an increased active-to-sedentary transition probability in middle-aged and older adults may reflect pre-clinical signs of future neurodegenerative processes indicating potential targets for modification through intervention.

# Physical (in)activity in office environments – review and meta-analysis of accelerometer studies

**Prof. Svend Erik Mathiassen<sup>1</sup>**, Associate Prof. David Hallman<sup>1</sup>

<sup>1</sup>Department of Occupational Health Science and Psychology, University of Gavle, Gavle, Sweden

**SO.1.04 - Improving measurement of diet and physical activity, UKK - Hall C (Level 3), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose** Most individuals aged 18-65 spend major parts of their weekdays at work. Thus, for these people exposures at work contribute to overall exposure to a similar extent as exposures during leisure, and guidelines for physical (in)activity should also include work. In occupational life, office work has been particularly in focus, due to the acclaimed risks associated with physical inactivity. Numerous studies have addressed this issue, but often using self-reports. However, self-reports are known to be inaccurate, and accelerometry-based measurements are gaining ground. Thus, the present systematic review summarized the available evidence on accelerometer-measured sitting, standing and moving during office work.

**Methods** We conducted a systematic search in seven databases for studies reporting an exhaustive composition of accelerometer-measured sitting, standing and moving in office environments. After screening titles, abstracts and full texts, 26 studies were included in a weighted meta-analysis of relative time spent in the three activities, and of the variability between workers within a study. Variables documenting temporal patterns of (in)activity were noted.

**Results** The 26 studies, ranging from 26 to 546 participants, included, in total, 2812 workers. The meta-analysis resulted in mean proportions of sitting, standing and moving of 70.3%time, 21.4%time, and 8.2%time, respectively. Studies ranged from 53.1%time to 79%time in sitting. Standard deviations between workers in a study was, on average, 15.8%time, 13.4%time, and 4.2%time; i.e. 22.5%, 62.6%, and 51.2% of the mean. Eight studies reported data on time spent sitting uninterruptedly for more than 30 consecutive minutes.

**Conclusions** Our meta-analysis showed that among 'office workers', sitting occurred, on average, somewhat more than the 60%time recommended by EU, while standing and moving occurred somewhat less than the recommended 30% and 10%, respectively. However, studies differed considerably in mean exposure, casting doubt on 'office workers' as a homogeneous group. Also, the variability between workers was large, further suggesting that 'office workers' may have quite different work tasks. Thus, many office workers were actually sitting less than 60%time. Temporal sitting variables were rarely analyzed further. Sub-dividing 'office workers' according to tasks, and investigating the temporal variation in office work, including recovery, are important issues for further research.

# Can we use video cameras to assess physical activity and other wellbeing behaviours in urban environments?

## Feasibility, reliability and participant reactivity

**Dr. Jack Benton<sup>1</sup>**, Ms. Kexin Wang<sup>1</sup>, Prof. James Evans<sup>1</sup>, Dr. Jamie Anderson<sup>1</sup>, Prof. David French<sup>1</sup>

<sup>1</sup>University of Manchester, Manchester, United Kingdom

**SO.1.04 - Improving measurement of diet and physical activity, UKK - Hall C (Level 3), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** Unobtrusive observation is a promising method of assessing physical activity and other wellbeing behaviours (e.g., social interactions) in urban environments. Notably, it avoids participant burden and non-response and recall biases associated with self-report. However, current observation methods are resource intensive and are limited as they rely on 'live' in-person observers. The aim of the present research was to test the feasibility of conducting observation of physical activity and other wellbeing behaviours by coding video recordings collected from stationary wireless video cameras, and assess its reliability and potential participant reactivity.

**Methods:** Across three studies, 148 hours of video recordings were collected in six outdoor public spaces in Manchester, UK. Recordings were double coded by three researchers using a reliable and valid in-person observation tool for assessing physical activity and two other wellbeing behaviours (social interactions and people taking notice of the environment). Inter- and intra-rater reliabilities were analysed using intraclass correlation coefficients (ICCs). Face-to-face intercept surveys were also conducted at outdoor public spaces to assess whether members of the public were aware of the cameras, and whether they altered their behaviour due to the presence of cameras.

**Results:** Overall, the 148 hours of video recordings were coded in 85 hours. There was mostly excellent inter-rater reliability (ICCs > 0.90) between pairs of independent coders. Inter-rater reliability was generally lower at night, although still mostly excellent (ICCs > 0.90) or good (ICCs > 0.75). Intra-rater reliability within a single coder after a two-week interval was excellent (ICCs > 0.90) or good (ICCs > 0.75), showing that the same researcher can reproduce similar coding outputs over time. Intercept surveys with 86 public space users found no evidence of reactivity.

**Conclusions:** Camera-based observation methods are more reliable than traditional in-person observation methods, without participant reactivity typically associated with self-report. Importantly this method requires considerably less time required to collect and code the data, and allows observation at night without risk to research staff. This is a vital first step in demonstrating the potential for camera-based observation methods to improve and scale-up natural experimental studies of real-world urban environment interventions on physical activity.

# Movement behaviours during walking trips to/from school: different methods of assessing trips matters

**Mr. Pablo Campos-Garzón<sup>1</sup>**, Dr. Daniel Molina-Soberanes<sup>1</sup>, Dr. Amador Lara-Sánchez<sup>2</sup>, Dr. Ana Queralt<sup>3</sup>, Dr. Marie Löf<sup>4</sup>, Dr. Tom Stewart<sup>5</sup>, Dr. Jasper Schipperijn<sup>6</sup>, Dr. Yaira Barranco-Ruiz<sup>1,7</sup>, Dr. Palma Chillón<sup>1</sup>, Dr. Jairo H. Migueles<sup>4,1</sup>

<sup>1</sup>PROFITH "PROmoting FITness and Health through physical activity" Research Group, Sport and Health University Research Institute (iMUDS), Department of Physical Education and Sports, Faculty of Sport Sciences, University of Granada, Granada, Spain, <sup>2</sup>Department of Didactics of Musical, Plastic and Corporal Expression. University of Jaen, Jaen, Spain, <sup>3</sup>AFIPS Research Group, Department of Nursing. University of Valencia, Valencia, Spain, <sup>4</sup>Department of Biosciences and Nutrition, Karolinska Institutet, Huddinge, Sweden, <sup>5</sup>Human Potential Centre, School of Sport and Recreation Auckland University of Technology, Auckland, New Zealand, <sup>6</sup>Active Living, Department of Sports Science and Clinical Biomechanics, University of Southern Denmark, Campusvej 55, 5230, Odense, Denmark, <sup>7</sup>Department of Physical and Sports Education, Faculty of Education and Sport Sciences, University of Granada, 52071, Melilla, Spain

**SO.1.04 - Improving measurement of diet and physical activity, UKK - Hall C (Level 3), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** There is no consensus on how to identify the temporality (i.e., start/end times) of trips to/from school and whether these affect the validity of movement behavior data. Therefore, the aim of this work was to compare sedentary time and physical activity levels across four frequently used methodologies for identifying the temporality of trips to/from school.

**Methods:** 102 Spanish adolescents aged 14.4±0.6 years wore an accelerometer and GPS for two school days. The start/end times of the walking were defined using four methods. Method 1 (reference): start/end times were automatically detected based on the GPS signal. Method 2: participants self-reported the time they left/arrived home, and the school start/end times. Method 3: a fixed 30-min window before/after the start/end of school (w30). Method 4: a fixed 60-min window before/after the start/end of school (w60). Agreement in sedentary time and physical activity levels across methodologies was evaluated using Bland-Altman analysis.

**Results:** Walking trips identified by self-report differed from GPS by 0.7 min for sedentary time (95% confidence interval (CI): -13.6–14.9 min), -0.6 min for light physical activity (LPA) (CI: -7.7–7.4 min), and -2.5 min for moderate-to-vigorous physical activity (MVPA) (CI: -9.6–4.7 min). Differences between w30 and GPS were 8.8 min (CI: -8.3–25.9 min) for sedentary time, 2.3 min (CI: -6.3–10.9 min) for LPA, and -1.6 min (CI: -9.2–6.0 min) for MVPA. Lastly, w60 and GPS showed the highest differences: 31.0 min for sedentary time (CI: 9.9–53.3 min), 7.5 min for LPA (CI: -3.4–18.4 min), and 0.1 min for MVPA (CI: -6.6–6.7 min). The wide confidence intervals indicate variability across individuals was high.

**Conclusion:** Sedentary time and physical activity are comparable between the self-report and w30 methods at group level. The differences from GPS were relatively low across methods, except for sedentary time when using the w60 method. At individual level, high variability across methods were observed. Further investigation on how to improve the trip windows definition at the individual level is warranted, particularly when GPS is not available.

# Defining and operationalising activity patterns: A modified Delphi study

Associate Professor Nicola D Ridgers<sup>1,2</sup>, Ms. Emily Denniss<sup>2</sup>, Dr. Alissa J Burnett<sup>2</sup>, Prof. Jo Salmon<sup>2</sup>, **Dr. Simone JJM Verswijveren<sup>2</sup>**

<sup>1</sup>Alliance for Research in Exercise, Nutrition and Activity, Allied Health and Human Performance, University of South Australia, Adelaide, Australia, <sup>2</sup>Institute for Physical Activity and Nutrition, School of Exercise and Nutrition Sciences, Deakin University, Geelong, Australia

**SO.1.04 - Improving measurement of diet and physical activity, UKK - Hall C (Level 3), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** There has been significant interest in assessing activity patterns in different populations. However, there has been no consensus concerning the definition and operationalisation of activity patterns, limiting the comparability and interpretability of study findings. The aim of this study was to establish a consensus regarding the way in which activity patterns are defined and operationalised.

**Methods:** A literature review was initially conducted to identify previous activity pattern definitions and how such patterns had been operationalised. A three-round modified Delphi survey was then conducted online (November 2021 to May 2022). In round one, participants were asked to rate their agreement with a proposed activity patterns definition, six activity pattern components (e.g., activity intensity, activity bout, transitions), and six examples of activity patterns (e.g., frequency of postural transitions in discrete time periods). Open-ended questions were also included for participants to provide further comments and suggestions for additional items. Free text responses were provided by 70% of participants. Consensus was defined a priori as  $\geq 80\%$  participants rating their agreement with an item. Following round one, one activity components item was dropped, two additional activity components items were added, and three items were amended based on feedback. The activity patterns definition was amended. In rounds two and three, participants rated their agreement with the revised activity patterns definition, as well as seven activity pattern components and six examples of activity patterns.

**Results:** Twenty participants with expertise in activity patterns research participated in round one, with response rates of 80% and 60% in rounds two and three, respectively. The proposed activity pattern definition, all activity pattern components definitions, and four of the six activity pattern examples achieved consensus. The removal of one activity component item between rounds 1 and 2 also achieved consensus.

**Conclusions:** This modified Delphi study achieved consensus for defining and operationalising activity patterns for the first time. This consensus definition enables standardisation of activity patterns terminology, which is important given the significant interest in quantifying how individuals accumulate their physical activity and sedentary behaviour across the lifespan to inform the development of future public health guidelines and interventions efforts.



# Feasibility of assessing the impact of Play Streets on accelerometer-measured physical activity and social outcomes in rural Louisiana

**Prof. M. Renée Umstattd Meyer<sup>1</sup>, Dr. Marilyn E. Wende<sup>1</sup>**, Mrs. Jessica Stroope<sup>2</sup>, Assistant Professor Denise Holston<sup>2</sup>, Prof. Keshia M. Pollack Porter<sup>3</sup>

<sup>1</sup>Baylor University, Robbins College of Health and Human Sciences, Waco, USA, <sup>2</sup>LSU Agricultural Center, Baton Rouge, USA, <sup>3</sup>Johns Hopkins Bloomberg School of Public Health, Baltimore, USA

**SO.1.04 - Improving measurement of diet and physical activity, UKK - Hall C (Level 3), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Background:** Play Streets are low-cost, community interventions that use existing public spaces to create safe and accessible opportunities for physical activity (PA) and social interaction. Limited research has evaluated the impact of Play Streets on objectively-measured PA outcomes among youth and social outcomes among parents/guardians in under-resourced, rural communities. This study tested the feasibility of assessing accelerometer-measured PA outcomes among children and survey outcomes among parents/guardians in rural parishes of Louisiana.

**Methods:** This study took place in rural Louisiana, where Play Streets were held from summer-fall of 2022. Extension agents in one control and two intervention/Play Streets parishes agreed to lead local recruitment/implementation. Children (ages 5-11 years, experiencing no physical limitations) were recruited through schools. Recruitment techniques included flyers, in-class announcements, and notifications via web-based parent/guardian portals and social media. Paper and web-based consent/assent forms were provided to parents/guardians. Wrist-worn Accelerometers (ActiGraph GT9X) were administered to child participants via mail, with instructions to wear the device for two full weeks. Parents/guardians were asked to complete daily accelerometer logs and two surveys on social outcomes (baseline; 2-weeks after baseline).

**Results:** 450 recruitment flyers were distributed to Extension agents for recruitment purposes and online classroom communications were also used by teachers in recruitment schools, with a 13.1% (n=59) response rate. Approximately 5.1% (n=3) reported that their child experienced physical limitations and 57.6% (n=34, mean age=7.8 yrs[SD=1.7]) enrolled in the study. In addition, 38.2% (n=13) of parents/guardians enrolled two children. On average, parents/guardians completed 12.9(SD=4.5) daily logs (out of 14). For social outcomes, 97.1% (n=33) of parents/guardians completed baseline surveys and 91.2% (n=31) completed follow-up surveys. Forty-seven accelerometers were distributed, and 14.9% (n=7) of devices were never returned. Participants noted barriers to accelerometer use, such as the fear that the children would harm the device while doing agricultural labor or the need for some children to take the device off at night.

**Conclusions:** As part of this feasibility study, recommendations for recruitment and overcoming barriers to retention of children and parents/guardians will be outlined. These recommendations can help researchers better partner with rural, low-income communities to effectively evaluate community PA programs.

# Comparing national device-based physical activity surveillance systems: A systematic review

**Ms. Inge De Wolf**<sup>1,2</sup>, Dr. Anne Elevelt<sup>2</sup>, Dr. Femke Van Nassau<sup>1</sup>, Dr. Vera Toepoel<sup>2</sup>, Dr. Ellen de Hollander<sup>3</sup>, Dr. Maaïke Kompier<sup>2</sup>, Dr. Annemieke Luiten<sup>2</sup>, Prof. Barry Schouten<sup>2</sup>, Dr. Wanda Wendel-Vos<sup>3</sup>, Associate Professor Hidde van der Ploeg<sup>1</sup>

<sup>1</sup>Amsterdam UMC, Amsterdam, Netherlands, <sup>2</sup>Statistics Netherlands, Den Haag, Netherlands, <sup>3</sup>National Institute for Public Health and the Environment, Bilthoven, Netherlands

**SO.1.04 - Improving measurement of diet and physical activity, UKK - Hall C (Level 3), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** The importance of physical activity (PA) for our health is well-known. The WHO 2020 guidelines recommend adults to undertake at least 150 minutes of moderate-to-vigorous intensity PA per week and to do muscle-strengthening activities at least 2 days a week. To assess and report on PA guidelines, national population-based surveillance systems are in place. Questionnaires are sensitive to recall bias and social desirability. Therefore wearable, accelerometer-based activity monitors have become more commonly used in observational studies to measure PA levels. When conducting PA research with activity monitors on a population level, numerous decisions about methodology have to be made. This systematic review aims to create an overview of the methodology used in existing device-based national PA surveillance systems.

**Methods:** Four literature databases (PubMed, Embase.com, SPORTDiscus and Web of Science) were searched, supplemented with backward tracking. Articles were included if they reported on population-based observational studies measuring PA, sedentary time and/or adherence to PA guidelines. When available and in English, the methodological reports of the surveillance studies were also included. An extensive quality assessment was performed to score the quality of methods used in the surveillance systems of all countries included.

**Results/findings:** This systematic literature search (following the PRISMA guidelines) yielded 28 articles and an additional 12 methodological reports, reporting on 22 studies. These 22 studies are about one or multiple waves of 12 different national and one international surveillance system. The included studies showed substantial variation between (waves of) systems in number of participants, response rates, population representativeness and recruitment. More agreement was found between systems on data reduction definitions. The quality assessment showed most negative scores on representativeness and response bias.

**Conclusions:** The results of this review indicate that few countries use device-based PA measurement in their surveillance system. The methodology in systems that do use these devices is diverse and often lacks standardization across systems. This review created an overview of the existing device-based national PA surveillance systems and shows the need for standardization on reporting about these surveillance systems. This results from this review can also help inform the development of such systems in other countries.

# Accelerometer measured physical activity and its correlates in two population-based studies from Berlin and Singapore

**Dr. Lilian Krist**<sup>1</sup>, Mr. Paul Kittner<sup>1</sup>, Mr. Thore Bürgel<sup>1</sup>, Miss Claire Goh Jie Lin<sup>2</sup>, Prof. Thomas Keil<sup>1, 3, 4</sup>, Prof. Falk Müller-Riemenschneider<sup>1, 2</sup>

<sup>1</sup>Charité-Universitätsmedizin Berlin, Berlin, Germany, <sup>2</sup>National University of Singapore, Singapore, Singapore, <sup>3</sup>University of Würzburg, Würzburg, Germany, <sup>4</sup>Bavarian Health and Food Safety Authority, Bad Kissingen, Germany

**SO.1.04 - Improving measurement of diet and physical activity, UKK - Hall C (Level 3), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose** About one-third of the adult population around the world does not meet the Global Recommendations on Physical Activity. However, these estimates are largely based on self-report and differences between countries not fully understood. The aim of this study was to compare PA in two metropolitan areas, Berlin and Singapore, and to investigate cross-cultural differences in sociodemographic, and lifestyle factors associated with PA.

**Methods** Data were used from the German National Cohort Study (NAKO) (study center Berlin-Center) and the Singapore Population Health Studies (SPHS). For better comparability, only data from participants assessed during the same time periods (2014/15 and 2018/19) were used. Sociodemographics, lifestyle factors, and chronic diseases were assessed via questionnaires. PA was objectively assessed via hip-worn accelerometers (Actigraph GT3X/+) for 7 consecutive days. Questionnaire data from both cohorts were harmonized. Raw accelerometry data were analysed using the R-package GGIR. Mean minutes of light (LPA), moderate, moderate-to-vigorous (MVPA), and vigorous PA were calculated, and MVPA was used as outcome in separate regression analyses for NAKO and SPHS.

**Results** Of the Berlin sample n=1969, and of the Singapore sample, n=1199 participants with complete accelerometry data were included in the analyses. Some differences regarding age ( $50.2 \pm 12.4$  vs.  $45.7 \pm 13.6$  years), marital status (50.7 vs. 65.7% married), and smoking behavior (23.3 vs. 12.8% regular smokers) were observed. Participants engaged in LPA for  $216.1 \pm 71.5$  vs.  $365.9 \pm 178.3$  minutes per day (min/day) and in MVPA for  $61.1 \pm 27.5$  vs.  $72.3 \pm 58.4$  min/day in Berlin and Singapore, respectively. Multivariable linear regression analyses showed that in both samples MVPA was positively associated with male sex, younger age, and being employed. In Berlin, MVPA was additionally associated with not being married, high education, and lower BMI, while in Singapore, Chinese ethnicity was positively associated with MVPA.

**Conclusions** Our study across two metropolitan areas in Europe and Asia showed that participants from Singapore engaged in more LPA and MVPA compared to those from Berlin. While some factors were associated with MVPA in both populations, our analyses also showed important differences. Knowing these differences may help when planning targeted prevention measures to promote PA.

# Simultaneous examination of physical and eating behaviours and their context using Ecological Momentary Assessment: the WEALTH pilot study

**Mr. Michael Janek**<sup>1,2</sup>, Dr. Jitka Kuhnova<sup>1</sup>, Dr. Antje Hebestreit<sup>3</sup>, Dr. Christoph Buck<sup>3</sup>, Dr. Richard Cimler<sup>1</sup>, Prof. Greet Cardon<sup>4</sup>, Prof. Jean-Michel Oppert<sup>5</sup>, Dr. Leopold Fezeu<sup>5</sup>, Dr. Janas Harrington<sup>6</sup>, Prof. Alan Donnelly<sup>7</sup>, Dr. Tomas Vetrovsky<sup>1,2</sup>, Dr. Steriani Elavsky<sup>1,8</sup>, Mx. on behalf of the WEALTH consortium

<sup>1</sup>Faculty of Science, University of Hradec Kralove, Hradec Kralove, Czech Republic, <sup>2</sup>Faculty of Physical Education and Sport, Charles University, Prague, Czech Republic, <sup>3</sup>Leibniz Institute for Prevention Research and Epidemiology - BIPS, Bremen, Germany, <sup>4</sup>Department of Movement and Sports Sciences, Ghent University, Ghent, Belgium, <sup>5</sup>Nutritional Epidemiology Research Unit (EREN), Universite Paris Sorbonne Paris Nord, Inserm, Inrae, Bobigny, France, <sup>6</sup>School of Public Health, University College Cork, Cork, Ireland, <sup>7</sup>Health Research Institute, University of Limerick, Limerick, Ireland, <sup>8</sup>Department of Human Movement Studies, University of Ostrava, Ostrava, Czech Republic

**SO.1.04 - Improving measurement of diet and physical activity, UKK - Hall C (Level 3), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** L. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

**Purpose:** Advances in Ecological Momentary Assessment (EMA) enable the triggering of surveys by behavioural events detected by wearable sensors (event-based EMA). The WEALTH (WEearable sensor Assessment of physical and eaTing beHAViours) project harnesses event-based EMA to simultaneously capture physical and eating behaviours and their context. This pilot study aimed to evaluate the feasibility of a complex EMA protocol for use in the WEALTH project.

**Methods:** The protocol was pre-tested in a convenience sample of 25 participants (32±9 years, 68% females) from Germany (n=12) and Czechia (n=13) and included wearing Fitbit Charge 5 and completing EMA surveys for 9 days using the custom-built HealthReact app on their smartphones (Android n=13, iOS n=12). The daily EMA protocol consisted of 7 time-based and up to 10 event-based surveys triggered after 30 minutes of sitting or 10 minutes of walking or running, as detected by Fitbit. Besides, participants were instructed to fill in self-initiated surveys whenever they consumed a meal, snack or drink. The surveys included 12 to 28 questions on the context of physical and eating behaviours (e.g., social company, location, mood) and expired 8 minutes after initiation. We analysed the last 7 out of 9 days to allow for familiarisation and to minimise the reactivity effect.

**Results:** On average, participants received 48.5±2.8 time-based and 11.4±8.7 event-based (10.2±8.0 sitting and 1.2±1.6 walking) surveys per week per person. The response rates were 53.9±22.6%, 33.8±23.9%, 36.5±23.3%, and 34.6±40.0%, and the average latency (time elapsed between survey initiation and the start of responding) was 115±126, 105±132, 77±129, and 195±141 seconds for time-based, event-based, sitting, and walking surveys, respectively. The response rates were higher among iOS than Android users (61.9±13.8% vs 40.2±21.0%, p=0.006). On average, participants self-initiated 27.2±18.4 surveys; of those, 42%, 18%, and 40% reported meals, snacks, and drinks, respectively. The average time needed to complete a survey was 70±46, 67±47, 65±48, 89±14, and 48.0±36.0 seconds for time-based, event-based, sitting, walking, and self-initiated surveys, respectively.

**Conclusions:** The number of event-based surveys, especially those triggered by walking, and their response rates were low, suggesting the need for protocol adjustment prior to wider application in the WEALTH project.

# Co-creation with grandchildren and grandparents to develop an intergenerational physical activity program: what did we do and what did we learn?

**Miss Evelien Iliano**<sup>1</sup>, Drs. Julie Latomme<sup>1</sup>, Prof. Greet Cardon<sup>1</sup>

<sup>1</sup>Ghent University, Ghent, Belgium

**SO.1.05 - If it's complex, use participatory research designs, UKK - Hall D (Level 2 - main floor), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** Intergenerational programming involving grandchildren and grandparents could lead to benefits for both age groups and long term effects. We present what we did and learned during the co-creation of an intergenerational PA program for grandparents and their grandchildren. The process and findings of co-creation sessions will be discussed.

**Methods:** To develop an intergenerational PA program in an evidence based way, the Behaviour Change Wheel (BCW) will be used in combination with a co-creation approach, which is a highly relevant and innovative approach in (PA) intervention development. Five co-creation sessions will be organized; two with grandparents, two with grandchildren and one with both (n = 6 dyads, 6-10 years old children with their grandparents) in November and December 2022 to develop the program. The co-created program will be further refined during a pilot study (May- June 2023) and an RCT (end 2023). Inclusion criteria for both will be: speaking Dutch and not having any severe physical, cognitive or mental health problems. All co-creation sessions will be recorded with a Samsung Galaxy A12 Voice recorder and analyzed in NVivo. Grandparents will complete a questionnaire questioning sociodemographic information about themselves and their grandchildren at the beginning of the sessions. To evaluate the co-creation process, a short questionnaire will be completed by grandparents and grandchildren after each session.

**Results:** The process and findings of the co-creation sessions will be presented. We will present which PA activities grandchildren and grandparents do or want to do together, and which joint activities they indicate as feasible, fun and attractive. In addition, barriers and motivators to be physically active together and contextual factors for an intergenerational PA program will be discussed.

**Conclusions:** The use of a theoretical framework (the BCW), in combination with co-creation sessions will lead to an evidence based development of an intergenerational PA program for grandchildren and grandparents. The use of these co-creation sessions, where researchers take into account the barriers, motivators, needs and preferences of target group, will result in increased empowerment and in more feasible and fun movement activities, which could lead to an effective intergenerational PA intervention.



# A Curated Open-source Database to Consolidate Knowledge About Co-creation: A Health Cascade Study Combining Systematic Review Methodology and Artificial Intelligence

**Mr. Quentin Loisel<sup>1</sup>**, Ms. Danielle Agnello<sup>1</sup>, Ms. Qingfan An<sup>2</sup>, Mr. George Balaskas<sup>3,4</sup>, Ms. Rabab Chrifou<sup>5</sup>, Dr. Philippa Dall<sup>1</sup>, Ms. Janneke de Boer<sup>5,6</sup>, Ms. Lea Delfman<sup>5,6</sup>, Prof. Maria Giné-Garriga<sup>7,8</sup>, Ms. Kunshan Goh<sup>9</sup>, Ms. Giuliana Longworth<sup>7</sup>, Ms. Katrina Messiha<sup>9</sup>, Ms. Lauren McCaffrey<sup>1</sup>, Ms. Niamh Smith<sup>1</sup>, Prof. Artur Steiner<sup>10</sup>, Ms. Mira Vogelsang<sup>1</sup>, Prof. Sebastien Chastin<sup>1,6</sup>

<sup>1</sup>School of Health and Life Sciences, Glasgow Caledonian University, Glasgow, United Kingdom, <sup>2</sup>Department of Community Medicine and Rehabilitation, Umeå University, Umeå, Sweden, <sup>3</sup>Institute of Informatics and Telecommunications, National Centre of Scientific Research "Demokritos", Athens, Greece, <sup>4</sup>Department of Digital Systems, University of Piraeus, Piraeus, Greece, <sup>5</sup>Department of Public Health and Primary Care, Ghent University, Ghent, Belgium, <sup>6</sup>Department of Movement and Sport Sciences, Ghent University, Ghent, Belgium, <sup>7</sup>Department of Sport Sciences, Faculty of Psychology, Education and Sport Sciences Blanquerna, Ramon Llull University, Barcelona, Spain, <sup>8</sup>Department of Physical Therapy, Faculty of Health Sciences Blanquerna, Ramon Llull University, Barcelona, Spain, <sup>9</sup>Department of Public and Occupational Health, Amsterdam Public Health Research Institute, Amsterdam UMC, Vrije Universiteit Amsterdam, Amsterdam, Netherlands, <sup>10</sup>Yunus Centre, Glasgow Caledonian University, Glasgow, United Kingdom

**SO.1.05 - If it's complex, use participatory research designs, UKK - Hall D (Level 2 - main floor), June 15, 2023, 12:00 PM - 1:15 PM**

## **SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** Co-creation is increasingly seen as a way to democratise research and bridge the implementation gap between research and practice. Despite promises of increased effectiveness and relevance, progress is hindered by the lack of comprehensive and consolidated literature about co-creation; which is a crucial step toward making co-creation a more robust, trustworthy, and evidence-based methodology. However, there are two considerable challenges to achieving this. First, there is a lack of clarity and standardization of the terminology about co-creation. Secondly, the rapid increase in scientific publishing means that obtaining exhaustive and comprehensive literature requires dealing with a vast body of information beyond human capacity.

**Methods:** To include all relevant literature, this study developed a novel methodology by combining attributes of systematic review methodology (PRISMA) with artificial intelligence. We set a broad definition of co-creation that captured the essence of existing definitions, and was inclusive of fields beyond public health, while still accommodating the variation in terminology. We then relied on artificial intelligence to filter out effectively, irrelevant information. We implemented a bibliometric analysis and a quality control procedure to assess the content and accuracy of the database.

**Results/findings:** The final version of the Co-Creation Database includes 13,501 papers, which are indexed in Zenodo and accessible in an open-access downloadable format. The quality assessment showed that the database contains 20.35% false positives (irrelevant material) and potentially misses 9.38% of relevant articles; which is lower than the human error rate of 10%. The word participatory, and forms of the term co-creation, occurred most frequently in the title and abstracts of included literature. Furthermore, the analysis of authorship and fields show a fragmentation of the knowledge in different fields and little indication of collaboration between fields.

**Conclusions:** This study consolidated peer-reviewed literature on co-creation into a curated and open-source database. This database makes it possible to perform rapid literature reviews about co-creation. The database lifts the main barrier that most researchers and practitioners will face in seeking evidence about co-creation: the fragmentation of knowledge, the lack of terminology standardization, and the ensuing dilemma of having to deal with a large amount of information.



# A participatory approach to the development of an intervention to reduce screen media use and promote time with friends during leisure time among 10-11-year-old children

Mrs. Teresa Victoria Høy<sup>1</sup>, Assistant Professor Kristian Traberg Larsen<sup>2</sup>, Miss Sarah Overgaard Sørensen<sup>2</sup>, Associate Professor Peter Lund Kristensen<sup>2</sup>, Associate Professor Mette Toftager<sup>2</sup>, Mr. Arne Gårn<sup>3</sup>, Prof. Anders Grøntved<sup>2</sup>, **Assistant Professor Anne Kær Gejl<sup>2</sup>**

<sup>1</sup>National Institute of Public Health, University of Southern Denmark, Copenhagen, Denmark, <sup>2</sup>Department of Sports Science and Clinical Biomechanics, University of Southern Denmark, Odense, Denmark, <sup>3</sup>Steno Diabetes Center Odense, Odense University Hospital, Odense, Denmark

**SO.1.05 - If it's complex, use participatory research designs, UKK - Hall D (Level 2 - main floor), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose** High levels of recreational screen media use during childhood seems to contribute to poor physical and mental health, emphasizing the importance of developing viable solutions to balance screen media use in children. Using a participatory approach, we aimed to develop an intervention to reduce time spent alone using screen devices while promoting time spent physically with friends during leisure time in 10-11-year-old children.

**Method** The development of the Screen Free Time with Friends intervention draws on the Medical Research Council UK framework for developing and evaluating complex interventions. The three-stage framework suggested by Hawkins and colleagues guided the development process, comprising four phases: 1) a comprehensive needs assessment including evidence review and fieldwork, 2) co-creation and prototyping of the recruitment strategy and intervention content, 3) development of protocol and outcome measures for the effect and process evaluation and 4) feasibility and pilot testing of the recruitment strategy, intervention content and outcome measures (will be conducted during spring 2023). All phases involved stakeholders.

**Results** The development process resulted in a multicomponent intervention with three core elements targeting families, afterschool clubs and local communities, respectively. The three elements consist of 1) An educational program and two family workshops for children and parents, respectively, aiming to enhance digital education and communication 2) an action learning program with the afterschool club personnel aiming to increase afterschool club attendance and 3) two workshops with local stakeholders aiming to build consensus and encouragement to initiate local actions tailored to the local context and needs.

**Conclusion** The Screen Free Time with Friends intervention provides an example of a complex intervention informed by evidence and contextual needs. The thorough development process has led to a flexible intervention that allows the implementation to vary across different contexts yet maintaining the integrity of the core components. We expect that this approach will increase engagement and ownership among end-users and stakeholders, leading to a more sustainable intervention.

# Designing a co-creation process in small-to-medium sized enterprises (SMEs) for developing interventions on sedentary behaviour – A Health CASCADE study.

**Ms. Mira Vogelsang<sup>1</sup>**, Ms. Lauren McCaffrey<sup>1</sup>, Dr. Gemma Ryde<sup>3</sup>, Dr. Maïté Verloigne<sup>2</sup>, Dr. Philippa Dall<sup>1</sup>  
<sup>1</sup>Glasgow Caledonian University, Glasgow, United Kingdom, <sup>2</sup>Ghent University, Ghent, Belgium, <sup>3</sup>University of Glasgow, Glasgow, United Kingdom

**SO.1.05 - If it's complex, use participatory research designs, UKK - Hall D (Level 2 - main floor), June 15, 2023, 12:00 PM - 1:15 PM**

## **SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** Co-creation provides an excellent methodology to design and implement tailored interventions, yet lacks reporting and transparency on how the co-creation process (the series of participatory sessions conducted with co-creators) is designed. Here we report on the design of a co-creation process for developing interventions on sedentary behaviour (SB) with employees in small-to-medium enterprises (SMEs).

**Methods:** The PRODUCE framework guided initial planning of the co-creation process. Session content was informed by literature on design and conducting of co-creation, discussion with colleagues experienced in co-creation projects, and previous research team experience. Finally, literature, discussion with colleagues, and research team expertise identified participatory methods to jointly engage with the content.

**Results:** The resulting co-creation process aims to address workplace SB (**P**roblem) of office workers in SMEs (end-**U**sers) using participatory action research (**D**esign), in which 6-12 employees (**C**o-creators) develop an intervention plan on SB (**O**bjective). Both process and impact of this co-creation will be evaluated (**E**valuation). The developed plan comprises 9 workshops (W) of 1h30 each over 10 weeks. Firstly, we focus on establishing group cohesion, including introductions and establishing ground rules (W1). We cover knowledge building and raising awareness of SB (W3) and explore the existing situation, including communication possibilities (W2), existing company policies (W4) and the physical environment (W5). Next, we start to co-create interventions by brainstorming possibilities (W6) and checking their feasibility (W7). A short-term intervention is selected (W7) to be implemented by the co-creators over the following 2 weeks. That implementation is reflected on (W8) and learning contributes to development of a finalised intervention plan (W8&9). Lastly, continuation of the group is discussed (W9). The co-creation process will be led by the co-creators with planned time for evaluation after each workshop facilitating this and a mix of participatory methods are used throughout the workshops to maintain engagement.

**Conclusions:** A framework, literature and expertise informed the systematic development of a co-creation process. Future research will implement the planned co-creation process in 3 SMEs where changes in each process will inform the next series of workshops, contributing to a generalisable protocol of how to conduct co-creation for workplace SB interventions.

# Development of a dietary support tool for 8-10-year old Dutch children: Co-creating food (group) illustrations with 8-10-year-old Dutch children and experts. Eetscore Jr.

**Ms. Zoë van der Heijden**<sup>1</sup>, Associate Professor Yuan Lu<sup>2</sup>, Ms. Desiree Lucassen<sup>1</sup>, Ms. Femke de Gooijer<sup>1</sup>, Dr. Arieke Janse<sup>3</sup>, Prof. Edith Feskens<sup>1</sup>, Associate Professor Sanne Nijhof<sup>4</sup>, Dr. Henk Schipper<sup>4</sup>, Assistant Professor Indre Kalinauskaite<sup>4</sup>, Dr. Guido Camps<sup>1</sup>, Assistant Professor Elske Brouwer-Brolsma<sup>1</sup>  
<sup>1</sup>Wageningen University & Research, Wageningen, Netherlands, <sup>2</sup>Eindhoven University of Technology, Eindhoven, Netherlands, <sup>3</sup>Gelderse Vallei Hospital, Ede, Netherlands, <sup>4</sup>University Medical Center Utrecht, Utrecht, Netherlands

**SO.1.05 - If it's complex, use participatory research designs, UKK - Hall D (Level 2 - main floor), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** Adherence to a healthy diet can prevent unhealthy weight gain and decrease later-life risks of developing related chronic diseases. Despite these benefits, most children do not meet recommended national dietary guidelines. In order to provide personalized dietary support, the development of valid and user-appropriate food intake registration tools is crucial. Currently, no validated tools exist yet that are suitable for self-report among children in the Dutch context. A factor that may have hampered successful development so far is a lack of child-centered perspective and involvement of children throughout the design cycle. To illustrate, pilot data has shown that children had difficulties with categorizing eaten products into predefined food groups, but also with recognizing supporting food group icons. Therefore, as a first step towards child-centered dietary assessment, this study aims to co-create (1) food groups and (2) a corresponding food group illustration set that facilitates finding or self-reporting on dietary intake among Dutch children of 8-10 year's old.

**Methods:** In this qualitative study a series of three co-creation workshops will be held involving children, parents, and experts (pediatric dietitians, graphic designers, and teachers). In the first one-to-one phase (*co-creation with user-perspective*), card sorting method will be used to ask children (n=12) to divide most consumed food items into food groups; subsequently participants will design first versions of corresponding. During the second phase (*co-creation with expert-perspective*), results from phase 1 will be evaluated and updated with experts by means of a mood board-guided discussion (n=9). Subsequently, using photovoice and contextual inquiry, the usability and comprehensiveness of the designed illustrations-set will be evaluated in a real-life setting with children (n=24) (*phase 3 – co-creation for evaluation*). Video recordings and field-notes will be analyzed by a combination of general inductive and deductive approaches of content analysis.

**Results:** First results are expected in April-May 2023.

**Conclusions:** Including end-user's voices throughout the development of dietary tools is expected to contribute to increased comprehensiveness (i.e., coverage of foods), user-friendliness and user-engagement. Insights of the current study will be used for further development of a digital dietary coaching's tool for children of 8-10 years old.

# Changes in capacity for public and political engagement, and attitudes towards obesity and preventive measures among adolescents participating in the CO-CREATE youth Alliance: an exploratory effect analysis

**Mr. Sondre Haugsbø Herstad<sup>1</sup>**, Dr. Navnit Kaur Grewal<sup>1</sup>, Assistant Professor Anna Banik<sup>2</sup>, Prof. Knut-Inge Klepp<sup>3</sup>, Prof. Cecile Knai<sup>4</sup>, Prof. Aleksandra Luszczynska<sup>2</sup>, Miss Sofia Mendes<sup>5</sup>, Dr. Ana Rito<sup>6</sup>, Prof. Harry Rutter<sup>7</sup>, Prof. Nanna Lien<sup>1</sup>

<sup>1</sup>Department of Nutrition, University of Oslo, Oslo, Norway, <sup>2</sup>SWPS University of Social Sciences and Humanities, Wrocław, Poland, <sup>3</sup>Division of Mental and Physical Health, Norwegian Institute of Public Health, Oslo, Norway, <sup>4</sup>Faculty of Public Health & Policy, London School of Hygiene & Tropical Medicine, London, United Kingdom, <sup>5</sup>Center for Studies and Research on Social Dynamics and Health - CEIDSS, Lisbon, Portugal, <sup>6</sup>National Institute of Health Dr. Ricardo Jorge, Lisbon, Portugal, <sup>7</sup>Department of Social and Policy Sciences, University of Bath, Bath, United Kingdom

**SO.1.05 - If it's complex, use participatory research designs, UKK - Hall D (Level 2 - main floor), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose** The aim of this study was to assess any effects on adolescents' reported readiness to be engaged in dealing with obesity as a societal issue, conceptualization of obesity in terms of personal or societal responsibility, and perceived drivers of unhealthy behavior before, during, and after participating in participatory action research based activities and policy design.

**Method** This was a quasi-experimental study, where adolescents (n=199) came together with researchers in their respective countries (the Netherlands, Norway, Poland, Portugal, and the U.K) and formed 15 youth Alliances to co-create policy ideas for obesity prevention. At baseline and monthly measurement points, the participants completed an online questionnaire, measuring readiness for action through 18 items, and attitudes towards obesity prevention – responsibility and drivers of unhealthy behavior, by 34 items. A control sample (n=280) was recruited from non-participating schools, and assessed twice. We created two sub-samples from the total sample (n=439) at baseline (Control=0, Alliance=1). Sub-sample 1 (n=213) and sub-sample 2 (n=195), which included Alliance members who responded to the questionnaire at baseline, and at a measurement point prior to the COVID-19 lockdown (n=90) as intermediary effects (after 2-3 months), or upon completion (n=72), respectively. A control group (n=123) were included in both samples. We used a two level linear mixed model to control for country variance to assess the effects in the two samples.

**Results** In sub-sample 1, Alliance members scored significantly higher than the control group on responsibility of “government/public policy” (b=0.56, 95% CI=0.11, 1.01), and on “social media” (b=0.50, 95% CI=0.08, 0.91) as a driver of unhealthy behaviour. In sub-sample 2, Alliance members scored significantly higher than the control group on “using social networking platforms to discuss a social issue” (b=0.62, 95% CI=0.21, 1.03), responsibility of “private business” (b=0.50, 95% CI=0.15, 0.85) and “transportation companies” (b=0.42, 95% CI=0.02, 0.82), and on “lack of knowledge/understanding” (b=0.37, 95% CI=0.06, 0.67) and “lack of focus on healthy lifestyle among friends and family” (b=0.44, 95% CI=0.00, 0.87) as drivers of unhealthy behaviour.

**Conclusion** Although few changes were found, significant effects, with the exception of “lack of knowledge/understanding”, were in the expected direction.

# Applying the Context Implementation and Complex Interventions (CICI) Framework to translating a nutrition evidence-based intervention for Latinos in rural Washington, USA.

**Dr. Barbara Baquero**<sup>1</sup>, Mrs. KeliAnne Hara-Hubbard<sup>1</sup>, Miss Norma Garfias Avila<sup>1</sup>, Dr. Lesley E. Steinman<sup>1</sup>, Dr. India J. Ornelas<sup>1</sup>

<sup>1</sup>University of Washington School of Public Health, Seattle, USA

**SO.1.05 - If it's complex, use participatory research designs, UKK - Hall D (Level 2 - main floor), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** Contextual factors are critical to the translation of evidence-based health promotion interventions; however, methods to identify these factors are limited. We applied the CICI framework to identify and evaluate contextual factors relevant to translating a nutrition intervention for Latinos in rural Washington, USA.

**Methods:** We used a participatory approach, partnering with community organizations invested in food equity. Using a mixed-method design, we: reviewed scientific, publicly available data on contextual factors (quantitative) and conducted 12 key informant interviews with community leaders (qualitative). Data was coded and categorized into the CICI's five contextual categories. We integrated the data, identifying contextual factors critical to increasing access to healthier foods and the translation of the intervention. A causal loop diagram helped illustrate connections between contextual factors and intervention translation.

**Results/Findings:** We synthesized data sources to determine the impact of contextual factors at different levels of influence. **Geographic factors** indicated a rural agricultural hub with 1-5.75 out of 20 walkability scores and limited access to public transportation. **Epidemiological factors** showed Latinos represented >51.8% in the study region, with many speaking a language other than English at home (20.9%-47.5%), experiencing high rates of obesity (31-37%) and poverty (9.1%-14.8%). **Sociocultural factors** indicated that food preferences and traditions were salient for the community when deciding where to purchase food and what food to eat. The traditional diet included fresh fruits and vegetables; however, there was low fruit and vegetable consumption. **Socioeconomic factors** suggested Latinos have fewer economic opportunities and spent more on housing than whites, and experience food insecurity. **Legal and political factors** indicated immigration status reduced Latinos' power to advocate for living wages, accessible food assistance programs, and healthier food environments.

**Conclusion:** Community partners noted that living wages, transportation, budgeting, and nutrition knowledge were key factors in translating a nutrition intervention in the region. We discuss how we incorporate these factors into the intervention. This research advances methods to include relevant contextual factors that influence the translation and implementation of interventions in community settings. This approach is feasible, rigorous, and effective when conducted in partnership with communities.



# Partner support and physical activity levels in mother-father dyads during pregnancy

**Dra. Vicka Versele**<sup>1,2</sup>, Associate Prof. Annick Bogaerts<sup>2,3,4</sup>, Prof. Roland Devlieger<sup>2,5,6</sup>, Assistant Prof. Tom Deliens<sup>1</sup>, Prof. Peter Clarys<sup>1</sup>, Prof. Dirk Aerenhouts<sup>1</sup>

<sup>1</sup>Faculty of Physical Education and Physiotherapy, Department of Movement and Sport Sciences, Vrije Universiteit Brussel, Brussels, Belgium, <sup>2</sup>Faculty of Medicine, Department of Development and Regeneration, KU Leuven, Leuven, Belgium, <sup>3</sup>Faculty of Medicine and Health Sciences, Centre for Research and Innovation in Care (CRIC), Antwerp, Belgium, <sup>4</sup>Faculty of Health, University of Plymouth, Plymouth, United Kingdom, <sup>5</sup>Obstetrics and Gynaecology, University Hospitals KU Leuven, Leuven, Belgium, <sup>6</sup>Department of Obstetrics, Gynaecology and Fertility, GZA Campus Wilrijk, Antwerp, Belgium

**SO.1.06 - Latest findings in motivational predictors, UKK - K1 (+K2) (Level 3), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Background and purpose:** Adequate physical activity (PA) levels during pregnancy are important for the health of the mother and her fetus. PA levels however decrease throughout the pregnancy and the postpartum period. Not only pregnant women, but also men experience changes in PA when becoming a parent. The influence of the partner was described as an interpersonal determinant of changes in both parents' PA behavior during the transition to parenthood. The aim of this study was to analyze if perceived partner support has an influence on parents own and partner's moderate-to-vigorous PA (MVPA) levels during the pregnancy of their first child.

**Methods:** A total of 304 expecting parents (i.e., 152 heterosexual couples) were recruited between week 8 and 10 of gestation by means of convenience sampling. Objective anthropometric and PA measurements were performed at 12 weeks of gestation. An online questionnaire was used to assess socio-demographic characteristics and perceived partner support in terms of PA. An Actor-Partner Interdependence Model (APIM) for distinguishable dyads was constructed to examine the relationship between perceived PA support and MVPA levels.

**Results:** For pregnant women, perceived PA support from their male partner was significantly associated with their own MVPA levels (i.e., actor effect;  $\beta=0.344$ ,  $SE=0.168$ ,  $p=0.040$ ) as well as the MVPA levels of the expecting fathers (i.e., partner effect;  $\beta=0.717$ ,  $SE=0.255$ ,  $p=0.005$ ). No significant actor nor partner effects were found for the expecting fathers. Partial intraclass correlation for MVPA levels between partners was positively significant ( $r=0.24$ ,  $p=0.007$ ) and also a positive relation between pregnant women and expecting fathers perceived PA support ( $r=0.40$ ,  $p<.001$ ) was observed.

**Conclusions:** Investigating the couple as a dyad is important as it takes into account daily interpersonal interactions between the partners of the couple. This study shows that partners can act as significant facilitators and may play an important role when promoting PA during pregnancy. Additionally, supportive couples seem to strengthen each other in keeping a healthy lifestyle in early pregnancy. Couple-based interventions need to be explored in the promotion of healthy lifestyle during the transition to parenthood.



# Concept: A configurable agent-based model of how qualitative beliefs influence active commuting

**Mr. Robert Greener**<sup>1</sup>, Dr. Simon Miles<sup>2</sup>, Prof. Nathan Griffiths<sup>3</sup>, Prof. Steven Cummins<sup>1</sup>

<sup>1</sup>London School of Hygiene and Tropical Medicine, London, United Kingdom, <sup>2</sup>Aerogility, London, United Kingdom, <sup>3</sup>University of Warwick, Coventry, United Kingdom

**SO.1.06 - Latest findings in motivational predictors, UKK - K1 (+K2) (Level 3), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose** Active commuting has been recommended as a method to increase population physical activity, but evidence is mixed. Social norms and beliefs related to travel behaviour may influence the uptake of active commuting interventions but are rarely considered in the design and evaluation of interventions. The purpose of this study was to develop and evaluate an innovative configurable agent-based model of how qualitative beliefs influence commuter travel behaviour, which could then be used to investigate active commuting interventions. Our research focussed on understanding the complex relationship between beliefs and individuals, considering the imperfect information of other's beliefs.

**Methods** We developed an agent-based model for how beliefs influence commuter travel behaviour, based on a mathematical model for how beliefs, in general, spread around social networks. This allows us to model how agents decide to perform commuting behaviours (walking, cycling, taking public transport, or driving) each day, for many agents. The model captures how individuals perceive the beliefs of their peers based upon the observation of behaviour. For example, if one individual sees another cycling to work, they determine that they are likely to have positive beliefs regarding cycling. Individuals belong to social networks, which exhibits small-world properties, with an average of 10 connections per individual. These connections are weighted, such that some peers are more influential than others. The model also captures how beliefs interact with one another, and how holding beliefs influences the performance of behaviour. The model was executed 10,000 times and is available under a permissive license.

**Results** The results will be analysed using a Bayesian hierarchical linear regression model exploring how the number of active journeys, and therefore population physical activity, is affected by input parameters. These results will be discussed during the oral presentation.

**Conclusions** This model serves as a useful instrument for investigating qualitative beliefs relevant to active commuting affect behaviour in a quantitative manner. The configurable nature of the model allows for exploration of the role of different beliefs in influencing travel choices, as well as the potential impact of interventions aimed at promoting active forms of transportation, which would be beneficial for health.

# Inequality regarding the climate impact of food - A comparative study between consumers with different energy consumption

**Mrs. Mari Wollmar**<sup>1</sup>, Dr. Anna Post<sup>1</sup>, Prof. Agneta Sjöberg<sup>1</sup>

<sup>1</sup>Food and Nutrition, and Sport science, Gothenburg, Sweden

SO.1.06 - Latest findings in motivational predictors, UKK - K1 (+K2) (Level 3), June 15, 2023, 12:00 PM - 1:15 PM

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** The food we eat contributes to the global climate impact, and food products contribute to climate impact in varying degrees. On a societal level, the shift towards sustainable meal options has mainly been noticeable among public meals. In this study, we want to problematize whether other groups in society can contribute to reducing their climate impact regarding food and meals – for example, consumers with a high energy intake (athletes). In this study, the carbon footprint from food and meals in high-energy consumers is compared with a group of consumers representing the Swedish average activity level.

**Methods:** The study recruited 49 participants aged 18-40 to one of two groups. The inclusion criteria were an activity level of a minimum of 300 minutes or a maximum of 150 minutes of MVPA and VPA per week. All study participants recorded their food intake and physical activity for seven and fourteen days, respectively. In addition, an online food record collected information on energy and macronutrient intake over seven consecutive days. Total energy expenditure was determined by indirect calorimetry and accelerometers. Further, the RISE climate database assessed carbon footprint (CO<sub>2e</sub>).

**Results:** Measured in absolute numbers, the high-active group, both females and males, increased their carbon footprint with higher energy intake. The low-active group, on the other hand, did not, on a group level, increase its carbon footprint with higher energy intake. The difference in carbon footprint results from macronutrient distribution within the two groups. The high-active group had a significantly higher energy intake, protein, carbohydrates, and fiber intake. The higher energy intake and choice of protein sources resulted in a significantly higher mean carbon footprint per day from the high-active group.

**Discussion/conclusion:** The focus on protein intake in athlete populations can have a substantial climate impact if protein sources are animal-based. It is a challenge to find nutritious and healthy analogs for animal products. But it is not the high energy intake per se that is problematic, but the foods the high energy consumers choose to eat.

# The Varying Influences of Outdoor Experiences During Childhood on Time Spent in Nature as an Adult

**Dr. Debra Kellstedt<sup>1</sup>**, Dr. Courtney Suess-Raeisinafchi<sup>2</sup>, Dr. Jay Maddock<sup>2</sup>

<sup>1</sup>Texas A&M AgriLife Extension, College Station, USA, <sup>2</sup>Texas A&M University, College Station, USA

**SO.1.06 - Latest findings in motivational predictors, UKK - K1 (+K2) (Level 3), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Multiple factors influence adults' decisions and abilities to be active and spend healthy amounts of time in nature. Physical activity performed in natural environments provides additional health benefits. While supports for physical activity have been well researched, we have less understanding of factors that influence time spent in nature. Over the last 50 years, the time that children spend in nature and free play has dropped dramatically. The purpose of this research was to explore the varying influences of a variety of outdoor childhood experiences on adult time spent in nature.

**Methods:** A multidisciplinary researcher and practitioner team generated 20 childhood experiences in nature items that were previously tested for reliability and validity. A factor analysis was conducted, and two childhood experiences in nature subscales were created to measure 1) everyday (e.g., playing on a playground or riding a bike) and 2) substantial (e.g., camping and hiking) outdoor experiences during childhood. Multiple linear regression was used with responses from a U.S. nationwide sample ( $n=2109$ ; 49.7% female; Mean Age=51.1; 59.8% White, 18.4% Hispanic 13.3% Black) to examine the influence of each outdoor experiences scale along with gender, age, intentions to be in nature, and self-efficacy to be in nature covariates on adult time spent in nature.

**Results/findings:** Everyday outdoor experiences in childhood ( $M = 3.81$ ,  $SD = 0.77$ ) were reported more often than substantial outdoor experiences ( $M = 2.55$ ,  $SD = 0.88$ ). The overall regression was statistically significant ( $R^2 = 0.31$ ,  $F(4, 2025) = 231.78$ ,  $p < 0.001$ ). There was a significant positive relationship between substantial childhood outdoor experiences ( $\beta = 0.16$ ,  $p = 0.01$ ), intentions ( $\beta = 0.83$ ,  $p < 0.001$ ), and self-efficacy ( $\beta = 0.54$ ,  $p < 0.001$ ), and adult time spent in nature, while everyday childhood outdoor experiences did not significantly predict adult time spent in nature ( $\beta = -0.02$ ,  $p = 0.72$ ).

**Conclusions:** Even though everyday childhood outdoor experiences occurred more frequently, they may not translate into activities for adults to spend time in nature. Interventions designed to produce more substantial childhood outdoor experiences may have a greater effect on adult health behaviors.

# Meeting 24 h Movement Guidelines and the relationship with active commuting to school in Spanish urban areas

**Miss Evelyn Martín-Moraleda**<sup>1</sup>, Mr. Iván Pinilla-Quintana<sup>1</sup>, Dr. Cristina Romero-Blanco<sup>2</sup>, Dr. Antonio Hernández-Martínez<sup>2</sup>, Mr. Fabio Jiménez-Zazo<sup>1</sup>, Mr. Alberto Dorado-Suárez<sup>1</sup>, Dr. Virginia García-Coll<sup>1</sup>, Dr. Esther Cabanillas-Cruz<sup>1</sup>, Dr. Matthew Fagan<sup>3</sup>, Dr. Manuel Herrador-Colmenero<sup>4</sup>, Dr. Ana Queralt<sup>5</sup>, Dr. Nuria Castro-Lemus<sup>6</sup>, Prof. Guy Faulkner<sup>3</sup>, Prof. Susana Aznar<sup>1</sup>

<sup>1</sup>PAFS Group University of Castilla-La Mancha , Toledo, Spain, <sup>2</sup>PAFS Group University of Castilla-La Mancha , Ciudad Real, Spain, <sup>3</sup>POP-PA Lab University of British Columbia, Vancouver, Canada, <sup>4</sup>PROFITH Group University of Granada, Granada, Spain, <sup>5</sup>AFIPS Group University of Valencia, Valencia, Spain, <sup>6</sup>FENIX Group University of Sevilla, Sevilla, Spain

**SO.1.06 - Latest findings in motivational predictors, UKK - K1 (+K2) (Level 3), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** New guidelines from Canada indicate all movement behaviours (physical activity (PA), screen time and sleep) are important for health. Active commuting to school (ACS) provides an opportunity to increase PA levels daily. The aim of this study was to assess the prevalence of ACS, and if meeting the 24h Movement Guidelines is associated with ACS in adolescents.

**Methods:** Our study captured a cross-sectional sample of adolescents from seven Spanish urban areas. Recruitment occurred at two time points, from November 2020 to June 2021 and December 2021 to April 2022. All measurements were carried out as part of the “PACO & PACA” Research Project. Adolescents answered an online questionnaire on the mode of commuting to school and lifestyle behaviors. Logistic regression models were fit to evaluate if meeting the 24h Movement Guidelines was associated with ACS.

**Results:** The final sample included 713 adolescents (mean age= 14.82 ± 0.5 years, 50.8% girls). A total of 55.8% adolescents commuted actively from home to school and only 8.9% met all the Canadian 24h Movement Guidelines. Data showed active commuters (AC) met 24h Movement Guidelines more than passive commuters (PC) (None: 46.3% in AC vs. 53.7% in PC; meeting 1 guideline: 53.8 % in AC vs. 46.2% in PC; meeting 2 guidelines: 62% AC vs. 38% in PC; meeting 3 guidelines: 59% in AC vs. 41 % PC; p=0.041). Evidence from the binary logistic regression indicated those who did not meet any 24 h Movement Guidelines had lower odds of ACS than those who met 2 guidelines (OR=1.89 , 95% CI: 1.19-3.01). In particular, girls who met 2 or all 24h Movement Guidelines had higher odds of ACS than those who met none (OR=2.06, 95% CI: 1.10-3.87; OR=2.30, 95% CI: 1.00-5.27, respectively).

**Conclusion:** These findings showed an association between meeting the 24 h movement guidelines and higher odds of ACS in adolescent girls.

# Effective behaviour change techniques in e- and mHealth interventions targeting risk factors for non-communicable diseases: an umbrella review

**Dr. Jacqueline Mair**<sup>1,2,6</sup>, Dr. Alicia Salamanca-Sanabria<sup>1</sup>, Dr. Mareike Augsburger<sup>3</sup>, Ms. Stefanie Abend<sup>3</sup>, Ms. Bea Frese<sup>1</sup>, Mr. Robert Jakob<sup>6</sup>, Prof. Severin Haug<sup>3</sup>, Prof. Tobias Kowatsch<sup>1,4,5,6</sup>

<sup>1</sup>Future Health Technologies, Singapore-ETH Centre, Singapore, Singapore, <sup>2</sup>Saw Swee Hock School of Public Health, National University of Singapore, Singapore, Singapore, <sup>3</sup>Swiss Research Institute for Public Health and Addiction, University of Zurich, Zurich, Switzerland, <sup>4</sup>Institute for Implementation Science in Health Care, University of Zurich, Zurich, Switzerland, <sup>5</sup>School of Medicine, University of St. Gallen, St Gallen, Switzerland, <sup>6</sup>Centre for Digital Health Interventions, ETH Zurich, Zurich, Switzerland

**SO.1.06 - Latest findings in motivational predictors, UKK - K1 (+K2) (Level 3), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Despite an abundance of e- and mHealth interventions targeting the prevention and management of common non-communicable diseases (NCDs), it is unclear what specific components make an intervention effective in changing human behavior. The aim of this umbrella review was to identify the most effective behavior change techniques (BCTs) in e- and mHealth interventions that target the most common NCDs and provide recommendations that will guide future research and design frameworks for the development of effective interventions.

**Methods:** Five electronic databases were searched for articles published in English between 1st January 2007 and 24th January 2021. Studies were included if they were systematic reviews or meta-analyses of e- or mHealth interventions targeting the modification of one or more NCD-related risk factors in adults. BCTs were coded using the Behaviour Change Technique Taxonomy (BCTTv1) where possible. Study quality was assessed using AMSTAR 2. Please note the search is currently being updated to 1 December 2022.

**Results:** Following screening of 342 articles from the initial search, 61 articles spanning 10 health domains and comprising over 500,000 individual participants were included in the review. We found that e- and mHealth interventions are favorably associated with improved health outcomes for patients with cardiovascular disease, cancer, type 2 diabetes, and asthma, and health-related behaviors including physical activity, sedentary behavior, diet, weight management, medication adherence, and abstinence from substance use. There was strong evidence from sub-group or regression analyses to suggest that education, communication with a professional, tailored reminders, goals and planning, feedback and monitoring, and personalization components increase the effectiveness of e- and mHealth interventions targeting NCDs and lifestyle behaviours. There was either no, or inadequate, evidence for effective BCTs in e- and mHealth interventions targeting cancer and asthma self-management. Reviews of nutritional and medication adherence interventions were unable to establish any association between specific BCTs and intervention effectiveness.

**Conclusions:** Common BCTs across several health domains, such as 'goals and planning', increase e- and mHealth intervention effectiveness and should be prioritized for inclusion within future interventions.

# A formative evaluation of NY SNAP Express among income-eligible food assistance beneficiaries using the COM-B Model

**Ms. Reah Chiong<sup>1</sup>**, Mr. Julio Salas<sup>1</sup>, Ms. Julia Kohn<sup>1</sup>, Ms. Emily St. John<sup>1</sup>, Assistant Professor Roger Figueroa<sup>1</sup>

<sup>1</sup>Cornell University, Ithaca, USA

**SO.1.06 - Latest findings in motivational predictors, UKK - K1 (+K2) (Level 3), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose.** The purpose of the study is to assess the barriers and facilitators to online grocery shopping through an online meal kit and grocery shopping platform titled NY SNAP Express among adults eligible for the Supplemental Nutrition Assistance Program (SNAP), a U.S. federal nutrition assistance program.

**Methods.** SNAP-eligible adults residing in NY state were purposively sampled to participate in 1-hour phone or virtual interviews. An interview facilitation guide was used and adapted using constructs from the Capabilities, Opportunities, Motivations, and Behaviors (COM-B) model. Interviews were conducted, transcribed verbatim, and analyzed using a grounded theory framework beginning with line-by-line coding followed by selective coding. At every coding stage, at least two researchers coded the transcripts independently and wrote analytic memos. Consensus was drawn between all researchers on major themes related to barriers and facilitators to online grocery shopping through the NY SNAP Express platform.

**Results/Findings.** Participants (n=32) were mainly female, White-identifying, and made less than \$9,999 annually. Major Capability barriers to participation include physiological and health conditions, weight of food, technology, and language. Additional barriers related to Opportunities include the price of foods, a lack of a reliable mode of transportation, and stigma associated with the SNAP program. Lastly, barriers related to one's Motivations to participate in the program include concerns regarding the quantity and quality of meal kits. Among Capability-related facilitators, most participants indicated that they would use the platform if their health and nutrition is improved and they gain food-related knowledge and skills. Among facilitators related to Opportunities, SNAP-eligible adults would be willing to participate if the program helped them save money, received support from family and friends, and offered culturally relevant meals. Finally, facilitators related to Motivations include the potential for efficiency in food purchasing and preparation and customization of meal kits that meets their and their household's needs.

**Conclusions.** Platforms like NY SNAP Express could maximize food access, especially among marginalized groups. Future studies aiming to improve online grocery services should consider the barriers and facilitators identified in this formative study.



# Exploring the Use of Context Specific Behavioral Economic Principles to Enable Patients to Change Their Physical Activity Patterns

**Dr. Brittany Barber<sup>1</sup>**, Prof. Daniel Rainham<sup>1</sup>, Dr. Michael Vallis<sup>1</sup>, Prof. Ruth Martin-Misener<sup>1</sup>, Prof. George Kephart<sup>1</sup>

<sup>1</sup>Dalhousie University, Halifax, Canada

**SO.1.06 - Latest findings in motivational predictors, UKK - K1 (+K2) (Level 3), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Cardiovascular diseases (CVD) are the leading cause of death worldwide, accounting for more than 17 million deaths annually, and 1/5 of all deaths in Canada. Behavioral interventions for modifying risk factors are critical for reducing risk of CVD or a repeat event. The effectiveness of interventions to reduce risk of CVD is hindered by poor maintenance of behaviors after an intervention when patients no longer have regular contact with healthcare professionals and peers, and use of digital tools that do not adequately consider the spatiotemporal contexts within which patient health behaviors occur. This additional knowledge is critical to ensure intervention strategies are tailored to incorporate the timing and location of seemingly automatic decisions patients make as part of their daily routines. This study explores how context-specific behavioral economic principles can be employed to tailor interventions to support patients' efforts to modify day-to-day routines.

**Methods:** Semi-structured interviews were used to gather in-depth descriptions about facilitators and barriers to increasing physical activity (PA) and contexts influencing decisions about day-to-day activities. Data were analyzed using the COM-B model for behavior change and MINDSPACE framework of behavioral economic principles as coding frameworks.

**Results:** Data were gathered from patients at one cardiac prevention and rehabilitation intervention in Nova Scotia, Canada. A total of 29 patients (19 men and 10 women) between the ages of 45 to 81 who were referred to the program after a cardiac event participated in this study. Findings indicate patients were capable and motivated to increase their PA but were challenged to identify opportunities to adapt day-to-day routines for increasing PA. Patients described disrupting default routines, increasing commitments, changing the messenger, and introducing incentives as potentially useful behavioral economic principles that could be applied to improve day-to-day decisions about increasing PA.

**Conclusions:** Coupling behavioral economic principles with spatiotemporal contexts of patients' day-to-day routines provides critical information of what behavioral economic principles can be tailored to when and where patients' health activities occur. Patients had insight into potential behavioral economic principles, although they were not previously educated, and could be valuable partners in developing behavioral intervention strategies.

# Factors influencing the physical activity of adolescent girls living in an informal settlement in Kenya: A mixed-methods sequential explanatory study

Dr. Stephanie Martin<sup>1</sup>, Dr. Erick Nandoya<sup>2</sup>, Mr. Nathan Ruto Kipkoech<sup>2</sup>, Ms. Mercy Owuor<sup>2</sup>, Ms. Wilkister Olando<sup>2</sup>, Mr. Mark Muasa<sup>2</sup>, Mr. Yunus Mohammed<sup>2</sup>, Mr. Hillary Omala<sup>2</sup>, Ms. Emily Seiger<sup>1</sup>, Dr. Alice Ammerman<sup>1</sup>, Dr. Katie Meyer<sup>1</sup>, Dr. Saroja Voruganti<sup>1</sup>, Dr. Margaret Bentley<sup>1</sup>, **Dr. Leslie Lytle<sup>1</sup>**

<sup>1</sup>University of North Carolina At Chapel Hill, Chapel Hill, USA, <sup>2</sup>CFK Africa, Nairobi, Kenya

**SO.1.06 - Latest findings in motivational predictors, UKK - K1 (+K2) (Level 3), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** In Nairobi Kenya, 70% of the population lives in informal settlements; Kibera is the largest. Physical activity can be negatively impacted by this environment and understanding specific factors related to physical activity in informal settlements is critical to designing effective interventions. Led by CFK Africa, an organization supporting participatory development and public health in informal settlements, this study examined factors that influence adolescent girls' physical activity.

**Methods:** Data from a mixed-methods sequential explanatory design were used to explore physical activity among adolescent girls in Kibera. Girls ages 15-16 from Kibera participated in a cross-sectional survey (n=316). The Global Physical Activity Questionnaire previously adapted for Kenya was used to collect self-reported physical activity data. A purposive sample of adolescent girls ages 13-19 years and their parents participated in focus group discussions (FGDs) to examine factors that influence adolescents' physical activity.

**Results:** The mean age of survey participants was 17.5 years (SD 1.34) and most were enrolled in school (79.8%). Walking was the main form of transportation among survey participants (83.1%) and more than half (56.9%) reported amounts of walking for transportation that met the WHO weekly guidelines for physical activity. Physical activity levels did not vary by sociodemographic characteristics. It was uncommon for participants to engage in recreational physical activity more than one day each week (13.9%) and 22.2% reported almost no recreational physical activity. In FGDs, girls expressed an interest in recreational physical activity, but adolescent girls and parents identified several barriers to recreational physical activity, including lack of space at schools and in the community, lack of clothes and equipment, concerns about safety, and lack of time because of household chores and schoolwork. Parents also identified adolescents' screen time as a barrier. FGD participants suggested organized family recreational activities (e.g. fun runs, dances) and providing school-based sports as a way to increase physical activity.

**Conclusion:** While walking for transportation was common, adolescent girls face considerable environmental, social, and economic barriers to recreational physical activity in Kibera. Tailored, contextually appropriate interventions are needed to address the barriers to physical activity that adolescent girls in informal settlements experience.

# ‘Maintaining balance in life’ - Exploring older adults’ long-term engagement in self-managed digital fall prevention exercise

**Dr. Beatrice Pettersson**<sup>1</sup>, Dr. Sara Lundell<sup>1, 2</sup>, Prof. Lillemor Lundin-Olsson<sup>1</sup>, Dr. Marlene Sandlund<sup>1</sup>  
<sup>1</sup>Umeå University, Department of Community Medicine and Rehabilitation, Umeå, Sweden, <sup>2</sup>Umeå University, Department of Sociology, Umeå, Sweden

SO.1.07 - Latest findings in Ageing, UKK - K3+4 (Level 3), June 15, 2023, 12:00 PM - 1:15 PM

**SIG - Primary Choice:** A. Ageing

**Background** Accidental falls are one of the greatest threats to older adults’ health and well-being. The risk of falling can be significantly reduced with strength and balance interventions. However, there needs to be further knowledge into how older adults can be supported to achieve a maintained exercise behaviour. Therefore, the aim of this study was to explore factors related to older adults’ long-term engagement during an intervention of self-managed digital fall prevention exercise.

**Methods** This study used a grounded theory methodology. Semi-structured individual interviews were conducted by phone or conference call. Eighteen community-dwelling older adults aged 70 years or more participated. The participants had a self-reported exercise dose 60 minutes or more during the last three months of participation in a 12-months intervention of self-managed digital fall prevention exercise, the Safe Step randomized controlled trial. Open, axial, and selective coding, along with constant comparative analysis, was used to analyze the data.

**Results** The analysis resulted in a theoretical model. We found that the fall prevention exercise habits of adults were developed through three stages: *Acting against threats to one’s own identity*, *Coordinating strategies to establish a routine*, and *Forming habits through cues and evaluation*. The main category of *Maintaining balance in life* encases the participants transition through the three stages and reflects balance in both physical aspects and in between activities in daily life. The process of maintaining balance in life and desire to do so were mediated both by intrinsic person-dependent factors and the Safe Step application acting as an external mediator.

**Conclusion** This study identified three stages of how older adults developed self-managed fall prevention exercise habits, supported by a digital application. The generated theoretical model can inform future interventions aiming to support long-term engagement in digitally supported and self-managed fall prevention interventions.

# Community-dwelling and institutionalized older adults' experiences of a physical activity and sedentary behaviour intervention: role of self-management strategies

**Prof. Maria Giné-Garriga<sup>1,2</sup>**, Dr. Nicole Blackburn<sup>3</sup>, Dr. Laura Coll-Planas<sup>4</sup>, Prof. Dawn Skelton<sup>5</sup>

<sup>1</sup>Department of Sport Sciences, Faculty of Psychology, Education and Sport Sciences Blanquerna, Universitat Ramon Llull, Barcelona, Spain, <sup>2</sup>Department of Physical Therapy, Faculty of Health Sciences Blanquerna, Universitat Ramon Llull, Barcelona, Spain, <sup>3</sup>Institute of Nursing and Health Research, School of Health Sciences, Ulster University, Ulster, United Kingdom, <sup>4</sup>Research Group on Methodology, Methods, Models and Outcome of Health and Social Sciences (M3O), Faculty of Health Sciences and Welfare, University of Vic - Central University of Catalonia (UVIC-UCC), Vic, Spain, <sup>5</sup>School of Health and Life Sciences, Glasgow Caledonian University, Glasgow, United Kingdom

**SO.1.07 - Latest findings in Ageing, UKK - K3+4 (Level 3), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** A. Ageing

**Background:** Two different studies comprising a physical activity and sedentary behaviour-based program enhanced with self-management strategies were evaluated in a trial in several European countries and England. The aim of these qualitative studies was to understand the role of self-management strategies in the sustainability of the intervention at 18 and 6-month follow up as mechanisms of impact, as well as to explore the perceived effects.

**Methods:** Qualitative methodologies were nested in the one trial including 71 individual interviews and 12 focus groups targeting intervention and control group participants from postintervention to 18-month follow-up in all intervention sites based on a semi-structured topic guide. Qualitative methodologies were applied in another trial including 9 individual interviews and 4 focus groups targeting intervention and control group participants from postintervention to 6-month follow-up in two intervention sites based on a semi-structured topic guide.

**Results:** Overarching themes were identified under the framework categories of context, implementation, sustainability of the intervention (mechanisms of impact) and perceived effects. The findings highlight the perceived barriers and facilitators to older adults' engagement in PA and SB programs, and differences were noted between community-dwelling and institutionalized older adults and between gender. Social interaction and enjoyment through the group-based programmes are key components to promote adherence and encourage the maintenance of targeted behaviours through peer support and connectedness. Exit strategies and signposting to relevant classes and facilities enabled the maintenance of positive lifestyle behaviours, and increased their adherence and maintenance.

**Conclusions:** When designing and implementing interventions, key components enhancing social interaction, enjoyment and continuity should be in place to successfully promote sustained behaviour change.

# Healthy Grandparenting Project: The impact of non-residential grandchild care on physical activity and sedentary behavior in people aged 50 years and over.

**Ms. Marie Vermote<sup>1, 2, 3</sup>**, Prof. Benedicte Deforche<sup>1,2</sup>, Prof. Tom Deliens<sup>1</sup>, Prof. Eva D'Hondt<sup>1</sup>

<sup>1</sup>Department of Movement and Sport Sciences, Vrije Universiteit Brussel, Brussels, Belgium, <sup>2</sup>Department of Public Health and Primary Care, Ghent University, Ghent, Belgium, <sup>3</sup>Research Foundation – Flanders (FWO), Brussels, Belgium

**SO.1.07 - Latest findings in Ageing, UKK - K3+4 (Level 3), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** Given the widespread provision of grandparental childcare, examining its impact on older adults' energy-expenditure related behavior in the broader context of health is imperative. Therefore, the Healthy Grandparenting Project aims to investigate the levels of physical activity (PA) and sedentary behavior (SB) in grandparents caring for their grandchildren (aged between 0 and 5 years) and to compare these outcomes with non-caregiving grandparents and older adults without grandchildren, both momentarily and over time.

**Methods:** A prospective cohort study ran over a one-year period, including three test occasions with a six-month time interval in between (T0 = baseline, T1 = 6 months, T2 = 12 months). Participants' levels of PA and SB were measured objectively by means of accelerometry. Information about their grandchildren and the provided grandparental care was assessed using self-report questionnaires. Mixed modelling was used to identify differences in PA and SB between the subsamples at baseline. Comparing changes in energy-expenditure related behavior over time between subsamples and identifying the predictors of these detected changes will be investigated in future analyses and presented at the conference.

**Results:** Initially, 98 were caregiving grandparents, 64 non-caregiving grandparents and 91 non-grandparents were included in the cross-sectional baseline analyses. The total sample (N=253) was  $65.6 \pm 5.8$  years old, consisted of 64.6% females and had a mean body mass index of  $25.7 \pm 4.1$  kg/m<sup>2</sup>. Preliminary results concerning the differences in PA and SB showed a significantly higher amount of light intensity PA in caregiving grandparents ( $1808.6 \pm 413.8$  min/week) compared to non-caregiving grandparents ( $1642.9 \pm 528.4$  min/week) ( $p=0.004$ ) and between caregiving grandparents and non-grandparents ( $1670.4 \pm 430.6$  min/week) ( $p=0.015$ ), whereas no differences were observed between non-caregiving grandparents and non-grandparents ( $p=0.509$ ). No subgroup differences were found in moderate-to-vigorous PA ( $p=0.275$ ) or SB ( $p=0.311$ ).

**Conclusion:** Regular care for grandchildren might have a beneficial effect on levels of light intensity PA. Within the next step(s) of data analysis, it should be examined whether these higher amounts of light intensity PA were obtained in presence or in absence of the grandchildren and whether the difference in light intensity PA has an impact on grandparents' health.

# Lifestyle factors and incidence of multimorbidity of chronic diseases: a population-based cohort study in 132,444 adults

Dr. Yihui Du<sup>1,2</sup>, Prof. Geertruida H. de Bock<sup>1</sup>, Dr. Judith M. Vonk<sup>1</sup>, Ms. An Thanh Pham<sup>1</sup>, Dr. Yldau van der Ende<sup>3</sup>, Prof. Harold Snieder<sup>1</sup>, Associate Professor Nynke Smidt<sup>1</sup>, Associate Professor Paul F. M. Krabbe<sup>1</sup>, Associate Professor Behrooz Z. Alizadeh<sup>1</sup>, Prof. Gerton A. Lunter<sup>1</sup>, **Associate Professor Eva Corpeleijn<sup>1</sup>**

<sup>1</sup>University of Groningen, University Medical Center Groningen, Department of Epidemiology, Groningen, Netherlands, <sup>2</sup>School of Public Health, Faculty of Medicine, Hangzhou Normal University, Department of Epidemiology and Health Statistics, Hangzhou, China, <sup>3</sup>Department of Cardiology, Division of Heart and Lungs, Utrecht University, University Medical Center Utrecht, Utrecht, Netherlands

**SO.1.07 - Latest findings in Ageing, UKK - K3+4 (Level 3), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose** Multimorbidity, the co-existence of two or more chronic conditions in the same individual, is a growing health challenge globally. This study aimed to evaluate the role of a comprehensive set of lifestyle factors in the development of multimorbidity.

**Methods** From the Dutch prospective Lifelines cohort, we included 132,447 adult participants without or with one chronic disease at baseline. Incidence of multimorbidity was defined as the co-occurrence of two or more diseases (cardiovascular disease, cancer, chronic respiratory disease and/or type-II diabetes) at follow-up, based on self-reported and clinical data. Eleven lifestyle factors were defined by the six Lifestyle Medicine domains, including diet quality, physical activity (daily physical activity, sedentariness (TV watching)), stress/relaxation (acute stress, chronic stress), substance use (alcohol consumption, smoking status), sleep (sleep duration, sleep treatment), and social connectedness (number of social contacts, marital status) from questionnaires. Cox regression models were constructed for evaluating the associations between baseline lifestyle factors and incident multimorbidity, separately for chronic disease-free participants (n=103,215), and participants with one chronic disease (n=29,232) at baseline. The follow-up time was counted from baseline to the time reporting disease or to last time of follow-up assessment, whichever came first. All analyses were adjusted for socio-demographical factors.

**Results** During a median follow-up of 3.4 (IQR:2.2-4.3) years, 433 chronic disease-free participants and 3677 participants with one disease at baseline developed multimorbidity. The top unhealthy lifestyle factors shared by both populations included current smoking (HR, 95%CI: 2.34, 1.77-3.09 and 1.34, 1.23-1.47, respectively), prolonged TV watching ( $\geq 5$  hrs/day, HR 1.71, 1.24-2.37 and 1.33, 1.18-1.50, respectively) and chronic stress (HR 1.70, 1.28-2.25 and 1.21, 1.09-1.33, respectively). Additionally in people with one chronic condition at baseline, high alcohol consumption ( $>1.5$  drinks/day and/or binge drinking, HR 1.28, 1.16-1.42) and inadequate sleep duration (too short/too long, HR 1.21, 1.01-1.44) were associated with a higher risk of developing multimorbidity.

**Conclusions** Current smoking, prolonged TV watching and chronic stress are strongly associated with the development of multimorbidity of chronic diseases in individuals with no or already one disease. The findings indicate interventions targeting a broad spectrum of unhealthy lifestyle factors in addition to traditional risk factors.



# Physical activity programs and services for older adults: a review of effectiveness from primary studies

**Dr. Heidi Gilchrist**<sup>1,2</sup>, Dr. Marina B. Pinheiro<sup>1,2</sup>, Dr. Jennifer Baldwin<sup>1,2</sup>, Dr. Juliana S. Oliveira<sup>1,2</sup>, Associate Professor Leanne Hassett<sup>2,3</sup>, Dr. Nathalia Costa<sup>1,2</sup>, Ms. Belinda Wang<sup>1,2</sup>, Dr. Wing Kwok<sup>1,2</sup>, Ms. Bruna S. Albuquerque<sup>1,2</sup>, Ms. Luiza R. Pivotto<sup>1,2</sup>, Ms. Ana Paula M. C. Carvalho-Silva<sup>1,2</sup>, Dr. Sweekriti Sharma<sup>1,2</sup>, Dr. Steven Gilbert<sup>1,2</sup>, Prof. Adrian Bauman<sup>1,4</sup>, Dr. Fiona Bull<sup>5</sup>, Dr. Juana Willumsen<sup>5</sup>, Prof. Anne Tiedemann<sup>1,2,4</sup>, Prof. Catherine Sherrington<sup>1,2,4</sup>

<sup>1</sup>School of Public Health, Faculty of Medicine and Health, The University of Sydney, Camperdown, Gadigal Country, Australia, <sup>2</sup>Institute for Musculoskeletal Health, The University of Sydney, Sydney Local Health District, Camperdown, Gadigal Country, Australia, <sup>3</sup>School of Health Sciences, Faculty of Medicine and Health, University of Sydney, Camperdown, Gadigal Country, Australia, <sup>4</sup>World Health Organization (WHO) Collaborating Centre for Physical Activity, Nutrition and Obesity, Charles Perkins Centre, The University of Sydney, Camperdown, Gadigal Country, Australia, <sup>5</sup>Physical Activity Unit, Department of Health Promotion, Division of Universal Health Coverage and Healthier Populations, World Health Organization (WHO), Geneva, Switzerland

**SO.1.07 - Latest findings in Ageing, UKK - K3+4 (Level 3), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose** Knowledge of which physical activity programs are most effective for older adults in different sub-populations and contexts is limited. The objectives of this World Health Organisation (WHO) commissioned rapid review were to: 1) overview evidence evaluating physical activity programs/services for older adults; and 2) describe impact on physical activity, falls, intrinsic capacity (physical domain), functional ability (physical, social, and cognitive/emotional domains), and quality of life.

**Methods** We conducted a rapid review, following Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA), of primary studies from 350 systematic reviews identified in a previous scoping review (March 2021: PEDro, MEDLINE, CINAHL, Cochrane Database). We included good quality ( $\geq 6/10$  PEDro scale) randomised controlled trials (RCTs) with  $\geq 50$  participants per group. The intervention effect for each relevant outcome was categorised and a positive effect was defined as more than 50% of between-group comparisons being in a positive direction.

**Results** Of the 1421 intervention studies identified from 8267 records, 79% were RCTs, 87% were in high income countries and 39% were good quality. We identified 87 large, good quality RCTs (26,861 participants). Overall activity promotion, structured exercise and recreation/sport had positive impacts ( $\geq 50\%$  between-group comparisons positive) across all outcome domains. For overall activity promotion (21 intervention groups), greatest impacts were on physical activity (100% positive) and social outcomes (83% positive). Structured exercise (61 intervention groups) had particularly strong impacts on falls (91% positive), intrinsic capacity (67% positive) and physical functioning (77% positive). Recreation/sport (24 intervention groups) had particularly strong impacts on cognitive/ emotional functioning (88% positive). Multicomponent exercise (39 intervention groups) had strong impacts across all outcomes, particularly physical activity (95% positive), falls (90% positive) and physical functioning (81% positive). Impacts varied across outcomes for different populations and settings.

**Conclusions** Evidence supporting physical activity for older adults is positive. The findings presented in this review for different populations and settings will provide guidance for developing physical activity programs for different populations, locations and settings globally.

# Avoiding God's waiting room: Lessons from the lived experiences of older people who use technology to support physical activity

**Dr. Abby Haynes<sup>1,2</sup>**, Dr. Heidi Gilchrist<sup>2,1</sup>, Dr. Juliana S Oliveira<sup>1,2</sup>, Prof. Catherine Sherrington<sup>1,2</sup>, Prof. Anne Tiedemann<sup>1,2</sup>

<sup>1</sup>Institute for Musculoskeletal Health, The University of Sydney and Sydney Local Health District, Sydney, Australia, <sup>2</sup>School of Public Health, The University of Sydney, Sydney, Australia

**SO.1.07 - Latest findings in Ageing, UKK - K3+4 (Level 3), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose** Digital technologies provide new opportunities to promote, incentivise and support physical activity for healthy ageing, but their potential is not fully realised. There is mixed information about older people's capacity to use new technologies to support physical activity, including how it can benefit them. This study sought to describe the characteristics and influences of older people's 'successful' uses of technology to support physical activity, and identify ways of building on existing strengths.

**Methods** We conducted narrative interviews with 17 purposively sampled people aged 70+ who, in a previous survey, reported using technology to support physical activity. Interview questions invited interviewees to reflect on their relationships with technology, physical activity and wellbeing, and to explore how their views and experiences were shaped by contextual factors. Data was analysed inductively, and then deductively using a framework of sensitising concepts (e.g. narratives of innovation, resistance, ageing and identity).

**Results** Interviewees perceived technology as a facilitator and motivator for physical activities that included walking, running, cycling, swimming, aqua aerobics, golf and online classes in yoga, Pilates, Tai Chi, seniors' exercise and dance. Many disparaged their technical skills yet used technology creatively to access, enhance and sustain physical activity. Interviewees were driven by philosophies of active living which underpinned their refusal to "sit in God's waiting room", and were bolstered by experiencing multiple health benefits. Technology use was influenced by social and health relationships. Gender difference were noted in how activity data was curated. Most interviewees reported navigating challenges associated with ageing in a discriminatory society, compounded by COVID-19. We identified four transferable 'lessons': 1. Embrace technology, 2. Find your thing, 3. Be adaptive and 4. Resist 'being old'.

**Conclusions** Older people's use of technology to support physical activity may be encouraged by leveraging trusted social and health relationships to model, promote and collaborate in technology-supported physical activity. More could be done to strengthen the value proposition of technology for older people by harnessing their expertise using co-design. In contrast to stereotypes, many older people are highly engaged in living active, resourceful lives, despite considerable challenges, and have valuable advice to offer.

# Changes in 24-hour (non-)movement behaviour during the retirement transition: the 'Move into Retirement' study

**Ms. Nina Vansweevelt<sup>1</sup>**, Prof. Jannique van Uffelen<sup>1</sup>, Prof. Filip Boen<sup>1</sup>, Prof. Jan Seghers<sup>1</sup>

<sup>1</sup>KU Leuven, Leuven, Belgium

**SO.1.07 - Latest findings in Ageing, UKK - K3+4 (Level 3), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** This study investigates the longitudinal changes in 24-hour (non-)movement patterns during the retirement transition in Flemish adults. Based on previous literature, it is hypothesized that the time spent in light physical activity (LPA) and moderate-to-vigorous physical activity (MVPA) will decrease, while the time spent in sedentary behaviour (SB) and sleep will increase. Besides this, it is expected that more favourable changes will occur in higher socio-economic groups compared to lower socio-economic groups. Moreover, changes are expected to be associated with several social-ecological factors.

**Methods:** The (non-)movement behaviour of the sample was measured with an Actigraph wGT3X-BT worn on the non-dominant wrist for 7 days and nights at two time points, namely up to six months prior to retirement and at three months after retirement. Questionnaires have been used to measure the following social-ecological factors: physical health status, mental health status, social connectedness and social group membership, exercise during the life course, exercise motivation, expectations regarding aging, several socio-economic status indicators and other demographic factors. The daily proportions in LPA, MVPA, SB and SLEEP will be estimated using the R package GGIR. Compositional data analysis will be used to analyse the data.

**Results:** We aim to recruit 100 participants pre-retirement (recruitment is still ongoing). The current sample (status 2022-12-01) measured at pre-retirement n = 88 and at 3 months post-retirement n = 62 (56% female; 2 % drop-out). Changes in (non-)movement behaviour during the retirement transition will be presented, alongside changes in the other measured factors. We will also present the absolute values of (non-)movement behaviour prior to retirement as well as after retirement.

**Conclusions:** This is one of the first studies to investigate device-based 24-hour (non-)movement behaviour in combination with a set of potentially influencing factors. The overarching aim of this study is to gain insight in the need for an intervention and to inform the development of an optimal lifestyle intervention during the retirement transition. The transition from work to retirement is a promising event to target with lifestyle interventions, since daily routines are often strongly impacted and mostly more free time becomes available.

# The equity of healthy eating and active living digital interventions for older adults

**Dr. Bronwyn McGill<sup>1</sup>**, Dr. Sarah Marshall<sup>1</sup>, Ms. Nicole Halim<sup>1</sup>, Dr. Sarah Yeun Sim Jeong<sup>2</sup>, Ms. Dee Upton<sup>2</sup>, Prof. Margaret Allman-Farinelli<sup>1</sup>

<sup>1</sup>Prevention Research Collaboration, The University of Sydney, Sydney, Australia, <sup>2</sup>NSW Ministry of Health, Sydney, Australia

**SO.1.07 - Latest findings in Ageing, UKK - K3+4 (Level 3), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose** Healthy eating and active living among people aged 65+ years contributes to healthy ageing. While health behaviour change interventions increasingly use digital technologies, there is debate about the equity of such interventions, particularly among older adults of low socioeconomic status, those living in regional and rural areas, those from culturally and linguistically diverse backgrounds and those with lower levels of education. This systematic review examined the equity of digital healthy eating and active living interventions in older Australian adults.

**Methods** We searched six electronic databases and grey literature. Eligibility criteria were: i) interventions targeting community-dwelling older Australians aged 65+ years, ii) delivered using digital technology to support behaviour change, iii) primary outcomes of promoting healthy eating and/or active living (physical activity and/or sedentary behaviour), iv) published evaluation results. Interventions delivered in rehabilitation or residential care settings were excluded. All study designs were included. Quality appraisal of studies was conducted by two independent authors using the Mixed Methods Appraisal Tool. A narrative synthesis was undertaken.

**Findings** Twenty-four reports of 17 interventions were included. From 1789 unique records identified, 110 full texts were assessed for eligibility. Of 66 grey literature listings assessed, none were eligible (e.g., government policy reports, local council documents, and local exercise groups). In the 17 interventions included, the primary outcomes included active living behaviours (n=13), healthy eating behaviours (n=1), or both (n=3). Digital delivery components included telephone (n=10), websites (n=6), fitness trackers (n=4), email (n=2), video conferencing (n=1), and mobile phone apps (n=1). Intervention duration ranged from 2 weeks to 18 months and were predominately delivered by allied health professionals (n=9). Four interventions specifically targeted older adults in regional or remote areas. No other equity-related characteristics were targeted. Healthy equity factors were either not discussed or minimally considered in the published evaluations.

**Conclusions** Our results highlight the scarce yet emerging evidence for digital healthy eating and active living interventions for older Australian adults. As interventions are developed or adapted, and evaluation evidence builds, it is essential to consider health equity to support all older adults to achieve a healthy and active lifestyle for maintaining independence and wellbeing.

# Maternal and paternal dietary quality and dietary inflammation associations with offspring DNA methylation and epigenetic biomarkers of aging

**Dr. Marion Lecorguillé<sup>1</sup>**, Dr. Pilar Navarro<sup>1</sup>, Dr. Ling-Wei Chen<sup>1,2</sup>, Dr. Celine Murrin<sup>1</sup>, Dr. Karien Viljoen<sup>1</sup>, Mr. John Mehegan<sup>1</sup>, Dr. Nitin Shivappa<sup>3</sup>, Prof. James R Hébert<sup>3,4</sup>, Prof. Cecily C Kelleher<sup>1</sup>, Dr. Matthew Suderman<sup>5</sup>, Dr. Catherine M Phillips<sup>1</sup>

<sup>1</sup>School of Public Health, Physiotherapy and Sports Science, University College Dublin, Dublin, Ireland,

<sup>2</sup>Institute of Epidemiology and Preventive Medicine, College of Public Health, National Taiwan University, Taipei, Taiwan, <sup>3</sup>Cancer Prevention and Control Program and Department of Epidemiology and Biostatistics, Arnold School of Public Health, University of South Carolina, Columbia, South Carolina, USA, <sup>4</sup>Connecting Health Innovations, LLC, Columbia, South Carolina, USA, <sup>5</sup>MRC Integrative Epidemiology Unit, Population Health Sciences, Bristol Medical School, University of Bristol, Bristol, United Kingdom

**SO.1.07 - Latest findings in Ageing, UKK - K3+4 (Level 3), June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** A. Ageing

**Purpose:** Maternal diet and chronic inflammation may influence early-life offspring health. Some evidence suggests these associations may be driven by epigenetic changes. New research described epigenetic aging – an age estimation based on DNA markers – as a mechanistic link between early-life exposures and long-term health. However, parental dietary quality effects on offspring DNA methylation (DNAm) remain poorly described. We aim to fill this gap by elucidating the influence of maternal and paternal whole-diet quality and inflammatory potential on offspring DNAm in the Lifeways Cross-generation cohort.

**Methods:** Irish families (n=1124) were recruited around 16 weeks of gestation. Maternal dietary intake during the first trimester and paternal diet during the 12 previous months were assessed with a food-frequency questionnaire. Parental dietary inflammatory potential and quality were determined using the energy-adjusted Dietary Inflammatory Index (E-DII<sup>TM</sup>), the Healthy Eating Index 2015 (HEI-2015), and the maternal Dietary Approaches to Stop Hypertension index (DASH) score. DNAm in the saliva tissue of 246 children at age nine was measured using the Illumina Infinium HumanMethylationEPIC array. DNAm-derived biomarkers of aging, the Pediatric-Buccal-Epigenetic clock (PedBE) and DNAm estimator of telomere length (DNAmTL), were calculated. Using an agnostic genome-wide approach, we examined parental dietary score associations with DNAm-derived biomarkers of aging and DNAm levels of 850K CpG sites.

**Results/findings:** We did not report major associations between parental dietary scores and epigenetic biomarkers of aging. However, maternal HEI-2015 scores were inversely associated with DNAm at CpG site (cg21840035) located near the *PLEKHM1* gene, whose functions involve regulation of bone development ( $\beta = -0.0036$ , per 1-point increase in the score,  $p\text{-value} = 5.6 \times 10^{-8}$ ). An increase in paternal HEI-2015 score was related to lower methylation at CpG site (cg22431767), located near cell signaling gene *LUZP1* ( $\beta = -0.0022$ , per 1-point increase in the score,  $p\text{-value} = 4.1 \times 10^{-8}$ ).

**Conclusions:** Parental dietary quality in the prenatal period, evaluated by the HEI-2015, may influence offspring DNAm but not DNAm biomarkers of aging during childhood. Further research to improve our understanding of parental nutritional programming is warranted, with a view to providing further evidence for public health action to promote health and longevity in future generations.

# Community implementer perceptions of the attributes of a packaged family healthy weight program with and without participation in a learning collaborative.

**Dr. Jennie Hill**<sup>3</sup>, Dr. Kate Heelan<sup>1</sup>, Dr. Tzeyu Michaud<sup>2</sup>, Ms. Caitlin Golden<sup>2</sup>, Dr. Bryce Abbey<sup>1</sup>, Dr. R. Todd Bartee<sup>1</sup>, Dr. Gwenndolyn Porter<sup>2</sup>, Dr. Paul Estabrooks<sup>3</sup>

<sup>1</sup>University of Nebraska Kearney, Kearney, USA, <sup>2</sup>University of Nebraska Medical Center, Omaha, USA,

<sup>3</sup>University of Utah, Salt Lake City, USA

**SO.1.08 - Lessons learned from implementation in the school setting, Clarion Hotel Gillet - Room Gillesalen, June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** Despite the efficacy of family healthy weight programs (FHWP), adoption and implementation, particularly in rural areas, has been challenging. The adoption of evidence-based interventions, such as FHWP, is enhanced when potential implementers positively perceive the intervention attributes. Further, facilitation and guidance through action learning collaboratives (LCs) are hypothesized to enhance potential implementers' positive perceptions of program attributes. This abstract describes the degree to which rural community implementation teams (CITs) positively evaluate the attributes of a prototype packaged program, the Building Healthy Families Online Training Resources and Program (BHF Resources) with and without participation in a LC.

**Methods:** This Type 3 Hybrid Effectiveness Implementation pilot trial was guided by the RE-AIM and Promoting Action on Research in Health Services (PARiHS) Frameworks. CITs were assigned to receive the BHF Resources with (n=4) or without (n=3; Package Only) participation in a LC. Members of the CITs (n=24) completed baseline and 1 year follow-up surveys with validated scales assessing intervention attributes including relative advantage, compatibility, ease of use, trialability and observability (7-point scale) as well as intervention acceptability, appropriateness, and feasibility (5-point scale). We conducted a Wilcoxon Rank Sum test to examine the group differences.

**Results:** CIT member perceptions of the attributes of the BHF Resources were positive and, as expected, did not differ based on LC and PO assignment at baseline (range=5.3-6.7/7; 4.3-4.7/5). At 1 year follow-up, LC CIT members either sustained or increased positive evaluations of all BHF Resources attributes while PO CIT members experienced decreases in positive evaluation of the attribute. All CIT member perceptions of the BHF Resources were significantly higher for those in LC than in PO at 1 year follow-up. The largest differences were in compatibility (LC: M=6.3 [SD=1.0] vs PO: M=4.7 [SD=1.1]; p<0.01) and relative advantage (LC: M=6.46[SD=0.9] vs PO: M=5.49[SD=0.9]; p=0.02).

**Conclusions:** CIT perceptions of program attributes are not solely based on the design and packaging of interventions. Interaction and facilitation with other CITs and program developers can further enhance positive views of factors that have been demonstrated to increase the likelihood of adoption, implementation, and program maintenance in rural communities.



# Participation and initial outcomes of a Family-based Healthy Weight Program- Building Healthy Families- implemented in rural US communities.

**Dr. Kate Heelan<sup>1</sup>**, Prof. Jennie Hill<sup>2</sup>, Dr. R. Todd Bartee<sup>1</sup>, Dr. Bryce Abbey<sup>1</sup>, Mrs. Ali Malmkar<sup>1</sup>, Dr. Paul Estabrooks<sup>2</sup>

<sup>1</sup>University of Nebraska at Kearney, Kearney, USA, <sup>2</sup>University of Utah, Salt Lake City, USA

**SO.1.08 - Lessons learned from implementation in the school setting, Clarion Hotel Gillet - Room Gillesalen, June 15, 2023, 12:00 PM - 1:15 PM**

## **SIG - Primary Choice:** E. Implementation and scalability

The United States expected 1.27 million new childhood obesity cases post pandemic. With the documented lack of evidence- and family-based healthy weight programs available in rural areas, this increase will likely exacerbate existing geographic disparities in obesity. Dissemination and implementation strategies such as packaging program materials and training resources for rural community implementation and action learning collaboratives (LC) have the potential to advance geographic health equity related to rural childhood obesity.

**Purpose:** To describe the utility of a resource package for the implementation of a 12-week family-based healthy weight program (Building Healthy Families: BHF) to improve participation and weight outcomes in rural midwestern US communities (mid and post pandemic) with and without a LC.

**Methods:** A pilot type-3 hybrid effectiveness-implementation trial was used to assign 7 communities to receive a turn-key, train-the-trainer, implementation package of BHF without a LC (PO: n=3) and with participation in a LC (n=4) that included bimonthly sessions with BHF developers and research team members. Families with at least one 6–12-year-old child with a BMI  $\geq$  95th percentile were eligible to participate. Programs were also intended to reach lower socioeconomic status families.

**Results:** Thirty-six families enrolled in the program with 19 qualifying children (BMI percentile =  $98.7 \pm 0.07$ , age =  $10.5 \pm 1.6$  yrs). Twelve families (9 children) were in LC communities and 14 families (12 children) were in PO communities. In LC, 47% of families had high school education and 21% reported food insecurities compared to 60% of PO families having pre-high school or high school education and 30% food insecurity. Ninety-two percent of families completed the 12-week program in LC compared to 71% in PO communities. LC children attended  $94.3 \pm 9.4\%$  of sessions and had a BMI z-score change of  $-0.15 \pm 0.08$ . PO children attended  $73.7 \pm 12.4\%$  of sessions and BMI z-score change was  $-0.09 \pm 0.11$  ( $p < 0.05$ ).

**Conclusions:** The LC implementation strategy improved adherence, reduced program attrition, and increased weight status reduction over and above providing the packaged BHF resources and training. A larger trial will be necessary to confirm the finding that rural communities providing services to lower socioeconomic families may need additional guidance to maximize success.

# Investigating implementation of school health policies through a health equity lens: Study protocol and initial findings

**Dr. Gabriella Mcloughlin<sup>1,2</sup>**, Ms. Callie Walsh-Bailey<sup>3</sup>, Ms. Rachel Inman<sup>4</sup>, Dr. Chelsea Singleton<sup>5</sup>, Dr. Lindsey Turner<sup>6</sup>

<sup>1</sup>Temple University, Philadelphia, USA, <sup>2</sup>Washington University Implementation Science Center for Cancer Control, St. Louis, USA, <sup>3</sup>Brown School Washington University in St. Louis, St. Louis, USA, <sup>4</sup>Drexel University, Philadelphia, USA, <sup>5</sup>Tulane University, New Orleans, USA, <sup>6</sup>Boise State University, Boise, USA

**SO.1.08 - Lessons learned from implementation in the school setting, Clarion Hotel Gillet - Room Gillesalen, June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** Policy, systems, and environmental interventions are an optimal vehicle for driving health promotion and addressing health disparities, yet much of the research fails to consider a policy's implementation as a precursor to its' population health impact. We are developing equity-focused measurement tools through a participatory approach comprising three aims: 1) identify priority constructs related to equitable implementation of school health policies; 2) create measures of key implementation determinants, processes, and outcomes; and 3) conduct cognitive testing to establish face and content validity.

**Methods:** We used a consensus approach to identify key implementation science and health equity frameworks, then selected constructs. We developed a survey containing key constructs, definitions, and example assessment items to gather input from an array of researchers, practitioners, and groups who implement or are affected by school wellness policies. We recruited respondents from over 20 professional groups across the United States to rate the importance (1= lowest; 5= highest) of these constructs and suggest additional topics to measure. Then, we solicited feedback from a group (n=8) of high school students. We conducted descriptive analyses; free response data were analyzed inductively to reveal themes and potential constructs to add.

**Results:** We received 121 survey responses, mainly from school staff and leaders (n=76; 62.8%) and researchers (21; 17.4%). Mean construct importance ranged from 3.82 to 4.62; the highest rated constructs were 'large-scale unanticipated events' (determinant; 4.62); 'socioeconomic, cultural, and political context' (determinant; 4.5); and 'provide access to healthy options that avoid stigmatization' (process; 4.5). Constructs rated below 4 (i.e., somewhat important) were dropped and two were added based on survey results and youth engagement, yielding 41 total. From these results, our team developed surveys and interview guides for multiple participant groups (i.e., students; parents/community members; teachers and staff; administrators) for cognitive testing.

**Conclusions:** Co-creating measurement tools with community partners and practitioners is a vital step to bridging the policy-practice gap. Grounding measures in health equity marks a key innovation in school policy research. This study will yield measurement tools that will undergo further psychometric testing and be made available to implementation researchers and practitioners.

# Let's Make a SPLASH: Results of the Supporting Physical Literacy at School and Home Feasibility Trial

**Dr. Erin Hennessy**<sup>1</sup>, Ms. Breanne Wilhite<sup>1</sup>, Dr. Kenneth Chui<sup>3</sup>, Dr. Christina Economos<sup>1</sup>, Dr. Daniel Hatfield<sup>1</sup>, Ms. Stephanie Herrick<sup>4</sup>, Ms. Chrissy Odalen<sup>4</sup>, Dr. Jennifer Sacheck<sup>2</sup>

<sup>1</sup>Tufts University Friedman School of Nutrition Science and Policy, Boston, USA, <sup>2</sup>George Washington University Milken School of Public Health, Washington, DC, USA, <sup>3</sup>Tufts University School of Medicine, Boston, USA, <sup>4</sup>New York Road Runners, New York City, USA

**SO.1.08 - Lessons learned from implementation in the school setting, Clarion Hotel Gillet - Room Gillesalen, June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** Physical literacy (PL)—the competence, confidence, and motivation to be physically active—has gained attention as a means to increase children's physical activity (PA) levels which have been stagnating below recommendations. Both the school and home environment are critical for supporting children's PL and PA, yet few multilevel interventions exist. This study examined the feasibility of SPLASH, a multilevel, comprehensive, PL-focused program to support children's PA at school and home.

**Methods:** During the 2021-2022 academic year, six NYC public schools completed a 5-month feasibility trial including implementation of a novel PL-focused school curriculum for 3<sup>rd</sup>-5<sup>th</sup> grade students and complementary family engagement materials. Families opted into receiving direct email and/or text messages with embedded video links while all families had access to print materials and social media (Facebook) posts. A mixed-methods evaluation included multiple web-based surveys distributed to families along with surveys and interviews with program implementers (e.g., PE teachers) during early- and late-phase implementation. Interviews were also conducted with families who opted into receiving email/text messages.

**Results/findings:** A total of 91 English- and Spanish-speaking families opted into receiving direct family engagement materials. Approximately 80% (72/91) of families who initially enrolled remained in the program at study completion. Email open rates ranged from 32-67% (mean, 50%). Parent surveys indicated higher reported encouragement of and engagement in PA from survey 1 to survey 3 ("always encourage PA" increased from 37.8% to 64.7% and "always enjoy sports and PA as a family" increased from 22.4% to 58.5%). Program implementers reported that program materials were easy to use and deliver to families, helped their students be more physically active at school, and elicited high levels of student enjoyment overall. Implementers reported making modifications to lesson plans to accommodate unique situations based on class size, class dynamics, and physical space.

**Conclusions:** Overall it was feasible to implement the multilevel (school-home) intervention despite ongoing challenges due to the COVID-19 pandemic. A randomized-controlled trial will be implemented in the 2023-2024 academic year to test the efficacy of this intervention for increasing children's PA levels.

# Potential implementation strategies to facilitate recess in elementary schools

**Dr. Allison Poulos<sup>1</sup>, Dr. Pamela Kulinna<sup>1</sup>**, Dr. Mengyi Wei<sup>1</sup>, Ms. Kylie Wilson<sup>1</sup>, Ms. Marissa Schulke<sup>1</sup>, Mr. Kahyun Nam<sup>1</sup>

<sup>1</sup>Arizona State University, Phoenix, USA

**SO.1.08 - Lessons learned from implementation in the school setting, Clarion Hotel Gillet - Room Gillesalen, June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** Recess is a critical physical activity opportunity for children, but often not prioritized in schools. The purpose of this research was to identify determinants of recess, and determine potential implementation strategies to overcome barriers to improve recess uptake.

**Methods:** In this qualitative case study, we retrospectively identified determinants of recess using data from five open-ended questions in a survey administered online to elementary school teachers (N=81) in Arizona in fall 2021. Questions were based on principles of Diffusion of Innovations' Theory, as these factors influence the likelihood of adopting an innovation, or practice such as recess. Determinants were classified as facilitators (advantage and compatibility) and barriers (challenges to implementation, problems for students, and needed supports). Data were analyzed using a reflexive thematic analysis to identify common barriers and facilitators, incorporating peer debriefing and negative case searches to ensure trustworthiness. We mapped barriers using the Expert Recommendations for Implementation Change (ERIC) tool aligned with Proctor's reporting guidelines to identify optimal implementation strategies to facilitate recess uptake.

**Results/findings:** Major reported facilitators of recess included physical health and socialization (relative advantage) and available equipment (compatibility). The most prominent barrier to offering recess was lack of supervision (challenge). Potential implementation strategies to address this barrier included incentivizing recess adoption and implementation, funding and contracting for recess, and accessing new funding. Bullying, behavior issues, and space and safe play spaces were the main reported issues for children during recess (problems for students). Potential implementation strategies to address these barriers included training recess staff to facilitate social and emotional learning competencies and evaluating conditions and adapting physical structures and equipment. Additional supervision, supervisor training, and equipment were the most prominent requests (needed supports). Potential implementation strategies to overcome barriers included conducting ongoing training, providing consultation for recess supervision, and accessing new funding.

**Conclusions:** The provision of recess in elementary school is a public health strategy and national recommendation in the United States of America. Implementation strategies defined using existing integrated implementation science frameworks can provide uniform guidance on overcoming common barriers to recess, supporting opportunities for physical activity in schools to foster children's health.

# Features of effective staff training programmes within school-based interventions targeting student activity behaviour: a systematic review and meta-analysis

Ms. Mairead Ryan<sup>1</sup>, Ms. Olivia Allcott<sup>1</sup>, Dr. Erika Ikeda<sup>1</sup>, Dr. Jian'an Luan<sup>1</sup>, Prof. Riikka Hofmann<sup>1</sup>, **Dr. Esther Van Sluijs<sup>1</sup>**

<sup>1</sup>University of Cambridge, Cambridge, United Kingdom, <sup>2</sup>University of Cambridge, Cambridge, United Kingdom, <sup>3</sup>University of Cambridge, Cambridge, United Kingdom, <sup>4</sup>University of Cambridge, Cambridge, United Kingdom, <sup>5</sup>University of Cambridge, Cambridge, United Kingdom, <sup>6</sup>University of Cambridge, Cambridge, United Kingdom

**SO.1.08 - Lessons learned from implementation in the school setting, Clarion Hotel Gillet - Room Gillesalen, June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** Evaluations of school-based activity behaviour interventions suggest limited effectiveness on students' device-measured outcomes. Teacher-led implementation is common but the training provided is poorly understood and may affect implementation and student outcomes. We reviewed staff training delivered within interventions and explored if specific features are associated with intervention fidelity and student activity behaviour outcomes.

**Methods:** We searched seven databases (01/2015-05/2020) for randomised controlled trials of teacher-led school-based activity behaviour interventions reporting on teacher fidelity and/or students' device-measured activity behaviour. Pilot, feasibility and small-scale trials were excluded. Study authors were contacted if staff training was not described using all items from the Template for Intervention Description and Replication reporting guideline. Training programmes were coded using the Behaviour Change Technique (BCT) Taxonomy v1. The Effective Public Health Practice Project tool was used for quality assessment. Promise ratios were used to explore associations between BCTs and fidelity outcomes (e.g. % of intended sessions delivered). Differences between fidelity outcomes and other training features were explored using chi-square and Wilcoxon rank-sum tests. Random-effects meta-regressions were performed to explore associations between training features and changes in students' activity behaviour.

**Results/findings:** We identified 68 articles reporting on 53 eligible training programmes and found evidence that 37 unique teacher-targeted BCTs have been used (mean per programme=5.1 BCTs; standard deviation=3.2). The only frequently identified BCTs were 'Instruction on how to perform the behaviour' (identified in 98.1% of programmes) and 'Social support (unspecified)' (50.9%). We found moderate/high fidelity studies were significantly more likely to include shorter ( $\leq 6$  months) and theory-informed programmes than low fidelity studies, and 19 BCTs were independently associated with moderate/high fidelity outcomes. Programmes that used more BCTs (estimated increase per additional BCT,  $d$ : 0.18; 95% CI: 0.05, 0.31) and BCTs 'Action planning' (1.40; 0.70, 2.10) and 'Feedback on the behaviour' (1.19; 0.36, 2.02) were independently associated with positive physical activity outcomes ( $N=15$ ). No training features associated with sedentary behaviour were identified ( $N=11$ ).

**Conclusions:** Few evidence-based BCTs have been used to promote sustained behaviour change amongst teachers in school-based activity behaviour interventions. Our findings provide insights into why interventions may be failing to effect student outcomes.

# The cost-effectiveness of a campus food pantry: food quality and nutrition security

**Ms. Ana Mitchell<sup>1</sup>**, Dr. Alana Harris<sup>1</sup>, Dr. Brenna Ellison<sup>1,2</sup>, Dr. Melissa Pflugh Prescott<sup>1</sup>

<sup>1</sup>University of Illinois at Urbana-Champaign, Urbana, USA, <sup>2</sup>Purdue University, West Lafayette, USA

**SO.1.08 - Lessons learned from implementation in the school setting, Clarion Hotel Gillet - Room Gillesalen, June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** Traditionally, food pantries were designed to support food sufficiency, measuring effectiveness as the quantity of food distributed, regardless of nutritional quality. Given burgeoning diet-related health disparities, the focus is shifting to improving nutrition security and measuring food quality. Food pantries have been the most implemented program on US college campuses to support food-insecure students and the sustainability and scale-up of these programs are largely cost-dependent. The aim of this study was to determine the cost-effectiveness of implementing a campus food pantry where effectiveness is measured as the amount and healthfulness of food distributed and the number of students served.

**Methods:** In August 2020, a campus, client-choice, satellite food pantry opened at a large Midwest university with MyPlate-inspired distribution guidelines. Student usage, item inventory, and costs were tracked by pantry staff. Items were analyzed for specific nutrients using the Nutrition Data System for Research. The servings of food distributed were estimated using serving sizes presented on food labels and analyzed for nutritional quality using the Healthy Eating Research Nutrition Guidelines for the Charitable Food System. This 3-tier system (*choose often* (green), *choose sometimes* (yellow), and *choose rarely* (red)) has thresholds based on levels of saturated fat, added sugar, and sodium. The cost per visit and per serving of 'choose often' food distributed were calculated for both total preliminary costs and implementation costs.

**Results/findings:** A total of 48,857 servings of food were distributed: 52.2% green, 24.2% yellow, and 23.6% red. Condiments and cooking staples were not ranked (3,373 servings). About 1 serving of 'choose often' food was distributed per dollar invested in the program and nearly 60% of the 'choose often' foods distributed were fruits and vegetables. For implementation costs only, the cost per serving of 'choose often' food was \$0.78, and per serving distributed was \$0.38.

**Conclusions:** Campus food pantries are uniquely positioned to promote health equity with the foods they make accessible and can be a relatively cost-effective way to get healthy foods to food-insecure students. More research is needed to assess the cost-effectiveness of other programs that promote nutrition security on college campuses.



# Investigating implementation determinants and implementation outcomes of the school-based obesity prevention intervention in the Family+ project: a mixed methods approach

**Ms. Friederike Butscher<sup>1</sup>**, Mr. Jan Ellinger<sup>1</sup>, Dr. Doris Gebhard<sup>1</sup>

<sup>1</sup>Department of Sport and Health Sciences, Technical University Munich, Munich, Germany

**SO.1.08 - Lessons learned from implementation in the school setting, Clarion Hotel Gillet - Room Gillesalen, June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** The school setting is of great importance for obesity prevention interventions in children. Evidence on how these interventions can be implemented successfully is scarce, though it is known that the implementation of an intervention affects its effectiveness. The aim of this study is to investigate the implementation determinants (ID) and implementation outcomes (IO) of a school-based obesity prevention intervention in the project Family+, using a mixed methods approach.

**Methods:** The intervention comprised the topics physical activity, sedentariness, nutrition, and sleep. It was conducted by teachers throughout the school year 2021/2022. In nine primary schools, a total of 47 classes participated.

The investigation of the ID and IO follows the Consolidated Framework for Implementation Research (CFIR). Based on the CFIR a questionnaire and a semi-structured interview guideline was developed. ID, their valence and IO were collected post-intervention from teachers, who conducted the intervention. The data sources complement each other.

In the first step, interviews will be analyzed using qualitative content analysis. The procedure of content-related structuring will be applied to the material following the CFIR constructs as deductive category system. Quantitative data will be analyzed and frequencies and correlations between ID, their valences and IO will be reported.

In the second step, results from both data sets will be merged, systematically compared, and jointly displayed in a convergence coding matrix.

Third, qualitative data will be quantified and merged with quantitative data. The merged data will be analyzed and construct frequencies and co-occurrences of ID, their valences and IO will be investigated for possible dependencies.

**Preliminary Results:** Data collection is completed, the online questionnaire was answered by n=20 teacher of which n=7 agreed to participate in an interview (on average 45min).

**Conclusions:** The presented results of the mixed methods analysis will contribute to better understanding ID and IO, and the relationship between them. Actionable recommendations for successful implementation of school-based obesity prevention interventions will be derived.

# Inequalities in exclusively mobile interventions targeting weight-related behaviours: A systematic review of observational studies

**Dr. Laura M. König<sup>1</sup>**, Dr. Cynthia C. Forbes<sup>2</sup>, Dr. Heide Busse<sup>3,4</sup>, Dr. Ann DeSmet<sup>5</sup>, Dr. Dorothy Szinay<sup>6,7</sup>, Dr. Eline S. Smit<sup>8</sup>

<sup>1</sup>University of Bayreuth, Kulmbach, Germany, <sup>2</sup>University of Hull, Hull, United Kingdom, <sup>3</sup>Leibniz Institute of Prevention Research and Epidemiology -BIPS, Bremen, Germany, <sup>4</sup>Leibniz Science Campus Digital Public Health, Bremen, Germany, <sup>5</sup>Université Libre de Bruxelles, Brussels, Belgium, <sup>6</sup>University College London, London, United Kingdom, <sup>7</sup>Evidera, London, United Kingdom, <sup>8</sup>University of Amsterdam, Amsterdam, Netherlands

**SO.1.09 - The Latest Research on Mobile Interventions for Weight-Related Behaviors, Clarion Hotel Gillet - Room Akademien, June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Mobile health interventions are promising behaviour change tools. However, recent evidence suggests that they might benefit deprived populations less, consequently widening existing inequalities in health. Most evidence so far stems from analyses of clinical trial data, which may suffer from selection bias. This systematic review investigated differences in uptake of, engagement with, and effectiveness of exclusively mobile interventions for weight-related behaviours (i.e., diet, physical activity, sedentary behaviour) in real-life contexts.

**Methods:** The protocol was registered on PROSPERO (CRD42021290769). Five databases (CINAHL, EMBASE, PsycINFO, PubMed, Web of Science) were searched, identifying 6466 individual records. Records were independently screened by two authors. Observational studies were eligible for inclusion if they reported on uptake, engagement, and/ or effectiveness of an exclusively mobile intervention, and examined outcomes by at least one inequality indicator included in the PROGRESS-Plus framework.

**Results:** Twenty-four publications reporting on 25 studies were included. The majority of studies investigated mobile intervention uptake by comparing users and non-users. Most studies examined multiple inequality indicators, with the majority studying age or gender (each n=21). Furthermore, studies investigated education (n=8), income (n=6), race/ ethnicity (n=4), the number of chronic conditions, having health insurance, location, socio-economic status composite scores (each n=2), disability status, employment, and migration status (each n=1). Younger age and higher socio-economic status were mostly associated with increased uptake, and ethnicity and location were unrelated to uptake. Results for other inequality indicators were mixed, as were results regarding engagement and effectiveness.

**Conclusions:** This review provides additional evidence in favour of a digital divide, especially regarding age and socioeconomic status, in mHealth interventions for weight-related behaviours based on observational studies by investigating the uptake of exclusively mobile interventions outside of clinical trials. More research, however, is needed on potential differences in engagement and effectiveness in real-life contexts.

# Predicting High-Risk Periods for Weight Regain Following Initial Weight Loss

**Dr. Kathryn Ross<sup>1</sup>**, Dr. Lu You<sup>1,2</sup>, Dr. Peihua Qiu<sup>1</sup>

<sup>1</sup>University of Florida, Gainesville, USA, <sup>2</sup>University of South Florida, Tampa, USA

**SO.1.09 - The Latest Research on Mobile Interventions for Weight-Related Behaviors, Clarion Hotel Gillet - Room Akademien, June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Newer, individually-adaptive intervention models focus on providing tailored support at times when individuals are at high risk for adverse health outcomes. It is unclear what constitutes a “high-risk” period for weight regain following initial weight loss.

**Methods:** We developed an algorithm to detect high-risk periods for weight regain using data collected from 74 adults (age=50.6±10.4 years, BMI=31.2±4.5 kg/m<sup>2</sup>, 69% Female, 83% Non-Hispanic White) with overweight or obesity who completed an initial 3-month Internet-based weight loss program followed by a 9-month maintenance period. Daily e-scale data were collected along with weekly self-report questionnaire items querying behaviors, cognitions, and moods hypothesized to be proximally associated with weight regain. Using data from participants who lost ≥5% of their baseline weight during the initial intervention (n=46), a linear mixed effects model was used to select predictors most highly associated with weight regain. Next, random forest regression was used to build a tree model predicting weight regain the following week. Algorithm performance was tested using data from the remaining participants not included in model development (n=28) and using pilot data collected over 6 months from 30 participants who self-reported recent weight losses of ≥5% (age=38.9±14.8 BMI=28.1±5.3 kg/m<sup>2</sup>, 67% Female, 60% Non-Hispanic White).

**Results:** The final algorithm retained frequency of self-monitoring caloric intake and weight over the past week along with self-report ratings of hunger and the importance of weight management goals compared to competing life demands. In the initial training dataset (n=46), the algorithm predicted weight regain the following week with a sensitivity of 75.6% and a specificity of 45.8%; in the initial test dataset (n=28), sensitivity was 82.0% and specificity was 30.4%. In the pilot dataset sensitivity was 81.1% and sensitivity was 31.7%.

**Conclusion:** Results demonstrate that patterns of self-monitoring and responses on two self-report questionnaire items can successfully be used to predict weight regain a week later. Our team has an ongoing, NIH-funded R01 clinical trial assessing whether the provision of extended-care intervention at times when this algorithm determines that individuals are at high risk for weight regain can improve long-term weight loss maintenance compared to standard, once-per month extended-care contact.

# A cluster RCT of a nudging intervention to increase healthier foods and drinks pre-ordered online from high school canteens

**Ms. Tessa Delaney**<sup>1,2,3</sup>, Ms. Hannah Lamont<sup>1,2,3</sup>, Associate Professor Sze Lin Yoong<sup>1,4</sup>, Prof. Luke Wolfenden<sup>1,2,3</sup>, Mr. Christophe Lecathelinais<sup>1,2,3</sup>, Dr. Tara Clinton-McHarg<sup>1,2,3</sup>, Dr. Rachel Sutherland<sup>1,2,3</sup>, Dr. Rebecca Wyse<sup>1,2,3</sup>

<sup>1</sup>Hunter New England Population Health, Wallsend, Australia, <sup>2</sup>School of Medicine and Public Health, The University of Newcastle, Wallsend, Australia, <sup>3</sup>Hunter Medical Research Institute, New Lambton Heights, Australia, <sup>4</sup>Global Preventive Health and Nutrition, Institute for Health Transformation, Deakin University, Geelong, Australia

**SO.1.09 - The Latest Research on Mobile Interventions for Weight-Related Behaviors, Clarion Hotel Gillet - Room Akademien, June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Background:** The World Health Organization recommends the use of 'nudging' to promote healthier food choices within school food settings. The rise in online school canteen lunch ordering systems, where students pre-order and pay for foods and drinks online, represents a unique opportunity to apply strategies that nudge users towards healthier food choices with high fidelity. Despite this, no study has tested the efficacy of an online nudging intervention on increasing healthier foods and drinks pre-ordered from high-school canteens.

**Purpose:** To assess the impact of embedding healthy food nudges (menu labelling, positioning, prompts and tailored feedback) in an online lunch ordering system on the nutritional quality of school canteen lunch purchases of high school students (aged 12–19 years).

**Method:** A cluster-RCT was conducted with nine high schools (1331 students) in one Australian state. Schools were randomised to a 2-month multi-strategy nudging intervention implemented in the school's online canteen or control (usual online ordering). Outcomes were the proportion of 'Everyday', 'Occasional' and 'Should Not Be Sold' lunch items purchased, categorized using the state's healthy canteen policy. Linear mixed models were used to analyse study outcomes.

**Findings:** Analysis of the student cohort (Intervention: 4 schools, 656 students; Control: 5 schools, 675 students) found significant between group differences over time favouring the intervention group for the mean percentage of online lunch items per student that were 'Everyday' (+5.5%;  $P < 0.001$ ) and 'Should Not Be Sold' (-4.4%;  $P < 0.001$ ). There were no between group differences over time in the mean percentage of online lunch items that were 'Occasional' (-1.2%;  $P = 0.47$ ).

**Conclusion(s):** These findings suggest a 2-month multi-strategy nudging intervention in an online lunch ordering system can increase the nutritional quality of foods purchased from high school canteens. Such an intervention may be an appealing policy option for stakeholders interested in improving adolescent nutrition. Further research assessing the long-term effect of the intervention may be warranted.

# Smart Indigenous Youth: A Digital Citizen Science Approach to Implement and Evaluate Active Living Interventions

**Dr. Tarun Reddy Katapally<sup>1</sup>, Dr. Jasmin Bhawra<sup>2</sup>, Mr. Eric Kwabia<sup>3</sup>, Ms. Prasanna Kannan<sup>3</sup>**

<sup>1</sup>Western University, London, Canada, <sup>2</sup>Toronto Metropolitan University, Toronto, Canada, <sup>3</sup>University of Regina, Regina, Canada

**SO.1.09 - The Latest Research on Mobile Interventions for Weight-Related Behaviors, Clarion Hotel Gillet - Room Akademien, June 15, 2023, 12:00 PM - 1:15 PM**

## **SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Smart Indigenous Youth (SIY) embeds land-based active living programs into Indigenous school curricula to improve youth mental health, while engaging youth as citizen scientists to implement and evaluate the initiative.

**Methods:** SIY is a mixed-methods 5-year longitudinal community trial set in the Canadian province of Saskatchewan. The initiative started in 2019, with two rural schools that administered separate 4-month (winter term) land-based active living programs specific to their culture, community, geography and language. Before implementation, youth were recruited as citizen scientists to engage with the research team using their own smartphones, before, during, and after the intervention period using a custom-built smartphone app. In year-1 (2019), 93 youth aged 13-18 years reported on their physical activity patterns, land-based activities, mental health, and substance misuse. These data were captured via objective smartphone sensors, subjective validated quantitative and qualitative measures, as well as mixed-methods real-time ecological momentary assessments. In year-2 (2020 [n=37]) and year-3 (2021 [n=20]), SIY was adapted to respond to the Coronavirus disease pandemic to capture the impact of school lockdown policies (2 schools/year) on youth active living and mental health. Analytical approaches include longitudinal regression modeling of quantitative data, thematic analysis of qualitative data, and descriptive and time-series analysis of ecological momentary assessment data.

**Findings:** Year 1 findings depicted an overarching theme of the importance of Indigenous culture, identity, history, and language. Analyses also showed that land-based activities such as canoeing and setting traps played a key role in improved youth mental health by providing them a sense of purpose and identity. Preliminary year 2 and 3 findings show that school lockdown policies had a differential impact on active living across participating schools, with youth belonging to schools with more advanced digital curricula responding more positively towards digital engagement strategies to promote active living.

**Conclusions:** SIY highlights not only the importance of linking active living with culture, but also indicates the potential of leveraging citizen-owned ubiquitous digital tools in implementing interventions in rural communities. More importantly, SIY shows that digital citizen science approaches allow for rapid adaptation of interventions to respond to real-world challenges.

# Examination of whether phone coaching can rescue individuals with poor early weight loss within Internet-delivered weight loss treatment: Results from the Dial Now Trial

**Dr. Jessica Unick<sup>1</sup>**, Dr. Shira Dunsiger<sup>2</sup>, Dr. Christine Pellegrini<sup>3</sup>, Dr. Graham Thomas<sup>1</sup>, Dr. Kathryn Demos<sup>1</sup>, Dr. Dale Bond<sup>4</sup>, Dr. Rena Wing<sup>1</sup>

<sup>1</sup>The Miriam Hospital and Brown University, Providence, USA, <sup>2</sup>Brown University, Providence, USA, <sup>3</sup>University of South Carolina, Columbia, USA, <sup>4</sup>Hartford Hospital, Hartford, USA

**SO.1.09 - The Latest Research on Mobile Interventions for Weight-Related Behaviors, Clarion Hotel Gillet - Room Akademien, June 15, 2023, 12:00 PM - 1:15 PM**

## **SIG - Primary Choice:** D. e- & mHealth

Internet-delivered weight loss (IDWL) programs often produce clinically significant weight loss (WL). However, individuals with the least amount of early WL (i.e., 1 month) are at risk for poorer outcomes and may require additional support.

**Purpose:** To examine whether adding BRIEF (3 calls during weeks 5-7) or EXTENDED (12 calls during weeks 5-16) phone coaching to IDWL treatment for 'early low responders' (1-month WL <2%) and 'early mid responders' (1-month WL 2-4%) improved 4-month WL compared to IDWL alone (CONTROL). Secondary aims compared treatment groups on intervention engagement and assessment of whether 1-month WL moderated the effect of coaching on treatment outcomes.

**Methods:** 452 individuals with overweight/obesity (BMI:  $34.6 \pm 5.0$  kg/m<sup>2</sup>, age:  $50.8 \pm 11.4$  years, 69.7% female) were randomized and received a 4-month, fully-automated, IDWL program consisting of weekly video lessons, daily self-monitoring of caloric intake, exercise minutes, and weight, and weekly automated, tailored feedback. 'Early low responders' and 'early mid responders' in BRIEF and EXTENDED also received individual coaching (first call ~45 minutes, follow-up calls ~10-15 minutes) which consisted of meal planning, goal setting, and problem solving.

**Results:** Across groups, 37.2% were 'early low responders' and 41.2% were 'early mid responders'. Coaching call completion rate and 4-month retention were 94.3% and 90.6% respectively. Four-month WL was significantly greater in BRIEF ( $-6.2 \pm 4.7\%$ ) and EXTENDED ( $-7.0 \pm 5.1\%$ ) versus CONTROL ( $-4.5 \pm 4.7\%$ ;  $p$ 's <0.02). Similarly, the percentage of individuals achieving clinically significant WL ( $\geq 5\%$ ) at 4 months was higher in BRIEF (58.5%) and EXTENDED (65.9%) versus CONTROL (36.5%; Chi-square:  $p < 0.001$ ). One-month WL was a significant moderator such that among 'early low responders', 4-month WL was significantly greater in EXTENDED ( $-4.5 \pm 4.3\%$ ) vs. BRIEF ( $-2.6 \pm 4.0$ ,  $p < .05$ ), but among 'early mid responders' no such effect was observed (EXTENDED:  $-6.9 \pm 3.8\%$  vs. BRIEF:  $-6.8 \pm 4.2\%$ ,  $p > 0.05$ ). Intervention engagement (e.g., video lessons viewed and # of days self-monitored) was greater in BRIEF and EXTENDED vs. CONTROL ( $p$ 's <0.001).

**Conclusions:** Reserving coaching for those with low or mediocre early WL is consistent with a stepped care intervention model and was found to improve program engagement and 4-month WL within Internet-delivered treatment. However, more extended coaching may be necessary for 'early low responders'.



# Effects of a collective family-based mobile health intervention on promoting physical activity and healthy eating – the SMARTFAMILY1.0 trial

**Dr. Janis Fiedler<sup>1</sup>**, Prof. Alexander Woll<sup>1</sup>, Dr. Kathrin Wunsch<sup>1</sup>

<sup>1</sup>Karlsruhe Institute of Technology Institute of Sport and Sport Science, Karlsruhe, Germany

**SO.1.09 - The Latest Research on Mobile Interventions for Weight-Related Behaviors, Clarion Hotel Gillet - Room Akademien, June 15, 2023, 12:00 PM - 1:15 PM**

## **SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Mobile health interventions are promising tools to deliver health behavior change interventions due to their adaptability and wide reach. This study aimed to evaluate the effectiveness of a theory and behavior change techniques (BCTs) based mobile health intervention within families on behavior change for PA and HE.

**Methods:** The study was a cluster-randomized control trial for adults and children who are sharing a common everyday life and live together as a family. The study included a baseline assessment (T0) over one week, followed by a three-week intervention with - among other BCTs - collaborative goalsetting on the application (intervention group) or a no-treatment period (control group). Directly after this period a second assessment over one week (T1) took place and four weeks later a follow-up was assessed using questionnaires only (T2). The main outcomes were self-reported and device-based measured PA, self-reported FVI, and secondary outcomes included intrinsic motivation, self-efficacy, and the family health climate.

**Results** were analyzed using a general linear mixed model with random intercepts which accounted for participants being nested within families. Results/findings: Data from 46 families (intervention group: 25 families with 84 participants; control group: 21 families with 64 participants) were used for the analyses. Results indicated no evidence for a group x time interaction for any PA or FVI measure (all  $p > .014$ ). The secondary outcomes self-efficacy, intrinsic motivation, and family health climate were not associated with the PA outcomes. For FVI, higher self-efficacy and higher intrinsic motivation were associated with higher FVI intake. Exploring the individual development of participants did not reveal responder/non-responder patterns.

**Conclusions:** Overall, our results found no evidence for the effectiveness of the SMARTFAMILY1.0 intervention. Reasons for this could be that the participants were already physically active (more than 8000 steps/day on average) and that the application was rather simplistic in the first version as opposed to the SMARTFAMILY2.0 trial. This research points to the issue, that future interventions should be better tailored to the individual or the respective family to facilitate the strengths of mobile health behavior change interventions.

# Intensity of lifestyle app use as a predictor of postpartum weight loss: The INTER-ACT RCT

**Dr. Femke Geusens**<sup>1,2</sup>, Ms. Hanne Van Uytsel<sup>2</sup>, Dr. Lieveke Ameye<sup>2</sup>, Prof. Roland Devlieger<sup>2,3</sup>, Prof. Annick Bogaerts<sup>2,4</sup>

<sup>1</sup>Department of Women's and Children's Health, Uppsala University, Uppsala, Sweden, <sup>2</sup>REALIFE Research group, Department of Development and Regeneration, KU Leuven, Leuven, Belgium, <sup>3</sup>Department of Obstetrics and Gynecology, University Hospitals Leuven, Leuven, Belgium, <sup>4</sup>Faculty of Medicine and Health Sciences, Center for Research and Innovation in Care, University of Antwerp, Antwerp, Belgium

**SO.1.09 - The Latest Research on Mobile Interventions for Weight-Related Behaviors, Clarion Hotel Gillet - Room Akademien, June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** INTER-ACT is an app-supported lifestyle intervention to enhance optimal weight and a healthy lifestyle in the interpregnancy and pregnancy period. We hypothesize that (1) the more intensively the app is used, the more weight women lose at 6 months postpartum and (2) the weight loss is primarily driven by tracking physical health (i.e., steps and weight).

**Methods:** The INTER-ACT program is a multicentered randomized control trial with an intervention and a control arm. This presentation focuses only on the women in the intervention arm (N = 333). They were given access to a mobile application supported by a Bluetooth-connected weighing scale and pedometer to track their weight, steps and mental health (i.e., mood and tension) with additional face-to-face coaching. Two linear regression models were run, both with the difference in weight between follow-up (6 months postpartum) and intake (6 weeks postpartum) as the outcome variable, and either the sum of the logged measures (steps, weight, mood and tensions,) or the logged measures separately as the independent variables. Due to multicollinearity issues, mood and tension logs had to be combined in one 'mental health' log. We controlled for mother's age, breastfeeding, pregnancy weight gain, weight lost between childbirth and intake, and BMI class before pregnancy.

**Results.** The more intensively women used the app, the more weight they lost between 6 weeks and 6 months postpartum (B(SE)=.01(.002),  $\beta$ =.11,  $t$ =2.26,  $p$ =.02). This weight loss was entirely driven by monitoring their weight using the scale: The more often women weighed themselves, the more weight they lost (B(SE)=.03(.01),  $\beta$ =.24,  $t$ =4.09,  $p$ <.001). Steps and mental health logging were non-significant. Stratification by BMI class indicated that this was only true for overweight women (B(SE)=.05(.01),  $\beta$ =.36,  $t$ =3.85,  $p$ <.01): Women with normal weight or obesity did not lose significantly more weight as they weighed themselves more often.

**Conclusion.** The INTER-ACT RCT is especially effective if women closely monitor their weight: The more often they weigh themselves, the more weight they lose postpartum, especially if they are overweight before pregnancy. Encouraging mothers to track their weight in the first 6 months postpartum can facilitate postpartum weight loss.

# Physical activity, sleep and nutrition in a cohort of Californian pregnant people with overweight and obesity: Findings from the GROWell trial

**Dr. Leigh Ann Simmons<sup>1</sup>**, Dr. Jennifer Phipps<sup>1</sup>, Prof. Siwei Liu<sup>1</sup>

<sup>1</sup>University of California Davis, Davis, USA

**SO.1.09 - The Latest Research on Mobile Interventions for Weight-Related Behaviors, Clarion Hotel Gillet - Room Akademien, June 15, 2023, 12:00 PM - 1:15 PM**

## **SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Overweight and obesity are associated with poor sleep, low quality diet, and inadequate physical activity (PA), all of which have negative impacts on maternal-fetal health. This study aims to determine whether dietary improvements are associated with improved sleep and PA prenatally in the Goals for Reaching Optimal Wellness (*GROWell*) trial.

**Methods:** *GROWell* is an mHealth intervention designed to improve diet quality from early pregnancy to six months postpartum in people who enter pregnancy with overweight or obesity. Prenatally, we collect data at baseline, 26-28 weeks, and 36-38 weeks. We have been conducting a fully remote, randomized control trial of *GROWell* in California. To date N=369 participants have enrolled (target enrollment is 480) and study completion rates are 77%. We conducted preliminary analyses, including descriptives and correlation analyses, and will conduct longitudinal analyses.

**Results:** At baseline 43% of participants have overweight; 32% have class 1 obesity; 25% have class 2/3 obesity. The sample is currently 65% White, 5% Black/African American, 13% Asian, 11% Multiracial, 24% Latinx, and 6% unreported/other. Average age is 34 years and average gestation is 13 weeks. Mean diet quality, PA, and sleep quality were all low. The mean Healthy Eating Index score was 54 (below the US average of 58). Average PA was 384 MET-min/week (below the minimum recommendation of 500-1000 MET-min/week). Sleep quality was 3.5 (range 0-7), indicating poor quality. Correlational analyses showed that increased PA was positively correlated with worse sleep ( $r=0.19$ ,  $p<0.001$ ). To evaluate the relationship of diet to sleep and PA, we will conduct a repeated measures ANOVA to examine whether the intervention and control groups differ in diet quality measured at three time points: baseline, 26-28 weeks gestation, and 36-38 weeks gestation. We will examine the effect of PA and sleep by including them as time-varying predictors in a mixed-effects model to predict diet quality. Missing data will be handled using full information maximum likelihood.

**Conclusions:** *GROWell* may improve diet quality among pregnant people with overweight/obesity. These improvements may improve sleep and support increased PA. *GROWell* may be an evidence-based mHealth tool to improve pregnancy health in high-risk groups.

# Health@NUS: Integrating repeated bursts of Ecological Momentary Assessment within a digital cohort study

**Ms. Xin Hui Chua<sup>1</sup>**, Dr. Sarah Martine Edney<sup>1</sup>, Ms. Claire Marie Jie Lin Goh<sup>1</sup>, Ms. Alicia Low<sup>2</sup>, Ms. Janelle Chia<sup>2</sup>, Ms. Daphne Koek<sup>2</sup>, Dr. Karen Cheong<sup>2</sup>, Prof. Rob Martinus van Dam<sup>1,3</sup>, Assistant Professor Chuen Seng Tan<sup>1</sup>, Dr. Falk Müller-Riemenschneider<sup>1,4,5</sup>

<sup>1</sup>Saw Swee Hock School of Public Health, National University of Singapore and National University Health System, Singapore, Singapore, <sup>2</sup>Health Promotion Board, Singapore, Singapore, <sup>3</sup>Departments of Exercise and Nutrition Sciences and Epidemiology, Milken Institute of Public Health, The George Washington University, Washington, D.C., USA, <sup>4</sup>Yong Loo Lin School of Medicine, National University of Singapore, Singapore, Singapore, <sup>5</sup>Digital Health Center, Berlin Institute of Health, Charité-Universitätsmedizin Berlin, Berlin, Germany

**SO.1.09 - The Latest Research on Mobile Interventions for Weight-Related Behaviors, Clarion Hotel Gillet - Room Akademien, June 15, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Health@NUS is a digital cohort study among university students in Singapore that aims to examine how health behaviours, health and well-being, and their determinants change during the transition from university into working life. In the current study, we examine the response rates to multiple bursts of ecological momentary assessment (EMA) surveys that were embedded within Health@NUS.

**Methods:** Health@NUS integrates biometric assessments, traditional questionnaires, a Fitbit smartwatch, and smartphone-based EMA to continuously collect physical activity, dietary, and sleep data from students over two years. For now, data from the first five bursts of EMA surveys were used (April-May 2021, July-August 2021, October 2021, November-December 2021, and December 2021 to January 2022) that were completed by students who joined the study between October 2020 to April 2021 were included in the analyses. Changes to communication strategies (multiple text messages and in-app notifications instead of emails) were implemented to subsequent bursts following the low response rate in Burst 1. Response rates were calculated based on the percentage of completed surveys per EMA burst and were analysed descriptively.

**Results/findings:** Participants (N=384) were mostly female (60.4%), of Chinese ethnicity (95.3%), with a mean body-mass index of  $22.0 \pm 3.2$  kg/m<sup>2</sup>, and mean age of  $23 \pm 1.3$  years. As compared to EMA Burst 1 (average response rate:  $25.8 \pm 30.1\%$ ), the average response rate was higher in subsequent bursts (Burst 2:  $50.6 \pm 33.6\%$ ), (Burst 3:  $48.3 \pm 33.2\%$ ), (Burst 4:  $40.2 \pm 33.4\%$ ), (Burst 5:  $36.7 \pm 33.4\%$ ), with a downward trend in response rates from Burst 2 to Burst 5. Changes to the communication strategies after EMA Burst 1 may have contributed to the initial rise in response rates. Analysis from 6 additional rounds of EMA bursts will be available in the coming months.

**Conclusion:** Health@NUS is the first digital student cohort study to integrate traditional assessments with continuous smartwatch monitoring and repeated bursts of EMA. Changing communications strategies have led to an initial rise in response rates and were not sustained in subsequent bursts. Examining the response rate to multiple EMA bursts will aid the design of future studies using EMA burst designs and enable the collection of high-intensity longitudinal data.

# Weight stigma in pregnancy and physical activity

**Dr. Taniya Nagpal**<sup>1</sup>, Dr. Rebecca Liu<sup>2</sup>, Dr. Maxine Myre<sup>1</sup>, Dr. Laura Gaudet<sup>3</sup>, Dr. Jocelynn Cook<sup>4</sup>, Dr. Danilo Fernandes<sup>5</sup>, Dr. Kristi Adamo<sup>6</sup>

<sup>1</sup>University of Alberta, Edmonton, Canada, <sup>2</sup>Women's College Hospital, Toronto, Canada, <sup>3</sup>Queen's University, Kingston, Canada, <sup>4</sup>Society of Obstetricians and Gynaecologists of Canada, Ottawa, Canada, <sup>5</sup>Bishop's University, Sherbrooke, Canada, <sup>6</sup>University of Ottawa, Ottawa, Canada

**SO.2.10 - How movement and nutrition behaviors are associated with mental health, UKK - Main Hall (Level 6), June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Physical activity during pregnancy has benefits for maternal and infant health, however overall adherence to global recommendations of a 150 minutes of moderate intensity activity is low. Specifically, individuals who have obesity before pregnancy reportedly have low uptake and adherence to prenatal physical activity recommendations; however, can we really attribute physical activity levels to obesity and the pregnant woman alone? This presentation aims to shift the dialogue away from just focusing on the individual's behaviours in pregnancy and obesity, to instead, understanding and challenging larger societal influences such as weight stigma. Weight stigma is defined as negative stereotypes and misconceptions associated with weight, and primarily affects individuals who have obesity. Findings from a qualitative study will be shared that documented lived experiences of weight stigma in pregnancy and implications for engagement in physical activity.

**Methods:** Semi-structured interviews took place with pregnant women in their third trimester who had been diagnosed with obesity. Interview questions were designed to gather their lived experience of obesity in pregnancy, document encounters of weight stigma in physical activity related contexts, and to collect suggestions on how to mitigate weight stigma in pregnancy. A content analysis was performed to assess findings and identify sources of weight stigma in prenatal physical activity contexts.

**Results:** Two sources of weight stigma were identified in relation to physical activity in pregnancy: 1. A lack of visual representation of diverse bodies when promoting physical activity in pregnancy; 2. A lack of recommendations for engaging in physical activity in pregnancy for women who have obesity. The lack of personalized recommendations that took into account comorbidities or other individualized barriers associated with maternal obesity resulted in vague communication and unhelpful advice from healthcare providers for engaging in physical activity.

**Conclusions:** Weight stigma is a pervasive social narrative, that exists in pregnancy and adversely impacts physical activity participation. To improve inclusion in physical activity in pregnancy, public discourse surrounding weight stigma needs to be addressed and changed. To mitigate weight stigma in prenatal physical activity contexts, we require representation of diverse body sizes engaging in physical activity and need to encourage individualized recommendations.

# Family Meal Quality and Quantity: Does one Matter More for Child Health and Emotional Well-being or are they Synergistic?

**Dr. Jerica Berge<sup>1</sup>**

<sup>1</sup>University of Minnesota, Minneapolis, USA

**SO.2.10 - How movement and nutrition behaviors are associated with mental health, UKK - Main Hall (Level 6), June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** G. Children and families

**Background and Objectives:** Prior studies show associations between family meal quantity (i.e., frequency) and child health and emotional well-being. Less is known about how family meal quantity and quality (i.e., meal healthfulness and interpersonal quality) is associated with child, parent, and family health and emotional well-being over time. The current study examined longitudinal associations between family meal quantity and quality and child, parent, and family health and emotional well-being. Interactions between family meal quantity and quality were also examined.

**Methods:** Children (n=1307) ages 5-9 years and their parents from six racial/ethnic groups (African American, Hispanic, Hmong, Native American, Somali/Ethiopian, White) were recruited for this study through primary care clinics in Minneapolis/St. Paul, MN. Parents filled out a survey at two time points (2016 and 2019), 18 months apart. Generalized estimating equations with an independence correlation structure were used to examine associations between each family meal characteristic and health or well-being outcome.

**Results:** Family meal quantity was associated with reduced prevalence of obesity, higher diet quality, less food fussiness, lower food responsiveness, and fewer conduct problems in children 18 months later. Family meal quality was associated with higher diet quality for children and parents and lower emotional problems and peer relationship problems in children 18 months later. There was a significant interaction between quantity and interpersonal quality of family meals in relation to children's peer relationship problems.

**Conclusions:** Overall, finding showed that family meal quantity and quality were both independently important for child, parent, and family health and well-being. Health care providers may want to consider focusing on the importance of family meals, both the quantity of meals and the dietary and interpersonal quality of meals, in their anticipatory guidance with parents during well-child visits, given these longitudinal findings showing they may be beneficial for the entire family over time.



# Effects of a long-term physical activity intervention on psychosocial health in adolescents

Ms. Barbara Haverkamp<sup>1,2</sup>, **Dr. Esther Hartman<sup>1</sup>**, Prof. Jaap Oosterlaan<sup>2,3,4</sup>

<sup>1</sup>University of Groningen, University Medical Center Groningen, Department of Human Movement Sciences, Groningen, Netherlands, <sup>2</sup>Vrije Universiteit, Clinical Neuropsychology section, Amsterdam, Netherlands,

<sup>3</sup>Emma Children's Hospital, Amsterdam UMC location University of Amsterdam, Department of Pediatrics, Emma Children's Hospital Amsterdam UMC Follow-Me program & Emma Neuroscience Group, Amsterdam, Netherlands, <sup>4</sup>Amsterdam Reproduction and Development research institute, Amsterdam, Netherlands

**SO.2.10 - How movement and nutrition behaviors are associated with mental health, UKK - Main Hall (Level 6), June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** G. Children and families

Worldwide, around 10-20% of the adolescents suffer from psychosocial health problems which emphasizes the importance of finding effective methods of prevention. Physical activity (PA) has been suggested as a psychosocial health promotion approach, as well as a treatment for psychosocial health problems through beneficial effects on brain structure and function. The purpose of the study was to investigate (1) the effectiveness of a PA intervention in enhancing psychosocial health in healthy adolescents, and (2) the dose-response relationship of dose of moderate-to-vigorous physical activity (MVPA) with psychosocial health. A cluster RCT was conducted during physical education (PE) in 24 classes in the Netherlands, including 297 adolescents (41.8% boys, age=13.4±0.19 years). The intervention group received exercises that were of MVPA intensity and cognitively engaging (14 weeks, two times/week). The control group followed regular PE lessons. Psychosocial health was assessed in three domains: self-concept (Competence Experience Scale for Adolescents), symptoms of depression (Child Depression Inventory), and anxiety (State and Trait Anxiety Inventory). During two PE lessons of the intervention and control group, MVPA was measured with accelerometry (ActiGraph GT3X+). Multilevel analysis was used with pre-intervention measures included as covariates in the models with respectively self-concept, symptoms of depression, state and trait anxiety as outcome measures. Other variables (sex, age, level of maturation, BMI and educational level) were included as covariates using a stepwise backward selection approach. Total dose of MVPA was added to investigate dose-response relationships. The results showed a main intervention effect on depression ( $B=-0.189$ ,  $SE=0.081$ ,  $p=0.019$ ), indicating that symptoms of depression decreased significantly more in the intervention group compared to the control group. Independent of group, a dose-response relationship of MVPA with symptoms of depression ( $B=-0.119$ ,  $SE=0.053$ ,  $p=0.025$ ), state anxiety ( $B=-0.164$ ,  $SE=0.061$ ,  $p=0.008$ ) and self-concept ( $B=0.079$ ,  $SE=0.037$ ,  $p=0.032$ ) was found, indicating that a higher dose of MVPA was associated with less symptoms of depression and state anxiety and better self-concept. In conclusion, the intervention was effective in decreasing symptoms of depression. In addition, our study showed that the dose of MVPA is a crucial aspect in the relationship of PA with psychosocial health.

# Characteristics of 24-hour movement behaviours and their associations with mental health in children and adolescents

**Prof. Stuart J. Fairclough<sup>1</sup>**, Ms. Lauren Clifford<sup>1</sup>, Dr. Richard Tyler<sup>1</sup>

<sup>1</sup>Health Research Institute, and Movement Behaviours, Nutrition, Health, and Wellbeing Research Group, Edge Hill University, Ormskirk, United Kingdom

**SO.2.10 - How movement and nutrition behaviors are associated with mental health, UKK - Main Hall (Level 6), June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose** Time-use estimates are typically used to describe 24-hour movement behaviours (24-hMB). However, 24-hMB can additionally be characterised by other easily measured metrics. These include acceleration-based movement metrics (e.g., Intensity Gradient), 24-hour activity rhythmicity (e.g., between-day variability of 24-hour rhythms), and sleep quality (e.g., sleep efficiency). Associations between these characteristics and youth mental health are unclear. This study's aims were to [1] compare youth 24-hMB characteristics by sex and age, and [2] examine associations between 24-hMB characteristics and mental health.

**Methods** Accelerometers were worn by 347 Primary and Secondary-school students for 24-hours/day over 7-days. Externalising and Internalising mental health problems were self-reported using the Strengths and Difficulties Questionnaire. 24-hMB characteristics were categorised as time-use, movement metrics, activity rhythms, and sleep quality. Associations between Externalising and Internalising problems and 24h-MB characteristics were analysed using compositional data analysis (for time-use estimates), and linear mixed models (for the other 24-hMB characteristics categories). Analyses were performed separately for Primary and Secondary students, and adjusted for school-level clustering, sex, socioeconomic status, maturity, and BMI z-score.

**Results** Boys spent significantly more time in moderate ( $p=.009$ ) and vigorous physical activity ( $p=.004$ ) than girls, and Primary students spent longer sleeping than Secondary peers ( $p=.002$ ). For movement metrics, boys were more active than girls according to the Intensity Gradient ( $p=.015$ ), and Primary students had higher Intensity Gradients than Secondary students ( $p=.011$ ). Boys' 24-hour activity rhythm indicators of overall rhythmicity ( $p<.001$ ), activity level during the most active 10-hours ( $p=.03$ ), and the difference in activity between the most active 10-hours and least active 5-hours ( $p=.02$ ) were higher than girls ( $p<.001$ ). Primary students had better sleep regularity ( $p=.02$ ) and earlier sleep onset ( $p=.002$ ) than Secondary peers. Among Primary students, Internalising problems were positively associated with sedentary time ( $p=.02$ ), overall rhythmicity ( $p=.03$ ), and later sleep onset ( $p=.03$ ). Secondary students' Externalising problems were inversely associated with between-day variability of 24-hour rhythms ( $p=.006$ ) and sleep efficiency ( $p=.03$ ).

**Conclusions** Using 24-hMB characteristics may help provide a more complete picture of relationships between youth 24-hMB and mental health, than time-use estimates alone. Understanding relationships between 24-hMB characteristics and health outcomes may inform future intervention content and design.

# Short, frequent physical activity breaks improve working memory in adolescents during prolonged sitting (AbbaH teen study)

**Miss Karin Kjellenberg**<sup>1</sup>, Dr. Emerald Heiland<sup>1,2</sup>, Miss Olga Tarassova<sup>1</sup>, Associate Professor Maria Fernström<sup>1</sup>, Associate Professor Gisela Nyberg<sup>1,3</sup>, Prof. Maria Ekblom<sup>1,4</sup>, Dr. Björg Helgaóttir<sup>1,5</sup>, Prof. Örjan Ekblom<sup>1</sup>

<sup>1</sup>Department of Physical Activity and Health, The Swedish School of Sport and Health Sciences (GIH), Stockholm, Sweden, <sup>2</sup>Department of Surgical Sciences, Medical Epidemiology, Uppsala University, Uppsala, Sweden, <sup>3</sup>Department of Global Public Health, Karolinska Institutet, Stockholm, Sweden, <sup>4</sup>Department of Neuroscience, Karolinska Institutet, Stockholm, Sweden, <sup>5</sup>Department of Clinical Neuroscience, Karolinska Institutet, Stockholm, Sweden

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**Purpose:** Physical activity breaks in schools have been suggested as a promising strategy to acutely improve cognitive performance in children and adolescents. Most previous studies have explored the effects of single physical activity bouts, but they are infeasible in a school setting (e.g. long duration/high-intensity or requiring equipment/space). Further, studies investigating the underlying physiological mechanisms in adolescents are lacking. Therefore, the aim of this study was to investigate the effects of short, frequent physical activity breaks of different intensities on adolescents' working memory (WM) and cerebral blood flow (CBF) during prolonged sitting.

**Methods:** This randomized crossover study was performed in adolescents (13-15 years of age). In 80-minute sessions, one of the following types of breaks was performed four times in three minutes durations on three different days: simple resistance training (SRA), step-up at a pre-determined pace (STEP), or remaining seated (SOCIAL). Before and after each session, WM (accuracy and reaction time during the 1,2,3-back test) were measured, with simultaneous measurement of task-related CBF (assessed by prefrontal oxygenation using functional near-infrared spectroscopy). Analysis of CBF is ongoing and will be presented at the conference.

**Results:** A total of 17 students participated (mean age 13.6 years, 11 girls). In the most demanding task (3-back) the following results were seen: improvement in reaction time following SRA (-30.1,  $p=0.04$ ) and STEP (-34.3 ms,  $p=0.05$ ) and no improvement following prolonged sitting. We also found a moderating effect ( $p < 0.01$ ) of WM performance at baseline (using a mean split), such that students with poor WM significantly improved their accuracy and reaction time following the higher-intensity breaks (STEP) while students with high performance did not.

**Conclusion:** We found that implementing physical activity breaks of both moderate and high intensities was beneficial for WM performance. For students with low WM performance, high-intensity breaks were more beneficial. Implementing physical activity breaks during periods of prolonged sitting, such as long school classes could improve the students' cognitive performance. However, future studies should investigate if these breaks are feasible, acceptable, and beneficial to implement in the school setting.

# Becoming a Healthy Mother: Harnessing the Identity Transformation of Becoming a Mother to Incorporate Sustainable Healthy Eating and Feeding Behaviors

**Miss Elaine Beulick<sup>1</sup>**, Miss Michelle Krach<sup>1</sup>, Miss Kaitlyn Henslee<sup>1</sup>, Miss Grace Moore<sup>1</sup>, Dr. Maria Romo-Palafox<sup>1</sup>

<sup>1</sup>Saint Louis University, Saint Louis, USA

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**Purpose:** Current theories on maternal identity fail to explore how the change in women's sense of self relates to dietary behaviors. Given that most children in the U.S. are exposed to obesogenic factors before their second birthday, this study explored potential dietary intervention targets that leverage the identity change naturally occurring during the transition to motherhood.

**Methods:** Preliminary thematic analysis was conducted on eleven 60-minute semi-structured interviews (2021-2022) with primiparous mothers in their third trimester or with a child  $\leq 12$  months who shared their experiences with health, diet, breastfeeding, and body image while becoming mothers.

**Results:** Eighteen themes emerged, and three themes presented promising intervention targets: food and diet, breastfeeding, and resources. Mothers described their dietary choices while breastfeeding as "what I consume is what he gets, so [I'm] making sure that I'm getting a good variety of nutrients and vitamins and different types of foods, so that he [infant] gets a healthy diet as well." Mothers described their plans to introduce complementary foods, "I took a mommy and me cooking class and they taught us different things that we can do with introducing food" and "the plan is to do baby-led weaning, so to do solids as opposed to purees." Yet, mothers also commented on turning to social media for nutrition and feeding information, "I follow Instagram accounts of PTs, OTs, registered dietitians . . . so I see that stuff on a regular basis and it's like okay, this is how I think I want to do it." Mothers' desire to provide children with the best nutrition, without receiving formal education (turning to social media), suggests that the postnatal period is an optimal time for dietary interventions. Moreover, prioritizing the child's nutritional status directly increases the mother's motivation to change her dietary habits.

**Conclusions:** This preliminary analysis provides evidence that the postnatal period presents a unique opportunity to optimize the nutritional status of mothers and children. We theorize that integrating habits into one's identity (sense of self) reduces reliance on self-regulation, consequently increasing resilience amidst the stress and fatigue of early motherhood and producing sustainable behavior change.

# Examining the associations between mealtime emotions and eating behaviors in adolescents

**Miss Laurence Vermette**<sup>1</sup>, Prof. Noémie Carbonneau (corresponding author)<sup>1</sup>, Dr. Geneviève Lavigne (corresponding author)<sup>1</sup>

<sup>1</sup>Université du Québec à Trois-Rivières, Trois-Rivières, Canada

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Family meals promote communication, bring family members closer and contribute to their physical, mental, and social well-being. Research suggests that a positive emotional atmosphere during mealtime is related to better nutrition, academic, and psychosocial outcomes in children (Smith et al., 2022). Further, mealtime emotions, especially those related to anxiety, are associated with increased eating psychopathology (White et al., 2015).

**Purpose:** A number of studies have documented the benefits associated with a high frequency of family meals, but more research is needed to better understand the associations between the family mealtime emotional climate and adolescents' eating behaviors. The present study examines the associations between adolescents' mealtime emotions and various dimensions of their eating behaviors while controlling for family meal frequency.

**Methods:** Recruitment is still ongoing. To date, 126 adolescents (114 girls, 12 boys) have been recruited, between the ages of 14 and 17 years ( $M = 15.7$ ;  $SD = 1.1$ ). They completed the Mealtime Emotions Measure for adolescents (White et al., 2015), which assesses the emotions typically experienced during family mealtimes. This measure contains three subscales: anxiety-related, anger-related, and positive mealtime emotions. Participants also completed the Adult Eating Behaviour Questionnaire (Hunot et al., 2016), which assesses eight eating behavior dimensions: hunger, food responsiveness, emotional overeating, enjoyment of food, satiety responsiveness, emotional undereating, food fussiness and slowness in eating.

**Results:** Linear regressions were conducted, controlling for family meal frequency. Preliminary results show that adolescents' anxiety-related mealtime emotions are positively related to emotional undereating ( $\beta = 0.410$ ,  $p < .01$ ) and marginally negatively related to enjoyment of food ( $\beta = -0.256$ ,  $p < .08$ ). Further, positive mealtime emotions are negatively associated with emotional overeating ( $\beta = -0.309$ ,  $p < .01$ ), and positively related to both satiety responsiveness ( $\beta = 0.245$ ,  $p < .05$ ) and enjoyment of food ( $\beta = 0.220$ ,  $p < .07$ ). No significant associations were found between anger-related mealtime emotions and eating behaviors.

**Conclusion:** Overall, the results of this study have important implications for the field of behavioral nutrition because they provide insight into how adolescents' emotional experience during family mealtimes relates to their eating behaviors.

# Empowering Informed Caregiver Decisions Surrounding Use of Pediatric Nutritional Supplement Shakes

**Miss Elaine Beulick<sup>1</sup>**, Dr. Maria Romo-Palafox<sup>1</sup>

<sup>1</sup>Saint Louis University, Saint Louis, USA

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**Purpose:** Early childhood is a critical period of dietary preference and habit development. A 2017 report found that one pediatric nutritional supplement shake brand accounted for 27% of all spending on food and drink marketing to infants and toddlers. Medically unnecessary use of such shakes may lead to excess calorie consumption and influence sweet taste preferences of healthy children. As childhood obesity rates increase, we recognize the need to help caregivers make an informed decision about when their child needs nutritional support from a supplement shake. Thus, this study tested a countermarketing infographic's ability to reduce purchase intent.

**Methods:** This cross-sectional study consisted of an online survey of U.S. caregivers (n=1,630) of healthy children (6-36 months). Data were collected November through December 2020. Participants were randomly assigned to an experimental group where they viewed either a countermarketing infographic, product website screenshot, or product picture. The infographic included messages targeting the perception of healthfulness and affordability of supplement shakes, organic or non-GMO ingredients, and pediatricians' support for the product. The main outcome measures included perception of healthfulness, willingness to pay, purchase intent, and attitudes.

**Results:** Most (68%) caregivers were between 18 and 34 years. The majority (90%) described their child's body size as healthy weight, and 93% perceived their child's diet as good, very good, or healthy. Due to the rapidly changing diets of children ages 6-36 months, an ANOVA tested the effect of age and image exposure on the main outcomes. Caregivers who saw the infographic had a significantly lower perception of healthfulness ( $p=0.03$ ), purchase intent ( $p=0.08$ ), and attitude ( $p=0.01$ ) for the pediatric supplement shake compared to the other images. Moreover, a significant interaction between child's age and image shows the infographic's effect is different for infant and toddler caregivers.

**Conclusions:** This study provides more evidence that Dietary Guidelines should explicitly discourage pediatric nutritional supplement shakes for healthy children. The infographic developed and tested in this study is a powerful tool that can be easily distributed in pediatric offices and online to inform caregivers about the appropriate use of pediatric nutritional supplement shakes, ultimately reducing misuse in healthy children.



# Weighting and Validation of the Childhood Obesogenic Environment Index in the United States

**Dr. Marilyn Wende<sup>1</sup>**, Dr. Andrew Kaczynski<sup>1</sup>, Dr. Ellen W. Stowe<sup>1</sup>, Dr. Alexander C. McLain<sup>1</sup>

<sup>1</sup>University of South Carolina, Columbia, USA

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**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Development of a national childhood obesogenic environment index (COEI) in the United States (U.S.) represents a key step for surveillance and intervention, and further validation and weighting of index components would enhance its rigor and utility. This study determined weights for the county-level COEI and assessed the validity of the weighted versus unweighted index.

**Methods:** Data on 10 variables were collected for all U.S. counties (n=3142) from publicly available sources. Six variables were nutrition-focused: percentage of births at facilities supporting breastfeeding and number of grocery/superstores, farmers markets, fast food restaurants, full-service restaurants, and convenience stores per 1000 residents. Four variables were physical activity focused: percentage of population living close to exercise opportunities, percentage of population <1 mile from a school, a walkability index, and number of violent crimes per 1000 residents. Variables supportive of healthful living were reverse-scored. All variables were ranked and assigned a percentile (0-100). A county COEI score was generated by calculating the average percentile for all 10 variables. Because county-level childhood obesity estimates were unavailable, adult obesity estimates served as a proxy measure. Principal components analysis (PCA) identified uncorrelated index components and created a weighted index using eigenvalues once simple structure was achieved. Linear regression validated the PCA-informed index and compared model fit among the weighted and unweighted COEI.

**Results:** Unweighted COEI ranged from 24.5-81.0 (M=50.02,s.d.=9.01) and was associated with adult obesity ( $\beta=0.15, p<.0001$ ). PCA produced simple structure for two factors: 1) access to exercise opportunities, fast food/full-service restaurants, and walkable neighborhoods; 2) access to convenience stores, grocery/super stores, and farmers markets. The PCA-informed weighted COEI ranged from 9.4-54.3 (M=32.0,s.d.=6.0) and was associated with adult obesity ( $\beta=0.18, p<.0001$ ). Compared to unweighted COEI ( $R^2=0.09$ ), the PCA-informed COEI explained slightly less variation in adult obesity ( $R^2=0.06$ ).

**Conclusions:** PCA-informed weighting methods are valuable for index development. While this study showed that the unweighted index explains a larger proportion of variance in adult obesity, researchers can use PCA to better understand index components and their relationships with each other. Moreover, determining the relationship between COEI and obesity provides important guidance for prevention efforts.

# Residents' preferences for neighborhood social, built, and digital environment interventions to promote physical activity

Ms. Esmee Boereboom, Dr. Pauline van den Berg, Dr. Pieter Van Gorp, Dr. Raoul Nuijten, **Dr. Astrid Kemperman**

<sup>1</sup>Eindhoven University of Technology, Eindhoven, Netherlands

**SO.2.11 - How Our Surroundings Impact Our Health, UKK - Level 6 Foyer, June 16, 2023, 12:00 PM - 1:15 PM**

## **SIG - Primary Choice:** H. Policies and environments

Cities are challenged by increases in chronic diseases, obesity, and sedentary lifestyles, and physical inactivity is a major contributor to these problems. Urban planning and design aims to ensure that all people have access to enabling environments and diverse opportunities to be physically active. However, knowledge about the preferences of citizens for interventions supporting physical activity is still limited. This study aims to measure the preferences of residents for new, still-to-be-implemented social, built, or digital environment interventions in their neighborhoods that support physical activity.

First, factors and interventions playing a role in creating active living environments were explored.

Subsequently, an online questionnaire was conducted including a stated-choice experiment to predict preferences for possible (new) interventions to increase physical activity. The experiment asked respondents to choose several times between two packages of interventions, created based on an experimental design. The interventions included personal support and guidance from an exercise broker/sports coach, sports activity sharing via an app, age-appropriate activities in the neighborhood, availability of free public fitness equipment in public space, availability of free public sports facilities, access to a gym, and earning rewards per activity through an app. All interventions were defined at two levels (present vs not present).

325 inhabitants of Venlo, a medium-sized city in the Netherlands (70,000 inhabitants), participated in the survey. A Latent Class model was estimated on the data collected and indicated two segments with different preferences. The 'no preference' segment is more likely to choose no package of interventions and is characterized by inhabitants having more satisfaction with social support, safety, walkability, cycling paths, parks, and sports facilities in their neighborhood compared to the 'preference' segment. This latter segment includes more households with children or one person, and prefers personal support and guidance from an exercise broker or sports coach and the improved availability of free public fitness equipment. Moreover, both segments prefer to have access to a gym with a discount to make physical activity more accessible. Hence, urban planners and policymakers are advised to implement these interventions in the built environment to support a more physical active lifestyle.

# Effects of investment in infrastructure and encouragement of walking and cycling in two small cities

**Prof. Michael Keall**, Dr. Edward Randal, Dr. Wokje Abrahamse, Dr. Ralph Chapman, Associate Professor Caroline Shaw, Prof. Karen Witten, Prof. Alistair Woodward, Prof. Philippa Howden-Chapman

<sup>1</sup>University of Otago, Wellington, New Zealand

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**SIG - Primary Choice:** H. Policies and environments

Effects of investment in infrastructure and encouragement of walking and cycling in two small cities

**Purpose:** Active transport rates in New Zealand are low and have been falling over recent years. In two small provincial cities, Model Communities Program (MCP) funding was provided to increase active travel by installing walking and cycling infrastructure and running programmes to promote and normalise active travel. We aimed to analyse longer-term effects (five years after baseline measures) along with changes in active travel rates associated with the intervention for Māori (the Indigenous people of New Zealand) and people on lower incomes. We also looked at the effects of the proximity of the new infrastructure to people's homes and estimated differential active trip rates by age group, sex and trip purpose.

**Methods:** Baseline measures were taken in 2011, before the start of the intervention, along with further measures taken in 2012, 2013 and 2016 post-intervention, involving a total of 2,500 people interviewed in person. Some were part of a cohort that was surveyed in more than one of these years regarding their travel behaviours and attitudes to active travel. Respondents from two matched control cities that did not receive the funding provided a comparison group.

**Results/findings:** The MCP was associated with sustained statistically significant increases in active travel rates in the intervention cities compared to the controls. Māori increased active travel rates considerably more than non-Māori, as did members of households with below median income. People living closer to the new infrastructure showed initial larger increases in active travel, but this difference then diminished over time.

**Conclusions:** It is possible that the program elements that benefitted Māori and lower-income households included: engagement with the community and local leaders; provision of infrastructure in lower income areas; engagement with Māori regarding infrastructure that highlighted the cultural significance of the land and its landmarks. The program was successful in addressing some inequities within a car-dominated transport system.

# Spatial accessibility to food retail around the home and school and its relationship with the weight status of children in rural Victoria, Australia.

**Dr. Cindy Needham**<sup>1</sup>, Dr. Ana Horta<sup>2</sup>, Dr. Jane Jacobs<sup>1</sup>, Prof. Liliana Orellana<sup>1</sup>, Prof. Steven Allender<sup>1</sup>, Dr. Gary Sacks<sup>1</sup>, Dr. Miranda Blake<sup>1</sup>, Dr. Claudia Strugnell<sup>1</sup>

<sup>1</sup>Deakin University, Geelong, Australia, <sup>2</sup>Charles Sturt University, Albury-Wodonga, Australia

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**Purpose:** Despite disparities in nutrition-related chronic disease between urban, regional and rural populations, the relationships between food environments and childhood obesity in regional and rural (hereafter rural) areas remains unstudied. This study quantified the accessibility and healthiness of food retail environments in Victorian rural communities; and examined the relationship between food retail environment measures and obesity prevalence in primary school children. We also explored whether socioeconomic position (SEP) modified the relationship. We hypothesised that variations in accessibility to food retail around the home and school is associated with health disparities in Victorian rural communities.

**Methods:** Height and weight of 3,002 students (aged 7-12 years) from 94 primary schools located in rural areas of Victoria, Australia were measured by trained researchers in 2019, and used to calculate Body Mass Index (BMI). Food outlet data was collected from local governments in 2019 and classified by a) healthiness (healthy, less healthy, unhealthy) and b) type (Discretionary, Eating out, Fast-food, Fresh produce, Small Goods, Supermarkets, Takeaways). Network analysis was used to determine accessibility to each classification of food retail based on the school's location and 1km and 3km network buffers. Accessibility to food retail in each student's home suburb was estimated as the proportion of the population within 1km, 3.2km and 17km network buffers from each food retail classification. A school-level and area-level (based on the child's home suburb) measure of SEP were used. Linear mixed models were used to estimate associations between children's BMI and food retail measures at the suburb and school level, and to assess whether school SEP or home suburb SEP modified the relationship between the food environment and BMI.

**Results:** Preliminary results indicate the accessibility of unhealthy food retail around primary schools and within children's home suburbs far outweighs accessibility of healthy food retail in rural areas. Results will provide the basis for evidence-based planning of policy and public health interventions to address the widening health inequalities between urban and rural Victorians.

**Conclusions:** The planning system in Australia needs to be strengthened to facilitate health-promoting environments, including in places where children gather.

# An evaluation of the food environment at an Australian university campus

**Dr. Daisy Hannah Coyle**<sup>1,2</sup>, Ms. Laura Sanavio<sup>3</sup>, Dr. Eden Barrett<sup>1,2</sup>, Dr. Liping Huang<sup>1,2</sup>, Ms. Kristy Law<sup>1,2</sup>, Ms. Pabasha Nanayakkara<sup>1,2</sup>, Prof. Jonathan Hodgson<sup>4</sup>, Dr. Merita O'Connell<sup>2</sup>, Ms. Belinda Meggitt<sup>2</sup>, Dr. Carrie Tsai<sup>2</sup>, Prof. Simone Pettigrew<sup>1,2</sup>, Prof. Jason Wu<sup>1,2</sup>

<sup>1</sup>The George Institute for Global Health, Sydney, Australia, <sup>2</sup>University of New South Wales, Sydney, Australia,

<sup>3</sup>University of California, Berkeley, California, Australia, <sup>4</sup>Edith Cowan University, Perth, Australia

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**Purpose:** There is increasing acknowledgment that public institutions, including universities, should provide leadership to ensure that staff, students and visitors are not exposed to unhealthy food environments. Unhealthy food environments at universities are especially concerning because many students are young adults who are vulnerable to poor dietary intakes due to limited cooking skills, low food literacy, lack of disposable income and limited access to kitchen facilities, particularly in shared housing and on-campus accommodations. The aim of this study was to conduct a baseline assessment of the healthiness of the food environment across all food outlets and vending machines ('outlets') at a large university in Australia.

**Methods:** A cross-sectional assessment was conducted (March – July 2022) across 51 food outlets (27 fixed food outlets and 24 vending machines). The healthiness of the on-campus food environment was evaluated using the Healthy Food and Drink in NSW Health Facilities for Staff and Visitors framework ('Framework'). The Framework assesses key food environment parameters including the availability, placement and promotion of 'Everyday' (healthy) and 'Occasional' (less healthy) products. Each parameter was evaluated overall and across each food outlet type (Café, Cafeteria, Convenience store, Kiosk and Vending machine).

**Results:** Across the outlets, Everyday foods and drinks made up 43.9% of all products available. Only two outlets met the Framework's product availability benchmark of ≥75% Everyday foods and drinks. The mean percentage of Everyday products available for sale differed according to the outlet type, ranging from 20.6% for the convenience store up to 64.6% for the cafés. A total of 43 outlets (84.3%) sold sugary drinks as part of their product range. Food outlets generally did not meet the recommendation to avoid displaying Occasional products in prominent positions. Occasional products made up 68.4%, 53.3% and 59.9% of all items for sale at checkout areas, countertops and eye-level shelves, respectively. Finally, 80.0% of meal deals (e.g., buy-one-get-one free) included Occasional products.

**Conclusion:** Consistent with similar prior evaluations at higher education institutions, our findings suggest the need for substantial improvement in the availability, placement and promotion of foods and drinks sold at a major university campus in Australia.

# Food and beverages from street outlets around elementary schools in Mexico

**Dr. Catalina Medina<sup>1</sup>**, Dr. Citlali González<sup>1</sup>, Ms. Uzzi López<sup>1</sup>, Ms. Armando G.-Olvera<sup>1</sup>, Ms. Vanesa Barranco<sup>1</sup>, Ms. Irving Contreras<sup>1</sup>, Prof. Simon Barquera<sup>1</sup>, Ms. Magdiel Barrios<sup>1</sup>

<sup>1</sup>National Institute of Public Health, Mexico, Mexico

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**SIG - Primary Choice:** H. Policies and environments

**Purpose.** To evaluate the healthfulness of the street food & beverages outlets (SFBO) around primary schools in a neighborhood in Mexico City. We hypothesized that a higher proportion of unhealthy SFBOs and higher non-recommended (NR) products are sold at the SFBO in the nearest buffer to the school (100m) and within the highest marginalized areas.

**Methods.** A neighborhood that contains 5 marginalization levels was selected. From this, a sample of 15 schools was randomly selected. A 500m Euclidean buffer was drawn around the selected schools. All SFBOs found within the buffer were evaluated using a previously validated survey by trained personnel. The survey includes a checklist of traditional food and beverages sold in SFBO, these products were classified as recommended, moderately recommended, and non-recommended (NR) to be consumed daily based on Eat-Lancet guidelines, Mexican food recommendations, and a group of experts. Those outlets that contained 30% or more NR products were classified as unhealthy based on previous studies. Descriptive analysis was used to characterize the sample. The Chi-square test was used to compare the percentage of NR products available within the 100m buffer to the 101-500m buffer. Logistic regression was used to identify the association between the healthfulness of outlets and marginalization levels. Analysis was performed using SPSS.

**Results.** 438 SFBOs were found within the 500m buffer. 90.4% of the SFBOs were classified as unhealthy. The most common products found within the SFBO included sugar-sweetened beverages, deep-fried tacos, candies, simple water, and flavored milk and coffee. A higher proportion of NR products was observed within 100m buffer compared to 101-500m buffer (71.2% vs. 62.2%,  $p=0.012$ ). Those schools located within the lowest marginalized areas were associated with healthier outlets (1.35, CI 95%: 1.67, 8.94;  $p=0.02$ ).

**Conclusions.** Most of the SFBOs around schools were classified as unhealthy. The proportion of NR products is higher within the nearest buffer and the most marginalized areas around schools. Although the results of this study are consistent with other LMIC studies, further studies are needed in other contexts. This study contributes to filling the information gap regarding the informal food environment in the Mexican scholar context.



# Violent Crime and Food Retail in Chicago, IL: Differences in Associations by Neighborhood Socioeconomic Status

**Dr. Chelsea Singleton**<sup>1</sup>, Dr. Fikriyah Winata<sup>2</sup>, Dr. Karen Sheehan<sup>3</sup>, Dr. Diego Rose<sup>1</sup>, Prof. Robin Fretwell Wilson<sup>4</sup>, Dr. Sara McLafferty<sup>4</sup>

<sup>1</sup>Tulane School of Public Health and Tropical Medicine, New Orleans, LA, USA, <sup>2</sup>Mississippi State University, Starkville, MS, USA, <sup>3</sup>Northwestern University, Chicago, IL, USA, <sup>4</sup>University of Illinois at Urbana-Champaign, Champaign, IL, USA

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**Purpose:** Violent crime (e.g., homicide, armed robbery, aggravated assault) is a major public health issue in America that disproportionately affects underserved communities. While studies have concluded that certain food retailers may be crime attractors (e.g., liquor stores, fast food restaurants), recent evidence suggests that violent crime may be detrimental to the healthfulness of food retail environments. Unfortunately, there is limited research on this topic. This study aimed to evaluate associations between violent crime occurrence and the availability of food retailers in Chicago, IL. Additionally, this study aimed to determine if associations varied by neighborhood socioeconomic status.

**Methods:** Cross-sectional data representing Chicago's census tracts (N = 798) in 2018 were gathered from the Chicago Data Portal and the U.S. Census Bureau. Violent crime rate for each census tract represented the number of homicides, armed robberies, and aggravated assaults per 1,000 residents. Business license data provided estimates for the availability of supermarkets, dollar stores, liquor stores, and fast food restaurants per 1,000 residents. Stratified regression models were evaluated to test associations between violent crime rate and food retailer availability by neighborhood socioeconomic status. Census tracts were categorized into 3 groups based on the 2018 empirical distribution of median household income in Chicago: "lower income", "medium income", and "higher income".

**Results:** After controlling for key covariates (e.g., % Black, % Hispanic/Latino, population density, etc.), violent crime rate was not associated with supermarket availability. Violent crime rate was positively associated with dollar store availability among all Chicago census tracts ( $p=0.001$ ) and low-income tracts ( $p=0.002$ ). Violent crime rate was positively associated with liquor store availability among all Chicago tracts ( $p<0.001$ ); stratified associations were not statistically significant. Furthermore, violent crime rate was positively associated with fast food restaurant availability among all Chicago census tracts ( $p<0.001$ ), lower income tracts ( $p=0.03$ ) and higher income tracts ( $p<0.001$ ).

**Conclusions:** Violent crime occurrence was associated with greater availability of dollar stores, liquor stores, and fast food restaurants in Chicago with associations varying across neighborhood socioeconomic status. Future studies should explore the influence of violent crime, and other socio-environmental factors, on changes to food retail environments over time.

# Structural Racism and Geographic Access to Food Retailers in the United States: A Scoping Review

**Dr. Chelsea Singleton<sup>1</sup>**, Ms. Laura Wright<sup>1</sup>, Ms. Meredith McDonald<sup>1</sup>, Ms. Isabel Archer<sup>1</sup>, Dr. Caryn Bell<sup>1</sup>, Dr. Gabriella McLoughlin<sup>2</sup>, Dr. Bailey Houghtaling<sup>3</sup>, Dr. Kristen Cooksey Stowers<sup>4</sup>, Dr. Elizabeth Anderson Steeves<sup>3</sup>

<sup>1</sup>Tulane University, New Orleans, LA, USA, <sup>2</sup>Temple University, Philadelphia, PA, USA, <sup>3</sup>Gretchen Swanson Center for Nutrition, Omaha, NE, USA, <sup>4</sup>University of Connecticut, Storrs, CT, USA

**SO.2.11 - How Our Surroundings Impact Our Health, UKK - Level 6 Foyer, June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Structural racism is considered the root cause of racial/ethnic inequities in America. In the past, studies have documented associations between neighborhood racial/ethnic composition and geographic access to food retailers. More recent studies have linked manifestations of structural racism (e.g., redlining, gentrification) to disparities in access. This scoping review aimed to summarize findings from US-based literature that 1) identified differences in food retailer access by neighborhood racial/ethnic composition or 2) examined the influence of structural racism on food retailer access. Furthermore, this review aimed to thoroughly describe the measures used to operationalize structural racism.

**Methods:** In 2022, a search of relevant literature was conducted using Covidence software. Seven databases yielded 13,069 citations after removing duplicates. Two reviewers evaluated the titles and abstracts of all citations to identify those that met inclusion criteria. Only studies that featured large or small food retailers that sell groceries were included (e.g., supermarkets, grocery stores, supercenters, convenience stores, dollar stores, pharmacies, and liquor stores). Studies that solely focused on restaurants were not included. The full text of 163 citations were reviewed with 65 studies meeting all inclusion criteria. An additional 5 studies were located via hand searching, which resulted in 70 studies being included in the review.

**Results:** Approximately 20 studies (28.6%) evaluated the influence of structural racism on geographic access to food retailers while 50 (71.4%) solely examined differences in retailer access by neighborhood racial/ethnic composition. All studies that modeled one or more measures of structural racism reported significant findings. However, measures of structural racism varied significantly across studies making it difficult to compare findings. Key examples of measures included mortgage redlining (n = 3), gentrification (n = 3), retailer redlining/decentralization (n = 2), and blockbusting/white flight (n = 2). Sixty percent of studies that featured a measure of structural racism modeled supermarkets, grocery stores, and/or an index measure of healthy food availability as the dependent variable.

**Conclusions:** Many US-based studies have evaluated food retailer access by neighborhood racial/ethnic composition. Moving forward, studies should model measures that reflect structural racism and determine how these measures influence access to large and small food retailers.

# Association of perceived and objective neighborhood walkability with accelerometer measured physical activity and sedentary time in the Maastricht Study

**Mr. Jeffrey A. Chan<sup>1,2</sup>**, Prof. Hans Bosma<sup>1</sup>, Ms. Connie Drosinou<sup>1</sup>, Assistant Professor Erik J. Timmermans<sup>3</sup>, Prof. Hans Savelberg<sup>1</sup>, Prof. Nicolaas Schaper<sup>1</sup>, Associate Professor Miranda T. Schram<sup>1</sup>, Dr. Coen D.A. Stehouwer<sup>1</sup>, Associate Professor Jeroen Lakerveld<sup>4</sup>, Associate Professor Annemarie Koster<sup>1</sup>  
<sup>1</sup>Maastricht University, Maastricht, Netherlands, <sup>2</sup>Northern California VA Healthcare System, Martinez, USA, <sup>3</sup>Utrecht University, Utrecht, Netherlands, <sup>4</sup>Vrije Universiteit Amsterdam, Amsterdam, Netherlands

**SO.2.12 - What have we learned recently on socio-economic inequalities, UKK - Hall B (Level 3), June 16, 2023, 12:00 PM - 1:15 PM**

## **SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** We aim to investigate the association of neighborhood walkability with accelerometer-measured physical activity (PA) and sedentary behavior (SB) levels and examine whether objective and subjective measures of walkability result in similar findings.

**Methods:** PA and SB from the first 7,689 Maastricht Study participants were measured using accelerometers for a period of seven days. Mean daily step count, light intensity PA, moderate to vigorous PA (MVPA), and SB were calculated. Objective walkability was measured by the 7-component Dutch Walkability Index within 500m Euclidian buffers around residential addresses of participants. Subjective walkability was obtained from the Abbreviated Neighborhood Environment Walkability Scale. Linear regression models analyzed the associations of walkability with PA and SB, controlling for potential confounders.

**Results:** Objective walkability was negatively associated with light intensity physical activity in the most walkable quartiles (Q3:  $b = -15.05$ , 95% CI = -21.38, -8.73; Q4:  $b = -14.58$ , 95% CI = -20.94, -8.23). Compared to participants living in the objective, least walkable neighborhoods, those in the most walkable quartiles had statistically significant higher SB levels (Q3:  $b = 13.18$ , 95% CI = 6.53, 19.83; Q4:  $b = 11.64$ , 95% CI = 4.95, 18.32). For subjective walkability, mean daily step count was significantly higher in the most walkable quartiles (Q3:  $b = 378.02$ , 95% CI = 126.76, 629.29; Q4:  $b = 509.60$ , 95% CI = 243.38, 775.81). Higher subjective walkability was positively associated with MVPA (Q3:  $b = 3.56$ , 95% CI = 1.82, 5.29; Q4:  $b = 4.40$ , 95% CI = 2.56, 6.23).

**Conclusion:** Living in a neighborhood with higher objective walkability was associated with lower levels of PA and higher SB levels while higher subjective walkability was associated with higher levels of PA. These results show contrasting findings and thus, the effect of walkability on participant physical activity and sedentary behavior within our sample is to be determined.

# Association between social vulnerability burden and cardiovascular health over adolescence using the novel Life's Essential 8 score

**Mr. Jesús Martínez-Gómez<sup>1</sup>**, Dr. Juan Miguel Fernández-Alvira<sup>1</sup>, Miss Amaya de Cos-Gandoy<sup>1, 2</sup>, Miss Patricia Bodega<sup>1, 2</sup>, Mrs. Mercedes de Miguel<sup>1, 2</sup>, Dr. Anna Tresserra-Rimbau<sup>3, 4</sup>, Dr. Emily Laveriano-Santos<sup>3, 4</sup>, Miss Camila Arancibia-Riveros<sup>3</sup>, Dr. Rosa Casas<sup>5</sup>, Dr. Ramón Estruch<sup>4, 5</sup>, Prof. Rosa María Lamuela-Raventós<sup>3, 4</sup>, Dr. Gloria Santos-Beneit<sup>1, 2, 6</sup>, Dr. Rodrigo Fernández-Jiménez<sup>1, 7, 8</sup>

<sup>1</sup>Centro Nacional de Investigaciones Cardiovasculares (CNIC), 28029, Madrid, Spain, <sup>2</sup>Foundation for Science, Health and Education (SHE), 08008, Barcelona, Spain, <sup>3</sup>Departament de Nutrició, Ciències de l'Alimentació i Gastronomia, Xarxa d'Innovació Alimentària (XIA), Facultat de Farmàcia i Ciències de l'Alimentació, Institut de Nutrició i Seguretat Alimentària (INSA-UB), Universitat de Barcelona (UB), 08921, Santa Coloma de Gramenet, Spain, <sup>4</sup>Consorcio CIBER, M.P. Fisiopatología de la Obesidad y Nutrición (CIBEROBN), Instituto de Salud Carlos III (ISCIII), 28029, Madrid, Spain, <sup>5</sup>Department of Internal Medicine, Hospital Clínic, Institut d'Investigacions Biomèdiques August Pi i Sunyer (IDIBAPS), University of Barcelona, 08036, Barcelona, Spain, <sup>6</sup>The Zena and Michael A. Wiener Cardiovascular Institute, Icahn School of Medicine at Mount Sinai, 10029, New York, USA, <sup>7</sup>Centro de Investigación Biomédica En Red en enfermedades CardioVasculares (CIBERCV), Madrid, Spain, <sup>8</sup>Hospital Universitario Clínico San Carlos, 28040, Madrid, Spain

**SO.2.12 - What have we learned recently on socio-economic inequalities, UKK - Hall B (Level 3), June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose.** The evidence for differences related to social vulnerabilities in cardiovascular health (CVH) in adolescents is not well studied. The main purpose of this study was to explore differences in overall CVH and its individual components in a large cohort of adolescents aged 12 to 16 years in Spain according to the accumulation of social vulnerabilities.

**Methods.** This study collected data from 1297 adolescents at baseline (48.3% girls; 12.5 (0.4) years), 1198 (48.0% girls; 13.9 (0.4) years) at first follow-up and 1090 at second follow-up (48.1% girls; 15.8 (0.4) years) attending 24 secondary schools enrolled in the SI! Program for Secondary Schools trial in Spain. Eight individual metrics (nicotine exposure, diet, physical activity, sleep health, body mass index (BMI), blood glucose, non-high-density lipoprotein cholesterol, and blood pressure) were measured and scored from 0 to 100 points according to the Life's Essential 8 (LE8) criteria established recently by the American Heart Association. A vulnerability score was constructed based on the exposure to the following vulnerabilities: low household income, low parental education, migrant background (at least one parent/caregiver born outside Spain), and parental unemployment (at least one parent unemployed or living on social assistance).

**Results.** At approximately 12 years of age, LE8 CVH score was similar between adolescents exposed to 0, 1, and 2 or more vulnerabilities (77.1, 76.1, and 76.1 points, respectively). However, LE8 CVH score was significantly higher (healthier) in adolescents with 0 vulnerabilities compared to the ones presenting 1 and 2 or more vulnerabilities at 14 and 16 years of age (78.0 vs 76.5/77.5 points, and 77.3 vs. 75.5/74.3 points, respectively). Regarding individual metrics, nicotine exposure and BMI metrics were significantly different between groups at the three time-points, presenting adolescents with 0 vulnerabilities the highest (healthiest) score, and smaller differences in sleep health, blood lipids and blood pressure were also found.

**Conclusions.** Adolescents exposed to social vulnerabilities presented a significantly unhealthier CVH profile, especially at 14 and 16 years of age, mainly due to a higher nicotine exposure and higher BMI. Tailored policy actions are required to tackle CVH inequalities already seen in adolescence.

# Moving in the Margins: A qualitative study into the role of physical activity in marginalised communities

**Miss Ella Creagh<sup>1</sup>**, Dr. Matthew Jenkins<sup>1</sup>, Dr. Paul Skirrow<sup>1</sup>, Associate Professor Mark Huthwaite<sup>1</sup>

<sup>1</sup>Department of Psychological Medicine, University of Otago, Wellington, New Zealand

**SO.2.12 - What have we learned recently on socio-economic inequalities, UKK - Hall B (Level 3), June 16, 2023, 12:00 PM - 1:15 PM**

## **SIG - Primary Choice:** I. Socio-economic inequalities

Regular physical activity is essential in maintaining health and well-being, and has been described as a human right. However, people in marginalised communities who experience financial and/or housing insecurity often face significant barriers to physical activity. In Wellington, New Zealand, the charitable organisation Wellington City Mission reduces financial barriers to physical activity by providing their clients with swimming passes, leisure club memberships, and sports equipment. The aim of this study was to investigate the health and well-being outcomes of the clients receiving these physical activity subsidies. Using a qualitative approach, 12 semi-structured one-to-one interviews were conducted with clients of Wellington City Mission. Interview transcript data was analysed using inductive thematic analysis. The overarching theme we identified was that physical activity support resulted in participants actively shaping their health and well-being in four key areas: mental, physical, social, and behavioural health. These results are closely aligned with two established frameworks that describe well-being outcomes. The first of these is Self Determination Theory, which suggests that well-being and ongoing motivation are maximised when an individual's psychological needs of autonomy, competency, and relatedness are met. The second framework is Te Whare Tapa Whā, the Māori (indigenous people of New Zealand) model of health and well-being. This model depicts four aspects of health as being equally important: mental, physical, social, and spiritual health. This research is significant on many levels. For the participants, it allows them to feel seen, heard, and valued. For the wider population, it demonstrates the importance of physical activity in improving the well-being of people in marginalised communities, and the value of organisations like Wellington City Mission in making this possible. It is original in that this is the first time that health and well-being outcomes of physical activity have been investigated in marginalised communities in New Zealand. In terms of impact, the results of this study have been shared with Wellington City Council and they have agreed to supply further funding. Our hope is that other organisations are inspired by this research and develop their own initiatives to improve the social capital, health, and well-being of marginalised people.



# Patterns in postnatal diet and physical activity behaviours among a highly deprived population of women living with obesity in the UK

**Dr. Nicola Heslehurst<sup>1</sup>**, Dr. Angela Flynn<sup>2</sup>, Miss Chloe Briggs<sup>1</sup>, Mr. Lewis Smart<sup>1</sup>, Prof. Judith Rankin<sup>1</sup>, Prof. Elaine McColl<sup>1</sup>, Prof. Falko Sniehotta<sup>1</sup>, Dr. Catherine McParlin<sup>1</sup>

<sup>1</sup>Newcastle University, Newcastle Upon Tyne, United Kingdom, <sup>2</sup>Kings College London, London, United Kingdom

**SO.2.12 - What have we learned recently on socio-economic inequalities, UKK - Hall B (Level 3), June 16, 2023, 12:00 PM - 1:15 PM**

## **SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** Maternal obesity affects 22% of UK pregnancies and is most prevalent among deprived populations. The postnatal period is an important time for healthy maternal diet and physical activity (PA) behaviours for women's health and future pregnancies. There are limited existing data on women's postnatal behaviours. This research aimed to explore maternal postnatal diet and PA among women with obesity, living in an area of high-deprivation.

**Methods:** A pilot cluster RCT cohort study set in four maternity hospitals in Northeast England. Women who had obesity in early pregnancy were invited to complete food frequency and pregnancy PA questionnaires at 3, 6, 9 and 12-months postnatal. Cross sectional descriptive statistics (mean SD; median IQR; n %) explored patterns in diet and PA behaviours at each time-point.

**Results/findings:** There were 24, 22, 12 and 20 questionnaires returned at each time-point. Across time-points, there was minimal difference in the median BMI (range 35.0kg/m<sup>2</sup> [IQR32.9-42.8] to 36.6 kg/m<sup>2</sup> [IQR33.9-39.0]), mean age (29.0 [SD5.4] to 31.2 [SD4.6] years), and 66.6-83.3% resided in the two most deprived quintiles. Median ranges for intake of fruits and vegetables (1.6-2.0 portions/day) and starchy carbohydrates (85g-109g/day) were low. Meat and fish intake (124-169g/day) was primarily from red/processed meats with low oily fish consumption (0-37g/day). Milk intake was 142mL/day and cheese 4-12g/day. Sugary drinks were higher at 3-months postnatal (158mL/day) compared to other time-points (14-80mL/day). Snacks were similar across the time-points (31-61g/day), with higher intakes of sweet than savoury snacks. Median total energy expenditure (TEE) ranged from 213.4-300.7METS/day across time-points. TEE was mainly from light (102.5-145.9METS/day) and moderate (76.6-109.6METS/day) intensity PA, followed by sedentary (17.9METS/day) and limited vigorous intensity PA (0.0-0.8METS/day). TEE was also primarily from the household/care domain (131.9-180.1METS/day), followed by inactive (17.9-29.4METS/day) and transport (13.4-28.0METS/day) domains, with limited TEE from sport (0.5-5.3METS/day).

**Conclusions:** Postnatal diet and PA in this highly deprived population of women with obesity were sub-optimal. Interventions should prioritise supporting women to meet national recommendations for their own health and for future pregnancies. Interventions that tackle wider determinants of health are likely to be required to support women living in deprivation to achieve these goals.



# Effective Recruitment Strategies for Underrepresented Populations in a Community Physical Activity Program

**Dr. Christine Pellegrini<sup>1</sup>**, Dr. Sara Wilcox<sup>1</sup>, Mrs. Krystal Cooper<sup>1</sup>, Ms. Kaitlyn Ramey<sup>1</sup>

<sup>1</sup>University of South Carolina, Columbia, USA

**SO.2.12 - What have we learned recently on socio-economic inequalities, UKK - Hall B (Level 3), June 16, 2023, 12:00 PM - 1:15 PM**

## **SIG - Primary Choice:** I. Socio-economic inequalities

Enrollment of underrepresented populations within physical activity programs is challenging. Unique barriers and enablers to participation may exist, necessitating different recruitment strategies to reach various underrepresented populations.

**Purpose:** To examine which recruitment strategies for a community physical activity program were most effective for recruiting Black, low income, older adult populations with arthritis. Second, we compared Black and White populations on baseline characteristics.

**Methods:** Multiple strategies were used to recruit adults with arthritis, lupus, fibromyalgia, or gout for a community telephone-based Walk With Ease (WWE) Program between March 2022 and December 2022. WWE is a 6-week telephone-based walking program that includes one group call and one individual call per week with a WWE leader. The program was adapted from the Arthritis Foundation's in-person WWE program. In addition to obtaining recruitment source and socioeconomic characteristics, objectively measured physical function (Six-minute walk test [6MWT], chair stand test) and pain (visual analog scale) were assessed. Independent t-tests examined differences by race, sociodemographic characteristics, physical function, and pain.

**Results:** Among the 90 participants (93% female) recruited, 71% were Black and 29% White. Black participants were significantly younger ( $62.5 \pm 8.7$  yrs) and had lower objectively measured function (6MWT:  $1204.5 \pm 283.0$  ft;  $8.2 \pm 2.9$  chair stands) than White participants ( $67.1 \pm 10.2$  yrs,  $P < 0.05$ ; 6MWT:  $1378.2 \pm 271.6$  ft,  $P = 0.01$ ;  $9.9 \pm 2.2$  chair stands,  $P < 0.01$ ). There were no differences in BMI ( $35.1 \pm 9.4$  kg/m<sup>2</sup>) or pain ( $38.7 \pm 27.8$  mm). The majority of Black participants were recruited from radio advertisements (48%), university flyers/emails (11%), and community flyers/events (9%). White participants were primarily recruited from university flyers/emails (35%), Facebook (31%), and word of mouth (15%). Recruitment strategies that yielded the most participants with incomes  $< 150\%$  of the poverty line ( $n = 12$ ) or  $< \$54,000$  ( $n = 29$ ) were radio advertisements (12%), university flyers/emails (6%), and community flyer/events (6%). Adults  $\geq 65$  years ( $n = 43$ ) were most successfully recruited from the radio (17%) and university flyers/emails (8%).

**Conclusion:** Radio advertisements, community flyers/events, and university flyers/emails were the most effective recruitment strategies for Black, lower income, and older adults for a community physical activity program. Future physical activity programs looking to increase enrollment of underrepresented populations may want to consider these strategies.

# Refining index to measure physical activity inequality: which group of population is the most vulnerable?

**Associate Professor Piyawat Katewongsa<sup>1</sup>**, Dr. Dyah Anantalia Widyastari<sup>1</sup>, Ms. Aunyarat Khanawapee<sup>2</sup>

<sup>1</sup>Institute for Population and Social Research, Mahidol University, Salaya, Phutthamonthon, Nakhon Pathom, Thailand, <sup>2</sup>Thailand Physical Activity Knowledge Development Centre (TPAK), Salaya, Phutthamonthon, Nakhon Pathom, Thailand

**SO.2.12 - What have we learned recently on socio-economic inequalities, UKK - Hall B (Level 3), June 16, 2023, 12:00 PM - 1:15 PM**

## **SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** There is substantial evidence that inequality – both in access and opportunity – is a predominant factor affecting one's participation in PA. However, the evidence of PA inequality is mostly focused on the disparities in the level (prevalence of sufficiency or cumulative minutes) of MVPA. This study assessed PA inequality by using three parameters to construct an inequality index: (1) Proportion of the population with sufficient MVPA; (2) Cumulative minutes of MVPA; and (3) The Gini coefficient.

**Methods:** Three rounds of data from Thailand's Surveillance on Physical Activity (SPA) 2019–2021 were employed. In each round, over 6,000 individuals aged 18–64 years were selected as nationally-representative samples and were included in the analysis. PA was measured subjectively by using the Global Physical Activity Questionnaire (GPAQ) version 2.0. PA inequality (between- and within-group) was constructed by using three parameters, with a combination of the three as the final measure, to identify the sub-groups of the Thai adults who are most vulnerable: groups with the least MVPA, highest insufficiency, and highest inequality index (Gini).

**Results:** During the Covid-19 epidemic, socioeconomic inequalities in PA was more profound than biologically-driven inequalities (age, sex), indicated by the lowest level of MVPA among socioeconomically deprived population (unemployed). Within group comparison suggested that the gap in the proportion of sufficient MVPA and cumulative minutes MVPA was the largest between those employed in the agricultural sector and the unemployed:  $\Delta$  17.3% vs 15.2%; 275 min vs 199 min in 2020 and 2021, respectively. However, by combining three metrics (the refined index) the five most vulnerable groups during the Covid-19 epidemic were identified as follows: (1) Those with no income; (2) The unemployed; (3) Those who have no access to PA facilities; (4) Older adults aged 60+years; and (5) Those earning <3,500 Baht per month.

**Conclusion:** The use of combined indicators in measuring PA inequality should aid in determining the most vulnerable groups of the population with a refined procedure. This method can be applied in many settings since the baseline data used to assess inequality (i.e., percent sufficient and cumulative minutes of MVPA) are widely available.

# Differences in grocery purchasing behaviours by socioeconomic position during COVID-19 lockdowns in Melbourne, Australia

**Mr. Damian Maganja (corresponding author)<sup>1</sup>**, Dr. Daisy H Coyle<sup>1</sup>, Dr. Liping Huang<sup>1</sup>, Dr. Simone Pettigrew<sup>1</sup>, Ms. Maria Shahid<sup>1</sup>

<sup>1</sup>The George Institute for Global Health, Sydney, Australia

**SO.2.12 - What have we learned recently on socio-economic inequalities, UKK - Hall B (Level 3), June 16, 2023, 12:00 PM - 1:15 PM**

## **SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose** Studies of the impact of COVID-19 on food purchases and dietary patterns have largely relied on self-reporting or aggregated government data. We investigated how household grocery purchasing behaviours, objectively recorded, were impacted by lockdowns in Melbourne, Australia, in 2020, with a focus on differences by socioeconomic position. Increased government support made available at the time may have improved access to healthy foods for some individuals, however it is critical to understand whether this temporary policy change translated into improved dietary patterns at a population level.

**Methods** We used 2019 and 2020 data from the NielsenIQ Homescan Consumer Panel, a large and representative sample of households providing scanned barcode data for all groceries purchased from retail outlets. Households must have provided data in both years to be included. Purchase data was matched to the Australian FoodSwitch database, which contains information for >100,000 products available in Australian supermarkets. Postcode-level data linkage was used to map households to an index of relative socioeconomic position. We assessed mean expenditure on groceries and energy content of grocery purchases per capita, comparing the months in which Melbourne was in lockdown in 2020 to the same months in 2019 (pre-COVID-19).

**Results/findings** A total of 1,413 Melbourne households were included in this study. COVID-19 lockdowns appear to have impacted grocery purchasing behaviours, with average expenditure per capita increasing by 21.2% and average energy purchases per capita increasing by 17.7% between 2019 and 2020. The most disadvantaged households saw the smallest increases in expenditure (12.9%) and energy purchases (9.8%). During lockdowns, these households spent the least on but purchased the most energy from unhealthy sources (A\$108, 109MJ), while the most advantaged households spent the most on but purchased the least energy from unhealthy sources (A\$121, 102MJ).

**Conclusions** Results suggest that temporarily improved social and financial supports were insufficient to positively affect purchasing behaviours, with the most disadvantaged households potentially relying on cheaper but more energy-dense unhealthy products despite spending relatively more on healthy products altogether. These findings have implications for social policy settings in Australia, as well as policy to support healthier dietary patterns during crises.

# How education and income are associated with the consumption of plant-based protein-rich foods and related food choice motives?

**Dr. Elviira Lehto**<sup>1</sup>, Dr. Hanna Konttinen<sup>1</sup>, Prof. Jaakko Nevalainen<sup>2</sup>, Prof. Maijaliisa Erkkola<sup>1</sup>

<sup>1</sup>University of Helsinki, Helsinki, Finland, <sup>2</sup>Tampere University, Tampere, Finland

**SO.2.12 - What have we learned recently on socio-economic inequalities, UKK - Hall B (Level 3), June 16, 2023, 12:00 PM - 1:15 PM**

## **SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose** Since people with low education and income level might face greater obstacles in the transition to a healthier and more sustainable diet, we examined how food choice motives (FCMs) associate with consumption of legumes and processed plant-based meat alternatives (PBMA) and whether education and income moderated these associations.

**Methods** The cross-sectional survey among blue-collar workers and members of the Service Union United was conducted in Finland in 2019 (n=6435). Participants provided information on their FCMs (how important they find health, sustainability, domesticity, convenience, and that they can eat whatever they want) and possible changes in the consumption of legumes and PBMA in the past two years. Information on gender, age, education, and income was received from the population register. Associations between FCMs and food consumption (stable/increased vs. decreased/non-consumption) were examined with logistic regression analyses adjusted for sociodemographic factors using education (low vs. high) and income (lowest quintile vs. higher) levels as moderators.

**Results** Stable/increased consumption of legumes and PBMA were less common among the low-education group (OR 0.47, 95%CI 0.41-0.53,  $p<.001$  and OR 0.51, 95%CI 0.45-0.59,  $p<.001$ , respectively) but no differences were found among income groups ( $p>.05$ ). Stable/increased consumption of legumes and PBMA associated positively with considering health, sustainability, and domesticity important (all  $p<.001$ ) and negatively with finding it very important to be able to eat whatever they want (both  $p<.01$ ). Valuing convenience associated negatively only with legume consumption ( $p<0.01$ ). Education moderated the association between sustainability and legume consumption ( $p=.049$ ) and income the association between convenience and PBMA consumption ( $p=.027$ ). In the stratified analyses, both among highly and less educated stable/increased legume consumption was more likely if they found sustainability very important (OR 5.24, 95%CI 3.46-7.94,  $p<.001$  and OR 3.10, 95%CI 2.61-3.67,  $p<.001$ , respectively). The income-stratified analyses were nonsignificant: in the low-income group the tendency was positive between convenience and PBMA consumption ( $p=.079$ ) whereas in the high-income group the tendency was negative ( $p=.107$ ).

**Conclusions** Barriers to increasing consumption of legumes and PBMA also among those with low education who already value sustainability need more attention. A more varying assortment of inexpensive and convenient PBMA might attract especially low-income consumers.

# Coping strategies of food insecure households with children and adolescents: Insights from Bourdieu's theoretical contributions.

**Mr. Gerónimo Brunet**<sup>1</sup>, Mr. Leandro Machín<sup>1,2</sup>, Ms. Luciana Bonilla<sup>3</sup>, Ms. María Costa<sup>3</sup>, Ms. María Fernanda González<sup>3</sup>, Ms. Silvia Bentancor<sup>3</sup>, Ms. Gabriela Fajardo<sup>4</sup>, Ms. Alejandra Girona<sup>1,4</sup>, Ms. Sofía Verdier<sup>3</sup>, Ms. María Rosa Curutchet<sup>3</sup>, Mr. Gastón Ares<sup>1,5</sup>

<sup>1</sup>Núcleo Interdisciplinario Alimentación y Bienestar, Espacio Interdisciplinario, Universidad de la República, Montevideo, Uruguay, <sup>2</sup>Centro de Investigación Básica en Psicología, Facultad de Psicología, Universidad de la República, Montevideo, Uruguay, <sup>3</sup>Instituto Nacional de Alimentación, Ministerio de Desarrollo Social, Montevideo, Uruguay, <sup>4</sup>Escuela de Nutrición, Universidad de la República, Montevideo, Uruguay, <sup>5</sup>Sensometrics & Consumer Science, Instituto Polo Tecnológico de Pando, Facultad de Química, Universidad de la República, Montevideo, Uruguay

**SO.2.12 - What have we learned recently on socio-economic inequalities, UKK - Hall B (Level 3), June 16, 2023, 12:00 PM - 1:15 PM**

## **SIG - Primary Choice:** I. Socio-economic inequalities

**Purpose:** The effect of food insecurity on health strongly depends on the behavioral strategies individuals use to cope with food access difficulties. The aim of this work was to gain an in-depth understanding of the coping strategies of food insecure households with children and adolescents in Uruguay, a high income Latin American country.

**Methods:** The study adopted a qualitative approach. Semi-structured interviews with adults and adolescents who lived in beneficiary households of food-related interventions provided by the state or civil society organizations were conducted in four cities between August and December 2022. Deductive-inductive content analysis of interview transcripts was conducted based on Bourdieu's theoretical concepts of fields, habitus, capitals, and practices.

**Results/findings:** Several food and non-food based coping strategies to acquire foods were identified among food insecure households based on the usage, combination and/or consideration of their accumulated cultural, economic, social and symbolic capital. These mainly included changes in household expenditure and consumption patterns, asking food from relatives/friends, searching for jobs, formal or informal credit requests, application to cash-transfer assistance programs, and/or attendance at community pots or public kitchens. A group of distinctive practices were found, such as drinking stimulant beverages, begging or rummaging for food on the street. We argue that reliance on these coping strategies respond to the combination of capitals (not) accumulated in the households and to food-related habitus.

**Conclusions:** Findings contribute to expand current knowledge about coping strategies in food insecure households, providing new theoretical and interdisciplinary insights, and stimulating new research lines. Results provide insights to the development of strategies and policies to reduce food insecurity.

# Understanding the categorization and moralization of food and eating behavior

**Dr. Alexandra Jackson<sup>1</sup>**, Dr. Hyun Jeong Min<sup>1</sup>, Ms. Anaderi Iniguez<sup>2</sup>, Ms. Megan Strickland<sup>3</sup>, Dr. Jane Lanigan<sup>3</sup>

<sup>1</sup>Pacific University, Forest Grove, USA, <sup>2</sup>Washington State University, Pullman, USA, <sup>3</sup>Washington State University, Vancouver, USA

**SO.2.13 - The Latest Research on Motivation and Emotion Studies, UKK - Hall C (Level 3), June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Intuitive eating emphasizes eating in response to physiological cues of hunger and satiety and is associated with multiple positive health outcomes. Unconditional permission to eat (UPE), a domain of intuitive eating, promotes removing food classifications and permission to eat all foods. This is based on the premise that not allowing foods can lead to preoccupation, guilt, or disordered behavior, whereas permission to eat all foods reduces emotional responses to food and supports consumption based on internal cues. However, people frequently categorize food items to simplify decision making. Foods are often categorized by characteristics of the food (e.g., nutrient value, convenience, context) as well as the moral aspects of healthy eating (e.g., clean, good, bad, junk). To promote UPE, we were interested in understanding how Americans categorize food and how categorizations that moralize foods were associated with UPE.

**Methods:** We recruited 48 adults 18 years and older living in the United States to complete a parallel mixed methods study including an online survey followed by an interview. The survey included demographic data and assessed UPE via the intuitive eating scale (IES-2). The interview explored what and how participants eat, and their thoughts and feelings about their body. To understand how foods are categorized, we used inductive and deductive coding. Next, we divided each code into two categories: moralizing and non-moralizing. We then used thematic analysis to describe how foods were moralized. Lastly, among participants who moralized foods, we conducted an exploratory case analysis assessing the frequency and content of moralizing codes with UPE scores.

**Results:** Participants were primarily White (77%) and female (68%) yet ranged from 18-76 years old. While analyses are in progress, we anticipate the rich description of food categorization including how the moralization of foods is associated with UPE scores will inform the promotion of intuitive eating.

**Conclusions:** Describing the categorization and moralization of foods and their association with eating behavior can help to better understand how to promote intuitive eating, positive health outcomes, and the development of nutrition messaging to promote diet quality while preventing disordered eating behaviors and reducing eating disorder risk.



# Body image satisfaction and food intake in adolescents from the SI! Program for Health Promotion in Secondary Schools

**Ms. Patricia Bodega**<sup>1,2</sup>, Dr. Juan Miguel Fernández-Alvira<sup>2</sup>, Miss Amaya de Cos-Gandoy<sup>1,2</sup>, Dr. Luis A Moreno<sup>3,4</sup>, Miss Mercedes de Miguel<sup>1,2</sup>, Miss Carla Rodríguez<sup>1</sup>, Dr. Anna Tresserra-Rimbau<sup>4,5</sup>, Miss Jesús Martínez-Gómez<sup>2</sup>, Miss Sonia Ramírez-Garza<sup>5</sup>, Dr. Emily P Laveriano-Santos<sup>5</sup>, Dr. Ramón Estruch<sup>4,6</sup>, Dr. Rosa M Lamuela-Raventós<sup>4,5</sup>, Dr. Rodrigo Fernández-Jiménez<sup>2,7,8</sup>, Dr. Gloria Santos-Beneit<sup>1,9</sup>

<sup>1</sup>Foundation for Science, Health, and Education (SHE), Barcelona, Spain, <sup>2</sup>Centro Nacional de Investigaciones Cardiovasculares (CNIC), Madrid, Spain, <sup>3</sup>GENUD (Growth, Exercise, NUtrition and Development) Research Group, Faculty of Health Sciences, Instituto Agroalimentario de Aragón (IA2), University of Zaragoza, and Instituto Investigación Sanitaria de Aragón (IIS Aragón), Zaragoza, Spain, <sup>4</sup>Consorcio CIBER, Fisiopatología de la Obesidad y Nutrición (CIBEROBN), Instituto de Salud Carlos III (ISCIII), Madrid, Spain, <sup>5</sup>Department of Nutrition, Food Science and Gastronomy, School of Pharmacy and Food Sciences XIA, Institute of Nutrition and Food Safety (INSA-UB), University of Barcelona, Santa Coloma de Gramenet, Spain, <sup>6</sup>Department of Internal Medicine, Hospital Clínic, Institut d'Investigacions Biomèdiques August Pi I Sunyer (IDIBAPS), University of Barcelona, Barcelona, Spain, <sup>7</sup>Hospital Universitario Clínico San Carlos, Madrid, Spain, <sup>8</sup>Centro de Investigación Biomédica En Red en enfermedades Cardiovasculares (CIBERCV), Madrid, Spain, <sup>9</sup>The Zena and Michael A. Wiener Cardiovascular Institute, Icahn School of Medicine at Mount Sinai, New York, USA

**SO.2.13 - The Latest Research on Motivation and Emotion Studies, UKK - Hall C (Level 3), June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Background:** Adolescence is a period in which body image satisfaction (BIS) gains relevance and influences dietary habits among other behaviors.

**Purpose:** To evaluate the relationship between BIS and food intake over adolescence.

**Methods:** 1315 adolescents from the SI! Program for Secondary Schools trial were assessed at baseline (12.5 [±0.4] years, 48.2% girls), first follow-up (1-FU) (13.9 [±0.4] years, 47.6% girls), and second follow-up (2-FU) (15.8 [±0.4] years, 48.4% girls). Adolescents self-reported their BIS and food intake through the Stunkard's figure rating scale and a validated food frequency questionnaire, respectively. Associations were estimated using linear and logistic mixed models stratified by gender, and adjusted for age, nutritional status, educational level, migrant background, and randomization group as fixed effects, and region and schools as random effects.

**Results:** In general, adolescents who desired to gain weight consumed more frequently unhealthier foods (e.g. fast-food, sweets, and processed meat). Compared to body-satisfied participants, boys willing to gain weight were more likely to be in the highest consumption group of sweets in 1-FU (OR: 2.39 [95%CI: 1.46;3.92]) and fast-food in 2-FU (OR: 2.97 [95%CI: 1.51;5.87]), while girls who desired to gain weight were more likely to be in the highest consumption group of sweets at baseline (OR: 1.99 [95%CI: 1.14;3.48]). In contrast, boys with a drive for thinness were less likely to be in the highest sweet beverages (baseline OR: 0.57 [95%CI: 0.34;0.96]; 1-FU OR: 0.57 [95%CI: 0.35;0.93]; 2-FU OR: 0.59 [95%CI: 0.35;1.00]), and sweets (baseline OR: 0.59 [95%CI: 0.36;0.98]; 2-FU: 0.49 [95%CI: 0.29;0.83]) consumption groups as compared to body-satisfied boys, while girls who desired to lose weight were less likely to be in the highest fruits and vegetables (OR: 0.64 [95%CI: 0.41;1.00]) and snacks (OR: 0.54 [95%CI: 0.3;0.99]) consumption groups at 1-FU.

**Conclusion:** BIS was consistently related to food intake during adolescence, with adolescents who desired to gain weight presenting an unhealthier dietary profile, especially boys. Health promotion programs on adolescent dietary habits should include a gender perspective and emphasize the overall health-related aspects of nutrition beyond weight status.

# Effects of combining physical activity with mindfulness on mental health and wellbeing: A systematic review

**Miss Masha Remskar<sup>1</sup>**, Dr. Max J. Western<sup>1</sup>, Miss Emma L. Osborne<sup>1</sup>, Dr. Olivia Maynard<sup>2</sup>, Dr. Ben Ainsworth<sup>3</sup>

<sup>1</sup>University of Bath, Bath, United Kingdom, <sup>2</sup>University of Bristol, Bristol, United Kingdom, <sup>3</sup>University of Southampton, Southampton, United Kingdom

**SO.2.13 - The Latest Research on Motivation and Emotion Studies, UKK - Hall C (Level 3), June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Physical activity and mindfulness practice both have established psychological benefits. However, relatively little is understood about how combining them may impact these effects, and whether there are additional benefits to a combined approach. This pre-registered review systematically identified, synthesised, and evaluated the existing literature on interventions combining physical activity and mindfulness, with a focus on mental health and wellbeing outcomes. Potential mechanisms of action and effects on physical activity engagement were explored as secondary aims.

**Methods:** Six databases (PubMed, Scopus, EMBASE, PsychINFO, Web of Science, The Cochrane Library) were searched for trials published up to June 2022. Eligible studies reported combined behaviour change interventions with 1) physical activity and mindfulness as the only or main treatments, 2) any type of control condition present, 3) adult samples with any or no medical condition(s), and 4) at least one wellbeing or mental health outcome. Study screening, data extraction and quality assessment (using the Cochrane Risk of Bias 2 tool) were performed by two separate reviewers. Findings are presented as a narrative synthesis due to clinical and methodological heterogeneity of included interventions.

**Results:** Out of 6389 original search results, 25 trials reported in 27 publications met the inclusion criteria. Most were pilot or feasibility studies (14 trials) or had small sample sizes ( $N_{median} = 47$ ), which limited our ability to draw firm conclusions regarding intervention effectiveness. Combining physical activity with mindfulness was deemed feasible and well-received by clinical and non-clinical samples alike. Combined interventions improved mental health and wellbeing outcomes relative to inactive controls (9/13 trials), with mixed results when compared to active control conditions (5/14 trials favoured combination). Effects on engagement in physical activity were also mixed, where measured.

**Conclusions:** Interventions combining physical activity with mindfulness are feasible and can be promising for improving mental health and wellbeing. Further research, particularly full-scale randomised controlled trials, is required to determine effectiveness, optimal intervention duration, dose and delivery type of either component. Assessing possible mediators or qualitatively exploring mechanisms of change would further advance the current understanding of the effects of combined interventions on mental health, wellbeing and their potential for behaviour change.

# How competitive high school sport influences boys' and girls' food habits: A gendered role for body shape.

**Miss Alysha L Deslippe<sup>1,2</sup>**, Miss Coralie Bergeron<sup>1,2</sup>, Dr. Tamara Cohen<sup>1,2</sup>

<sup>1</sup>Faculty of Land and Food Systems, The University of British Columbia, Vancouver, Canada, <sup>2</sup>Healthy Starts, BC Children's Hospital Research Institute, Vancouver, Canada

**SO.2.13 - The Latest Research on Motivation and Emotion Studies, UKK - Hall C (Level 3), June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Adolescents (13-18 years) who play competitive sports experience performance-related pressures like body shape that influence food habits and vary by gender. Most research exploring gender and food habits is conducted in elite sport settings (i.e., collegiate or high-performance teams) with limited work exploring athletes in competitive high school sports. Therefore, this study explored how adolescents in high school sports perceive the role of gender, sports and body shape over their food habits.

**Methods:** Semi-structured one-on-one interviews with high school students involved in competitive sports were conducted in Spring 2022 (n=27). All participants were purposefully recruited based on biological sex and high school sport participation. Interviewers were trained to probe for the perceived impact of sports, gender and social influences on participants' food habits. The interview guide was developed using previous literature and Bronfenbrenner's Social-Ecological Model. A brief online demographic question was also completed. Thematic analysis using inductive methods on 10 analyzed interviews (n=5 boys, n=5 girls) is reported here.

**Results:** All adolescents suggested that eating a healthy, balanced diet, staying hydrated and timing meals was critical for athletic performance. Majority of sport nutrition knowledge was learned from coaches or trainers, though girls also mentioned social media. In particular, adolescents highlighted the role of dietary protein on achieving performance goals. Within this, boys reported consuming more function protein sources (i.e., bars and shakes) compared to girls (i.e., shakes only). With regard to body shape, boys emphasized a desire to be fit and tall whereas girls stressed wanting to be thin. Among girls, these body-related pressures were more prominently stated to guide eating. Girls discussed feeling pressure to look a certain way to avoid judgement on their self-worth outside of sport in uniforms from coaches or teammates. In contrast, boys only discussed potential benefits for sport performance as a motivator for altering body shape.

**Conclusions:** Greater research is needed to understand how body-related pressures impact adolescents in high school sports food habits. Findings from these preliminary analyses suggest that gender specific messaging is needed to support adolescents' understanding that all bodies belong in sport.

# Cross-lagged effect of self-compassion on physical activity: The longitudinal mediation of barrier self-efficacy

**Dr. Shuge Zhang**, Prof. Andy Pringle, Dr. Clare Roscoe

<sup>1</sup>University of Derby, Derby, United Kingdom

**SO.2.13 - The Latest Research on Motivation and Emotion Studies, UKK - Hall C (Level 3), June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Overcoming barriers to engaging in regular physical activity is not an easy task but challenging to most people if not all. Self-compassion that involves one's disposition to approach distress, suffering, or unpleasant feelings and experience with an accepting and gentle mindset, is an important psychological quality and resource for an individual to overcome obstacles, recuperate from a setback or exercise lapse, and reengage in regular physical activity. Building on the limited, existing research on self-compassion and physical activity, the present research was the first to apply a longitudinal design and to examine the cross-lagged effect of self-compassion on physical activity. Moreover, the study also tested the longitudinal mediation of barrier self-efficacy that underlies the potential causal influence of self-compassion on one's physical activity levels.

**Methods:** We recruited a sample of 654 UK adults (Mean age = 40.83, SD = 13.58; 328 males) and followed them over three time points across seven months. At each time point, participants completed an online survey via Qualtrics, which assessed their levels of self-compassion, barrier self-efficacy, and physical activity (PA) levels. Cross-lagged panel analysis and longitudinal mediation analysis were performed.

**Results:** Self-compassion manifested a stable, significant cross-lagged effect from Time 1 to Time 2 and from Time 2 to Time 3 on increased MVPA and light PA. Time 2 Barrier self-efficacy mediated the effect of Time 1 self-compassion on increased MVPA and light PA at Time 3. All these observed effects were controlled for autoregressive effects across time (e.g., the effect of Time 1 MVPA on Time 2 MVPA) and synchronous correlations at each time point (e.g., the correlation of Time 1 MVPA and Time 1 self-compassion). Self-compassion did not demonstrate a meaningful effect on reducing time spent in sedentary behaviour.

**Conclusions:** Adopting a self-compassionate mind can help an individual engage in physical activity. The benefit of self-compassion is greater for MVPA than light PA but seems not useful for addressing sedentary behaviours. Future PA intervention should consider compassion-focused training to explore new ways to tackle physical activity and sedentary behaviour.

# Gratitude is associated with a healthier and more sustainable diet in the NutriNet-Santé Study

Dr. Margaux Robert<sup>1</sup>, Prof. Rebecca Shankland<sup>2</sup>, Dr. Mélanie Deschasaux-Tanguy<sup>1</sup>, Dr. Emmanuelle Kesse-Guyot<sup>1</sup>, Dr. Julia Baudry<sup>1</sup>, Dr. Alice Bellicha<sup>1</sup>, Dr. Bernard Srour<sup>1</sup>, Miss Marion Van Beekum<sup>1</sup>, Dr. Christophe Leys<sup>3</sup>, Prof. Serge Hercberg<sup>1,4</sup>, Dr. Mathilde Touvier<sup>1</sup>, Dr. Benjamin Allès<sup>1</sup>, **Dr. Sandrine Péneau<sup>1</sup>**

<sup>1</sup>Université Sorbonne Paris Nord, Inserm U1153, Inrae U1125, Cnam, Equipe de recherche en Epidémiologie Nutritionnelle (EREN), Centre de Recherche en Epidémiologie et Statistiques – Université de Paris (CRESS), Bobigny, France, <sup>2</sup>Laboratoire DIPHE (Développement, Individu, Processus, Handicap, Education), Université Lumière Lyon 2, Lyon, France, <sup>3</sup>Université Libre de Bruxelles, Service d'analyse des données (SAD), Bruxelles, Belgium, <sup>4</sup>Département de Santé Publique, Avicenne Hospital, Bobigny, France

**SO.2.13 - The Latest Research on Motivation and Emotion Studies, UKK - Hall C (Level 3), June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Gratitude has been associated with positive health outcomes, such as better cardiovascular health, less anxiety and depression or less dysfunctional eating. Grateful individuals have also been shown to be more compliant with medical recommendations, including diet recommendations suggesting that more grateful individuals could also have a better overall diet quality. However, data are lacking. This cross-sectional study aimed to investigate the associations between gratitude and food intake and in particular diet quality, food group and ultra-processed food (UPF) consumption and the contribution of organic and plant-foods to the diet.

**Methods:** In 2017, 20,190 participants of the NutriNet-Santé study completed the Gratitude Questionnaire-6 (GQ-6) and at least three self-administered 24-h dietary records. Adherence to dietary guidelines were assessed with the French National Nutrition and Health Program-Guideline Score (mPNNS-GS). Foods consumed were categorized according to their degree of processing by the NOVA classification. Organic food consumption was measured through an organic food frequency questionnaire. Contribution of plant-based foods to the diet was assessed with the plant-based diet index (PDI). Logistic and linear regressions were used to analyze associations between gratitude and diet quality, stratified on sex and considering socio-demographic and lifestyle characteristics.

**Results:** In both men and women, higher gratitude was associated with a better adherence to the dietary guidelines ( $\beta=0.08$ ; 95% CI = 0.05, 0.011) higher intakes of fruits and vegetables and whole-grain products, non-salted oleaginous fruit and lower intakes of meat and poultry, dairy and cheese and milk-based desserts. In women, gratitude was also associated with higher intake of healthy (legumes) and unhealthy (alcoholic and sugary drinks, fast-food and appetizers) food groups. Higher gratitude was also associated with lower intake of UPFs and a greater contribution of organic and plant-based foods to the diet in both men and women.

**Conclusions:** Gratitude was associated with a healthier and more sustainable diet overall. Potential impact of gratitude on the diet should be further investigated in intervention studies. These findings suggest that gratitude could be helpful in the promotion of healthy and sustainable dietary behaviors.

# A Randomized Controlled Trial on the Social Diffusion of Eating Behavior

**Associate Professor Nicklas Neuman**<sup>1</sup>, Ms. Ansung Kim<sup>2</sup>, Dr. Carolin Zorell<sup>2</sup>

<sup>1</sup>Uppsala University, Uppsala, Sweden, <sup>2</sup>Örebro University, Örebro, Sweden

**SO.2.13 - The Latest Research on Motivation and Emotion Studies, UKK - Hall C (Level 3), June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** This is an innovative method utilizing a mobile application both as a dietary assessment instrument and as an instrument for exposure to test effects on food behavior. We ask the important question: *are behaviors affected by what we are told to do or what our group members do?* More precisely: *does social reinforcement affect self-reported intakes of plant or animal foods within artificial social networks, and if so, under what conditions?*

**Method:** This is a 4-month randomized controlled trial conducted in Sweden. Participants were contacted via a variety of online and offline channels and directed to a questionnaire form. 328 eligible participants were invited to the app and randomized to one of three groups: (1) a factual information group (n=110); (2) a social information group (n=110); and (3) a no information group (control) (n=108). All participants were given the possibility to interact by posting pictures as well as commenting on and “liking” the activity of others. Throughout the study, groups 1 and 2 received weekly messages: (1) focused on facts about diet and health or environmental impact (mainly advice from the Swedish Food Agency); or (2) about the reported food intake of others in the group. Messages were mostly about plant or animal foods, but not only, since we did not want to make the study purpose too obvious. All three groups received reminders twice per week, asking participants to report at least two days’ total intake per week.

**Results:** Of all invited individuals, 190 reported at least one meal (n=62 [1]; n=65 [2]; n=63 [3]), with large variations in activity over the 4 months. Main outcome: proportions of plant:animal foods in the three groups across the 4 months. In addition, network dynamics, demographic associations (e.g. gender and education), patterns of specific foods, and the patterns of reporting (itself a behavior) are examples of secondary outcomes analyzed exploratively.

**Discussion:** The innovativeness of the method can inspire further behavior-change research to test the effects of different forms of social influence. The results have relevance for advancing behavioral nutrition knowledge and, in the long run, construct effective policy.



# Overcoming barriers to engage in physical activity: The role of self-compassion

**Associate Professor Clare Roscoe<sup>1</sup>**, Prof. Andy Pringle<sup>1</sup>, Dr. Shuge Zhang<sup>1</sup>

<sup>1</sup>University of Derby, Derby, United Kingdom

SO.2.13 - The Latest Research on Motivation and Emotion Studies, UKK - Hall C (Level 3), June 16, 2023, 12:00 PM - 1:15 PM

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Self-compassion involves being open to one's own suffering, generating the desire to heal oneself or acknowledging suffering as part of normal, human experience; it is likely to be a driver for physical activity. Existing studies examining the relationship between self-compassion and physical activity have insufficient statistical power or lack the sensitivity to detect a true effect. Therefore, the present study aimed to test the association between self-compassion and physical activity in a large, well-powered sample. We hypothesised that self-compassion exerts positive influences on one's active health behaviour (increases physical activity levels/reduces sedentary behaviour) via alleviated psychological distress (greater emotion and coping resources) and subsequently enhanced barrier self-efficacy (greater confidence and motivation).

**Methods:** In a sample of 569 UK adults (mean age = 41.92 years, SD  $\pm$  13.70; 47.8% female), participants consented and completed online surveys. We assessed self-compassion using the 12-item Self-Compassion Scale – Short, psychological distress using the 6-item Psychological Distress Scale, barrier self-efficacy using the 5-item Self-Efficacy Inventory and physical activity using the 7-item International Physical Activity Questionnaire – Short Form. We examined the effects of self-compassion on average daily time spent in sedentary behaviour, light and moderate-to-vigorous physical activity, whilst testing psychological distress and barrier self-efficacy as underpinning mediating factors. We also examined the effects of self-compassion on barrier self-efficacy, with psychological distress being the hypothesised mediator.

**Results:** Self-compassion demonstrated a significant, positive indirect effect on MVPA via increased barrier self-efficacy ( $\beta = .15$ ,  $p = .01$ , 95% CI [.04, .27]; standardised indirect effect = .06,  $p = .01$ , 95% CI [.01, .11]). The serial mediation path of self-compassion on MVPA via decreased psychological distress ( $\beta = -.75$ ,  $p = .00$ , 95% CI [-.78, -.71]) and subsequently increased barrier self-efficacy ( $\beta = -.11$ ,  $p = .06$ , 95% CI [-.23, .01]) was marginally significant and positive (standardised indirect effect = .03,  $p = .07$ , 95% CI [.00, .07]).

**Conclusions:** Self-compassion is a good source to overcome challenges and obstacles in the context of physical activity. Self-compassion contributes more strongly to moderate and vigorous physical activity levels and future interventions could consider incorporating self-compassion for physical activity adoption and maintenance.

# Exploring the Meanings and Perceptions of an Identity Towards Physical Activity in Early Cancer Survivorship

**Miss Allyson Tabaczynski<sup>1</sup>**, Miss Jada Roach<sup>1</sup>, Dr. Linda Trinh<sup>1</sup>

<sup>1</sup>Faculty of Kinesiology and Physical Education, University of Toronto, Toronto, Canada

**SO.2.14 - Lifestyle factors and cancer survivorship: Evidence from cross-sectional to intervention studies, UKK - Hall D (Level 2 - main floor), June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** C. Cancer prevention and management

**Purpose:** Physical activity (PA) behaviour change efforts for cancer survivors continue to be thwarted by a lack of understanding and application of the determinants for PA maintenance. PA identity has been theorized to be both an antecedent and product of sustained PA participation, with some support for a strong association between PA identity and behaviours among cancer populations. Cancer survivors often report cancer-related barriers (e.g., fatigue, poorer physical functioning) as an impediment to PA participation following diagnosis. However, there is little understanding of how cancer-related sequela can impact existing PA identities of cancer survivors or the development of new PA identities. Therefore, the purpose of this study is to explore the meaning and perceptions of PA identity among cancer survivors within early survivorship.

**Methods:** Purposeful sampling will be used to reach adult cancer survivors within the early survivorship period ( $\leq 5$  years post-treatment) who have an identity surrounding PA (i.e.,  $\geq 5$  points on each role-identity item on the Exercise Identity Scale). Using a constructivist approach, semi-structured interviews include items seeking to understand the meaning of their PA identity, perceptions of how it formed, and how their cancer journey has interacted with this identity. Online interviews will be transcribed verbatim and analyzed using the methods outlined in Braun and Clarke's thematic analysis. Data collection will continue until saturation has been reached.

**Results:** Data collection is currently ongoing, and results have not been generated. Complete results will be presented at the ISBNPA 2023 annual meeting.

**Discussion:** PA identity is becoming more explicitly targeted in PA interventions for cancer survivors given its growing support as an important predictor of behaviour. Application of such identity formation strategies may, however, be limited by a lack of understanding of this construct as it applies specifically to cancer populations. The current study will provide insight into the perspectives cancer survivors hold towards PA identity within the context of their individual experiences following their cancer diagnosis. Such exploration can be used to tailor identity formation strategies within PA interventions for cancer survivors.

# Self-efficacy, motivation, and habits: psychological correlates of exercise among women with breast cancer.

**Dr. Tamara Jones**<sup>1</sup>, Dr. Lara Edbrooke<sup>1,2</sup>, Dr. Jonathan Rawstorn<sup>3</sup>, Prof. Sandra Hayes<sup>4</sup>, Prof. Ralph Maddison<sup>3</sup>, Prof. Linda Denehy<sup>1,2</sup>, Associate Professor Camille Short<sup>1</sup>

<sup>1</sup>The University of Melbourne, Melbourne, Australia, <sup>2</sup>The Peter MacCallum Cancer Centre, Melbourne, Australia, <sup>3</sup>Deakin University, Melbourne, Australia, <sup>4</sup>Griffith University, Brisbane, Australia

**SO.2.14 - Lifestyle factors and cancer survivorship: Evidence from cross-sectional to intervention studies, UKK - Hall D (Level 2 - main floor), June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** C. Cancer prevention and management

**Purpose:** Designing effective programs that support breast cancer survivors to adopt and maintain regular exercise requires an understanding of characteristics that influence exercise behaviour. Psychological factors in particular are considered manipulable through behaviour change intervention. The purpose of this analysis was to inform future theory-based interventions by exploring associations between exercise behaviour and behavioural constructs from distinct theories: self-efficacy, motivation, and habits.

**Methods:** Breast cancer survivors (n=204) completed a cross-sectional survey collecting demographic and disease characteristics, exercise levels (Godin Leisure Time Exercise Questionnaire [GLTEQ] and a purpose-built resistance training item), and self-efficacy (Multidimensional Self-Efficacy for Exercise Scale), motivation (Behavioral Regulation in Exercise Questionnaire V2), and habit scores (Self-Report Habit Index). Multivariable linear regression models were used to identify psychological correlates of Total Activity (QLTEQ Score) and Resistance Training (sessions/week).

**Results:** Participants had a mean age of 57(11) years and most were diagnosed with early-stage disease (72%) and engaged in sufficient levels of exercise (GLTEQ Score  $\geq 24$ ; 94%), though only 44% completed two or more resistance training sessions/week. Identified motivation ( $\beta$ [95%CI]=7.58[3.91-11.24];  $p < 0.01$ ) and habits ( $\beta$ [95%CI] =4.43[1.48-7.38];  $p < 0.01$ ) were found to be significant correlates of Total Activity, whilst identified motivation ( $\beta$ [95%CI]=0.62[0.32-0.91];  $p < 0.01$ ) and coping self-efficacy ( $\beta$ [95%CI]=0.02[<0.01-0.03];  $p < 0.01$ ) were significant correlates of Resistance Training.

**Conclusions:** Although preliminary, these results may support the application of integrated theory-based interventions for improving exercise behaviour among breast cancer survivors and provide insight into how intervention techniques from distinct theories may be best integrated. Future research should explore these findings longitudinally to examine correlates of exercise maintenance and in a less active sample.

# Adherence to the WCRF/AICR cancer prevention recommendations and risk of recurrence after non-muscle invasive bladder cancer

Dr. Moniek van Zutphen<sup>1</sup>, Mr. Jasper Hof<sup>1</sup>, Dr. Katja Aben<sup>3</sup>, Prof. Ellen Kampman<sup>2</sup>, Prof. Alfred Witjes<sup>1</sup>, Prof. Lambertus Kiemeny<sup>1</sup>, **Dr. Alina Vrieling<sup>1</sup>**

<sup>1</sup>Radboud University Medical Center, Nijmegen, Netherlands, <sup>2</sup>Wageningen University & Research, Wageningen, Netherlands, <sup>3</sup>Netherlands Comprehensive Cancer Organisation, Utrecht, Netherlands

**SO.2.14 - Lifestyle factors and cancer survivorship: Evidence from cross-sectional to intervention studies, UKK - Hall D (Level 2 - main floor), June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** C. Cancer prevention and management

**Purpose:** Patients with non-muscle invasive bladder cancer (NMIBC) are at high risk of tumor recurrence. It has not been previously investigated if adherence to cancer prevention recommendations lowers risk of recurrence. We examined whether the standardized lifestyle score measuring adherence to the 2018 World Cancer Research Fund/American Institute for Cancer Research (WCRF/AICR) cancer prevention recommendations was associated with risk of recurrence and progression among patients with NMIBC.

**Methods:** The study population included patients diagnosed with primary NMIBC between 2014 and 2017 from the prospective cohort UroLife. Lifestyle was assessed at baseline (n=979; reflecting the prediagnosis period) and 3-months postdiagnosis (n=885). The standardized 2018 WCRF/AICR score was constructed based on recommendations for body weight, physical activity, diet, and alcohol intake. We computed multivariable-adjusted hazard ratios (HRs) and 95% confidence intervals (CIs) using Cox proportional hazard regression models.

**Results:** During a median follow-up time of 3.7 years, 320 patients developed  $\geq 1$  recurrence(s) and 49 experienced progression. Patients in the highest versus lowest tertile of postdiagnosis WCRF/AICR scores had a lower risk of first bladder cancer recurrence (HR, 0.74; 95%CI: 0.56, 0.98). No associations were observed for multiple recurrences (HR, 0.90; 95%CI 0.70, 1.15) or for the baseline score with either first (HR, 1.07; 95%CI 0.82, 1.40) or multiple recurrences (HR, 1.04; 95%CI: 0.82, 1.31). Improving lifestyle after diagnosis (per 1-point increase) was not significantly associated with risk of first or multiple recurrence(s) (HR, 0.87; 95% CI: 0.74, 1.02 and HR, 0.93; 95%CI: 0.80, 1.08, respectively). No associations were observed for bladder cancer progression, but power was limited.

**Conclusions:** Better adherence to the WCRF/AICR cancer prevention recommendations 3-months after NMIBC diagnosis, but not before diagnosis, is associated with a decreased risk of first bladder cancer recurrence. More studies evaluating postdiagnosis lifestyle are needed to provide solid support for lifestyle recommendations for cancer survivors.

# “I'm hooked on e-cycling, I can finally be active again”: Perceptions of e-cycling as a physical activity intervention during breast cancer treatment.

Ms. Kirsty Way<sup>1</sup>, Dr. Jessica Bourne<sup>1</sup>, Ms. Chloe Forte<sup>1</sup>, **Dr. Miranda Armstrong<sup>1</sup>**

<sup>1</sup>Exercise, Nutrition and Health Sciences, School for Policy Studies, University of Bristol, Bristol, United Kingdom

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**Purpose:** Electrically-assisted bicycles (e-bikes) are a means through which to increase individual physical activity (PA) and overcome some commonly reported barriers to engaging in conventional cycling. Fatigue is a common side effect to breast cancer treatment, and the rate of PA engagement drops significantly following a breast cancer diagnosis. The use of e-bikes as a means of increasing PA in this population has yet to be explored. Therefore, the primary aim of this research was to examine perceptions of e-cycling amongst individuals who have had a breast cancer diagnosis. Changes in perceptions of e-cycling were examined following completion of an e-bike taster session. A secondary aim was to understand when, during the treatment process, using an e-bike may be the most beneficial as a means of increasing PA.

**Methods:** Twenty-four participants (Mean age =57.5 (SD 10.2), 100% female) who had had a breast cancer diagnosis, completed two semi-structured interviews via Zoom. One interview was conducted prior to an e-bike taster session and a second, after the session. Taster sessions were conducted by certified cycling instructors in the community. Interviews were conducted between December 2021 and May 2022. Data were transcribed verbatim and analysed thematically using NVivo 12 software. An inductive and deductive approach to analysis was adopted whereby initial coding was inductive.

**Results/findings:** Five themes were generated: Perceived role of e-bikes during treatment; Overcoming fatigue; Cancer-specific considerations; Is e-cycling 'enough'? and Optimising intervention. Negative perceptions of e-bikes noted before the taster session were often altered following a trial on the e-bike. E-cycling was appealing to participants due to its multiple levels of assistance which made e-cycling more manageable, thereby enabling individuals to re-introduce cycling habits. An optimal time to implement an e-bike intervention during the cancer journey was difficult to discern; however, immediately post-diagnosis was deemed least convenient.

**Conclusions:** E-cycling may be a suitable option to increase PA behaviour amongst individuals being treated for breast cancer with the potential to overcome many of the barriers of conventional cycling. Enabling this population to trial an e-bike elicits positive physical and psychological responses that may help to promote future engagement.

# Physical activity and sedentary behaviour as predictors of health-related quality of life among women treated for breast cancer through Connect 4 Exercise intervention: A multi-level model analysis

**Miss Delaney Thibodeau<sup>1</sup>**, Dr. Ross Murray<sup>1</sup>, Dr. Madison Vani<sup>1</sup>, Dr. Catherine Sabiston<sup>1</sup>

<sup>1</sup>University of Toronto, Toronto, Canada

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**Purpose:** Health-related quality of life (HRQOL) is a key indicator of health and well-being, particularly among individuals diagnosed with cancer. Physical activity (PA) is positively associated with HRQOL, and there is sparse insight on the association with sedentary behaviour (SB). This study aimed to explore associations between changes in PA and SB and HRQOL among women treated for breast cancer involved in a 10-week partner-focused remote-delivered PA intervention. It was hypothesized that positive changes in PA and SB would be related to higher HRQOL from pre- to post-intervention, and that the effects would be stronger for the intervention group.

**Methods:** Women treated for breast cancer ( $N = 108$ ,  $M_{\text{age}} = 50.84$ ) were matched with a partner and randomly assigned to either engage in PA with their partner (ActiveMatch; AM group), or to attend PA sessions led by a qualified exercise professional (QEP group). Fitbit watches measured PA and SB and the Short Form Health Survey was used for physical- and mental HRQOL at baseline and post-intervention. The data were analysed using multi-level models to test longitudinal changes in PA and SB as predictors of HRQOL, accounting for the participants' age, dyad, intervention group, and baseline HRQOL.

**Results:** PA and SB both increased during the intervention, but these changes were not significant. There was a significant interaction of intervention condition and SB changes on post-intervention PQOL (CI: [0.00-0.03],  $p < .05$ ). Among AM participants, SB changes were associated with more negative changes in physical HRQOL; however, SB changes were not associated with physical HRQOL among QEP participants. Effects of PA were null in both groups. Changes in PA and SB were not associated with mental HRQOL ( $p > .05$ ) for AM or QEP.

**Conclusions:** Results suggest a protective effect of the PA intervention for the physical HRQOL domain. There is a specific benefit of being matched with a partner and a QEP to protect from poor changes in SB which connect to HRQOL. These findings implicate a potential benefit of supervised PA interventions for women treated for breast cancer who experience challenges to their quality of life resulting from treatment.



# Longitudinal associations of adherence to lifestyle recommendations and health-related quality of life in patients with non-muscle invasive bladder cancer

Dr. Nikoletta Vidra<sup>1</sup>, **Ms. Ivy Beeren**<sup>1</sup>, Dr. Moniek van Zutphen<sup>1,3</sup>, Dr. Katja KH Aben<sup>1,2</sup>, Prof. Ellen Kampman<sup>3</sup>, Prof. J Alfred Witjes<sup>1</sup>, Dr. Antoine G van der Heijden<sup>1</sup>, Prof. Lambertus ALM Kiemeny<sup>1</sup>, Assistant Professor Alina Vrieling<sup>1</sup>

<sup>1</sup>Radboud University Medical Center, Nijmegen, Netherlands, <sup>2</sup>Netherlands Comprehensive Cancer Organisation, Utrecht, Netherlands, <sup>3</sup>Wageningen University & Research, Wageningen, Netherlands

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**Purpose:** Although the role of lifestyle in health-related quality of life (HRQoL) outcomes has been increasingly recognized for various types of cancer, evidence in patients with non-muscle invasive bladder cancer (NMIBC) is very limited. Therefore, we aimed to evaluate the longitudinal association between adherence to the 2018 World Cancer Research Fund/American Institute for Cancer Research (WCRF/AICR) lifestyle recommendations and HRQoL in patients with NMIBC.

**Methods:** This study included 1,029 patients diagnosed with NMIBC between May 2014 and April 2017 from the Dutch multi-centre prospective cohort study UroLife. Self-reported lifestyle and HRQoL data were collected at six weeks (baseline), three months, and fifteen months after diagnosis. Information on body mass index (BMI), physical activity, diet (including intakes of fruit and vegetables, dietary fibre, ultra-processed foods, red and processed meat, and sugary drinks), and alcohol was used to compute the standardized 2018 WCRF/AICR adherence score (range 0-7). HRQoL outcomes were evaluated by the EORTC QLQ-C30. Linear mixed models were used to assess longitudinal confounder-adjusted associations between the WCRF/AICR adherence score and HRQoL outcomes.

**Results:** The mean WCRF/AICR adherence score was  $3.3 \pm 0.9$  at baseline. Adherence to each additional WCRF/AICR recommendation was associated with better global quality of life ( $\beta$ : 2.00, 95% CI: 1.15, 2.84), physical ( $\beta$ : 1.36, 95% CI: 0.74, 1.98), role ( $\beta$ : 1.92, 95% CI: 0.76, 3.09), and social ( $\beta$ : 1.21, 95% CI: 0.29, 2.13) functioning, and less fatigue ( $\beta$ : -1.33, 95% CI: -2.28, -0.39). We found stronger inter-individual than intra-individual associations, suggesting that associations were mainly driven by between-subject differences. Higher adherence to the BMI, physical activity, and dietary recommendations was associated with better scores for most HRQoL outcomes, while adherence to the alcohol recommendation (i.e. non-consumption) was associated with worse HRQoL.

**Conclusions:** Higher adherence to the overall 2018 WCRF/AICR lifestyle recommendations was associated with better HRQoL outcomes in patients with NMIBC. A reverse association was observed for alcohol consumption. Overall, following a healthy lifestyle may improve HRQoL in this patient group. Well-designed intervention studies are required to obtain further insight into the relationship between lifestyle and HRQoL.

# Lifestyle intervention during Colorectal Cancer Screening: a pilot study in France

**Miss Aline Al Nahas**<sup>1</sup>, Dr. Nathalie Kliemann<sup>1</sup>, Mrs. Aurelia Maire<sup>2</sup>, Dr. Emmanuel Forte<sup>3</sup>, Dr. Anne Anne Cattey-Javouhey<sup>2</sup>, Dr. Nicolas Benech<sup>3</sup>, Mrs. Olivia Pérol<sup>2</sup>, Mrs. Tracy Wootton<sup>1</sup>, Dr. Inarie Jacobs<sup>1</sup>, Dr. Julien Carretier<sup>2</sup>, Prof. Jean-Christophe Saurin<sup>3</sup>, Associate Professor Beatrice Fervers<sup>2</sup>, Dr. Marc J. Gunter<sup>1</sup>, Dr. Inge Huybrechts<sup>1</sup>

<sup>1</sup>International Agency for Research on Cancer, CEDEX 08, Lyon , France, <sup>2</sup>Centre Léon Bérard, Lyon, France,

<sup>3</sup>Service d'Hépatogastroentérologie, Hôpital Edouard Herriot, Hospices Civils de Lyon, , Lyon, France

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**SIG - Primary Choice:** C. Cancer prevention and management

**Purpose:** This pilot study aims to test the feasibility of a lifestyle intervention in French hospital settings to optimize fieldwork procedures for the large-scale randomized control trial LIFE-SCREEN (registered with clinicaltrials.gov: Record PP201907-26). The aim of the intervention is to provide evidence-based diet and lifestyle advice for cancer prevention at a teachable moment, namely at colorectal cancer screening.

**Methods:** the pilot study is ongoing and anticipates a final number of 40 patients recruited at two hospitals, Centre Léon Bérard and l'hôpital Edward Herriot in Lyon, France . The intervention material was administered to each patient and comprises WCRF recommendations, recipes, nutrition and physical activity tips, behavioural change section, and a logbook to help them in goal setting, tracking and achievement. Patients receive the intervention material in colonoscopy visit and are asked to complete questionnaires at baseline and after at least one month of using the material. They also receive a pedometer. Biospecimens collections (venous blood at hospital and self-administered urine, feces, capillary blood collections) were optional to enable patients to participate while refusing one or more biospecimens. Focus group meetings were organised with patients and then with hospital staff to give an understanding of their perspective on the intervention.

**Results/findings:** The first 10 patients who have been recruited accepted to give all the biospecimens (except from two patients); they rated the collection at home and the sending of the collected samples as acceptable. Patients participating in the focus group (2 men; 2 women) were impressed by the quality of the intervention material and found the monitoring sheets useful to help them reach their goals. Hospital staff suggested to simplify the material while referring to more detailed online information to reduce the time needed to explain the intervention material to the patient during the visit.

**Conclusions:** A simplification of the material and providing access to supplementary resources online (including short video's) are suggested modifications to improve efficacy and to meet the diverse needs of the patients while reducing the burden on hospital staff. Self-administered biospecimens collections are acceptable by the patients and posting them proved to be cost effective and practical.

# Prevalence and change in circadian rhythm disrupting sleep and eating behaviours in women after breast cancer.

**Ms. Kelly D'cunha**<sup>1</sup>, Dr. Yikyung Park<sup>2</sup>, Dr. Rebecca M. Leech<sup>3</sup>, Dr. Melinda M. Protani<sup>1</sup>, Dr. Louise Marquart-Wilson<sup>1</sup>, Prof. Marina M. Reeves<sup>1</sup>

<sup>1</sup>Faculty of Medicine, School of Public Health, The University of Queensland, Brisbane, Australia, <sup>2</sup>Division of Public Health Sciences, Department of Surgery, Washington University School of Medicine, St Louis, USA,

<sup>3</sup>Faculty of Health, Institute for Physical Activity and Nutrition (IPAN), Deakin University, Geelong, Australia

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**SIG - Primary Choice:** C. Cancer prevention and management

**Purpose:** Circadian rhythm disrupting lifestyle factors, such as sleep patterns and eating behaviours, may influence cancer outcomes in women following a breast cancer diagnosis. However, little is known about the prevalence of these behaviours in breast cancer survivors. This study examined the prevalence of sleep and eating behaviours within a sample of breast cancer survivors and changes in these behaviours following a weight loss (diet and physical activity) intervention.

**Methods:** 159 female breast cancer survivors (18-75 years; 25-45 kg/m<sup>2</sup>; stage I-III) were recruited to participate in a randomised controlled trial of a 12-month weight loss intervention versus usual care. Data were collected at baseline, 6-, 12-, and 18-months (80.5% retention at 18-months). Participants completed two non-consecutive 24-hour dietary recalls and sleep logs for seven days. Sleep duration, eating occasions, proportion of calories consumed in the evening, night-time eating, and nightly fasting duration were estimated and categorised based on existing evidence into desirable/undesirable behaviours. Prevalence of sleep and eating behaviours at baseline are described, and prevalence of eating behaviours were compared to an age- and BMI-matched national sample of women without cancer from the Australian Health Survey (2011-2013). Mixed-effects logistic regression models were used to examine the effects of the weight loss intervention on these behaviours.

**Results:** At baseline (mean 11 months post-diagnosis), 62% of breast cancer survivors had >6 eating occasions (versus 38% in women without cancer), 82% consumed ≥30% of caloric intake after 5pm (versus 79%), 67% consumed ≥25kcal after 8pm (versus 52%), 86% fasted for less than 13 hours overnight (versus 73%), and 24% slept <8 hours while 30% slept >9 hours per night. For breast cancer survivors, there were no statistically significant or meaningful (Cohen's effect sizes [d] all <0.3) differences between the intervention and usual care groups for changes in sleep or eating behaviours over the 18 months.

**Conclusions:** Circadian rhythm disrupting eating behaviours are highly prevalent in breast cancer survivors. These behaviours were not modified following a standard weight loss intervention. Future diet and health behaviour interventions should focus not only on diet quality but also on timing of eating in breast cancer survivors.

# The UNiversity students LIFEstyle behaviors and Mental health problems (UNILIFE-M) prospective cohort

Prof. Felipe Schuch<sup>1</sup>, **Associate Prof. Susan Torres**, Other On behalf of the UNILIFE-M consortium

<sup>1</sup>Federal University of Santa Maria , Santa Maria, Brazil

**SO.2.15 - Hot topics in young adults nutrition and physical activity, UKK - K1 (+K2) (Level 3), June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** J. Young Adults

**Purpose:** Emerging adulthood is a peak period for the onset of mental health problems. This period – in which many young people go to college – is also marked by a shift in multiple lifestyle behaviors, including increased time spent in sedentary behavior and physical inactivity, poorer dietary habits, sleep quality, and increased substance use. Lifestyle behaviors do not occur in isolation, there is a high level of interdependence between them, and thus, changes in one behavior may trigger changes in other behaviors. Robust evidence demonstrates that some lifestyle behaviors are independent risk factors for mental health outcomes. However, there is a paucity of evidence investigating the role of multiple lifestyle behaviors with incident mental health problems in university students. The present project portrays an international prospective multicenter cohort in over 60 universities in 24 countries, aiming to investigate the relationships between lifestyle behaviors and incident mental health problems in university students.

**Methods:** The prospective study will gather self-reported data on lifestyle behaviors (diet, physical activity, substance use, stress management, social support, restorative sleep, and screen exposure), using the Short Multidimensional Inventory Lifestyle Evaluation (SMILE) scale. Mental health problems (symptoms of depression, anxiety, mania, sleep problems, substance abuse, inattention/hyperactivity, and obsessive/compulsive thoughts/behaviors) will be assessed using a two-level approach. All students will answer the DSM-5 Level 1 Cross-Cutting Symptom Measure in level one. Further, the participants that screen positive for a problem will fill up the level two instrument for that problem(s). The level 2 questionnaires are the Patient Health Questionnaire (PHQ-9), the Generalized Anxiety Disorder (GAD-7), the Hypomania CheckList (HCL-16), the Alcohol, Smoking and Substance Involvement Screening Test, *Adult Self-Report Scale* for the symptoms of attention-deficit disorder (ASRS), the Pittsburg Sleep Quality Index (PSQI), and the obsessive-compulsive inventory-revised (OCI-R).

**Results:** A total of 300 first-year students will be assessed at baseline (the first semester of the 2023 academic year), and followed up for 1, 2, and 3.5 years.

**Conclusions:** The study will advance the field by comprehensively investigating how multiple lifestyle behaviors cluster to predict the most prevalent mental health problems in university students during their college years.

# Lifestyle behaviours clustering and their association with cardiorespiratory fitness and muscular strength in university students

**Mrs. Ximena Palma-Leal<sup>1,2</sup>**, Dr. José Francisco López-Gil<sup>3</sup>, Dr. Fernando Rodríguez-Rodríguez<sup>2</sup>, Dr. Daniel Camiletti-Moirón<sup>4,5</sup>, Dr. Palma Chillón<sup>1</sup>

<sup>1</sup>PROFITH Research Group, Department of Physical Education and Sports, Faculty of Sport Sciences, Sport and Health University Research Institute (iMUDS), University of Granada, Granada, Spain, <sup>2</sup>IRyS Group, School of Physical Education, Pontificia Universidad Católica de Valparaíso, Viña del Mar, Chile, <sup>3</sup>Health and Social Research Center, Universidad de Castilla-La Mancha, Cuenca, Spain, <sup>4</sup>GALENO Research Group, Department of Physical Education, Faculty of Education Sciences, University of Cádiz, Avenida República Saharaui, s/n, Puerto Real, Cádiz, Spain, <sup>5</sup>Instituto de Investigación e Innovación Biomédica de Cádiz (INiBICA), Cádiz, Spain

**SO.2.15 - Hot topics in young adults nutrition and physical activity, UKK - K1 (+K2) (Level 3), June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** J. Young Adults

**Background:** There is a prevalence of unhealthy lifestyles, especially among university students, which could have a negative impact on their short-and long-term health.

**Purpose:** The aim of this study was two-fold: 1) to identify different lifestyle behaviours patterns in Chilean and Spanish university students, according to their sleep duration, breakfast status, moderate-to-vigorous physical activity (MVPA), sitting time, and mode of commuting; and 2) to determine the odds of reporting high cardiorespiratory fitness and muscular strength among the different lifestyle behaviours patterns established.

**Methods:** In this cross-sectional design, a total of 2269 university students (52.9% women) participated in this study (26.8 ± 6.0 years old). Self-reported questionnaires were used to measure sleep duration, breakfast status, MVPA, sitting time, mode of commuting and physical fitness components (i.e., cardiorespiratory fitness and muscular strength). To examine the different lifestyle behaviours patterns, a two-step cluster analysis was performed. Logistic regression models were used to determine the odds of reporting high physical fitness among the different lifestyle behaviours patterns established.

**Results/findings:** Three different lifestyle patterns were identified: Cluster 1 (less sleep duration + skipping breakfast + low MVPA + medium sitting time), Cluster 2 (medium sleep duration + daily breakfast + high MVPA + less sitting time + passive commuting), and Cluster 3 (more sleep duration + daily breakfast + high MVPA + more sitting time + active commuting). Students in Cluster 2 and Cluster 3 were more likely to report higher cardiorespiratory fitness (Odd Ratio [OR]: 1.35, Confident Interval [CI] 95%: 1.06-1.74; OR: 1.37; CI95%: 1.01-1.86, respectively), and muscular strength (only significant for Cluster 2, OR: 1.29; CI95%: 1.01-1.64) compared to students in Cluster 1. Additionally, Cluster 2 had significant odds of reporting both high cardiorespiratory fitness and muscular strength (OR: 1.54; CI95%: 1.13-2.09) compared to students in Cluster 1.

**Conclusions:** Having a lifestyle behaviour pattern that includes more sleep duration, daily breakfast, high MVPA, and less sitting time was associated with reporting a high cardiorespiratory fitness and muscular strength among Spanish and Chilean university students. This finding could be clinically relevant, as both components of physical fitness are powerful markers of health.

# Diet quality, diet-related factors, and disability status among male young adults in the United States

**Dr. Andrea Deierlein**<sup>1</sup>, Ms. Jackie Litvak<sup>1</sup>, Ms. Chang Liu<sup>1</sup>, Dr. Cheryl Stein<sup>2</sup>

<sup>1</sup>School of Global Public Health at New York University, New York, USA, <sup>2</sup>New York University Grossman School of Medicine, New York, USA

**SO.2.15 - Hot topics in young adults nutrition and physical activity, UKK - K1 (+K2) (Level 3), June 16, 2023, 12:00 PM - 1:15 PM**

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**Purpose:** Diet during adolescence and early adulthood greatly influences overall physical and mental health and chronic disease development throughout the life course. Persons with disabilities report poorer health status and higher rates of chronic health conditions compared to their counterparts without disabilities. There are numerous contributors to these health disparities, including socioeconomic status, lifestyle behaviors, healthcare access, and receipt of preventive healthcare services. Additionally, an increased risk of household food insecurity is consistently associated with disability status. However, there remains limited investigation of dietary intakes and other diet-related factors among persons with disabilities. We aimed to address this gap in the literature by examining these factors among male young adults with and without disabilities in the United States.

**Methods:** Cross-sectional data were from the National Health and Nutrition Examination Surveys, 2013–2018. Disability was reported as serious difficulty hearing, seeing, concentrating, walking, dressing, and/or running errands due to physical, mental, or emotional conditions. Diet quality was assessed by the Healthy Eating Index (HEI)-2015 and diet-related factors included self-rated diet healthfulness, food security, and food assistance programs. Multivariable linear regression estimated differences in HEI-2015 scores. Multivariable Poisson regression estimated adjusted prevalence ratios (aPR) and 95% confidence intervals (CI) for diet-related factors.

**Results/Findings:** There were 3,249 male young adults, 18–44 years; of whom, 441 (13.4%) reported disabilities. Compared to males without disabilities, those with disabilities had a 2.69-point (95% CI:-4.18,-1.20) lower mean total HEI-2015 score and approximately one third to half of a point lower HEI-2015 component scores for greens and beans, total protein foods, seafood and plant proteins, fatty acids, and added sugars. Males with any disabilities were more likely to have low food security (aPR=1.57; 95% CI:1.28, 2.92); household participation in food assistance programs (aPR=1.61; 95% CI:1.34, 1.93); and consume fast food meals during the previous week (1–3 meals: aPR=1.11; 95% CI: 1.01–1.21 and 4 or more meals: aPR=1.18; 95% CI: 1.01–1.38) compared to males with no disabilities.

**Conclusions:** Factors affecting diet and other modifiable health behaviors among male young adults with disabilities require further investigation. Health promotion strategies that are adaptive to diverse populations within the disability community are needed.



# Health behavioural and psychosocial characteristics of physical activity patterns: a cohort study from adolescence to young adulthood

**Mrs. Tuula Aira**<sup>1</sup>, Dr. Tommi Vasankari<sup>2,3</sup>, Prof. Heinonen Olli<sup>4</sup>, Dr. Raija Korpelainen<sup>5,6,7</sup>, Mr. Jimi Kotkajuuuri<sup>8</sup>, Dr. Kerttu Toivo<sup>9</sup>, Prof. Jari Parkkari<sup>10,9</sup>, Dr. Kai Savonen<sup>11,12</sup>, Dr. Arja Uusitalo<sup>13,14</sup>, Dr. Maarit Valtonen<sup>15</sup>, Mr. Jari Villberg<sup>1</sup>, Mr. Henri Vähä-Ypyä<sup>2</sup>, Associate Professor Sami Kokko<sup>1</sup>

<sup>1</sup>University of Jyväskylä, Faculty of Sport and Health Sciences, Jyväskylä, Finland, <sup>2</sup>UKK Institute of Health Promotion Research, Tampere, Finland, <sup>3</sup>Faculty of Medicine and Health Technology, Tampere University, Tampere, Finland, <sup>4</sup>Paavo Nurmi Centre & Unit for Health and Physical Activity, University of Turku, Turku, Finland, <sup>5</sup>Medical Research Center (MRC), University of Oulu and University Hospital of Oulu, Oulu, Finland, <sup>6</sup>Oulu Deaconess Institute Foundation sr., Department of Sports and Exercise Medicine, Oulu, Finland, <sup>7</sup>Research Unit of Population Health, University of Oulu, Oulu, Finland, <sup>8</sup>Department of Mathematics and Statistics, University of Jyväskylä, Jyväskylä, Finland, <sup>9</sup>Tampere Research Center of Sports Medicine, Tampere, Finland, <sup>10</sup>Faculty of Sport and Health Sciences, University of Jyväskylä, Jyväskylä, Finland, <sup>11</sup>Department of Clinical Physiology and Nuclear Medicine, Kuopio University Hospital, Kuopio, Finland, <sup>12</sup>Kuopio Research Institute of Exercise Medicine, Kuopio, Finland, <sup>13</sup>Clinic for Sports and Exercise Medicine, Foundation for Sports and Exercise Medicine, Helsinki, Finland, <sup>14</sup>Department of Sports and Exercise Medicine, Clinicum, University of Helsinki, Helsinki, Finland, <sup>15</sup>Finnish Institute for High Performance Sport KIHU, Jyväskylä, Finland

**SO.2.15 - Hot topics in young adults nutrition and physical activity, UKK - K1 (+K2) (Level 3), June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** J. Young Adults

**Purpose** The decline in physical activity (PA) during adolescence is well-established. However, while some subgroups of adolescents follow the general pattern of decreased activity, others increase or maintain high or low activity. Correlates and determinants of different PA patterns may vary and are valuable information for targeted health promotion. The aim of this study was to examine how psychosocial factors, health behaviours, and PA domains are associated with longitudinal PA patterns from adolescence to young adulthood.

**Methods** This prospective study encompassed 254 participants measured at mean age 15 and 19. Device-measured moderate-to-vigorous PA was grouped into five patterns (*activity maintainers*, *inactivity maintainers*, *decreasers from moderate to low PA*, *decreasers from high to moderate PA*, *increasers*) via a data-driven method (K-means for longitudinal data). Multinomial logistic regression was used to analyse the associations between health behaviours, psychosocial factors, PA domains (all assessed via a survey), and different longitudinal PA patterns.

**Results** A lack of sports club participation characterised *inactivity maintainers* throughout adolescence, as modelled via (1) baseline determinants: Odds Ratio (OR) 4.6, Confidence Interval (CI) 2.2–9.6; (2) follow-up correlates: OR 6.4, CI 2.6–14.7; and using the combined group of activity maintainers and increasers as a reference. Difficulties in communicating with one's father at age 15 were associated with higher odds of belonging to *inactivity maintainers* (OR 2.4, CI 1.1–5.1) and to *decreasers from moderate to low PA* (OR 3.3, CI 1.6–7.1). Lower fruit and vegetable consumption at age 19 was also related to increased odds of belonging to the groups of *inactivity maintainers* (OR 0.8, CI 0.7–0.9) and *decreasers from moderate to low PA* (OR 0.9, CI 0.8–0.97). Smoking at age 19 was associated with being a *decreaser from moderate to low PA* (OR 3.0, CI 1.005–8.8).

**Conclusions** Multilevel factors characterise longitudinal PA patterns over the transition to young adulthood. Sports club participation contributes to maintained PA. Moreover, a father-adolescent relationship that supports open communication may be one determinant for sustained PA during adolescence. A healthier diet and non-smoking as a young adult are associated with more favourable PA development.

# Child maltreatment and psychological adaptation in adolescents: what if organized sports could help?

**Dr. Christopher Rodrigue<sup>1,2</sup>**, Prof. Martine Hébert<sup>3</sup>, Prof. Daniel Lalande<sup>1</sup>, Prof. Sylvie Parent<sup>2</sup>, Dr. Marie-Ève Blackburn<sup>1</sup>, Prof. Linda Paquette<sup>1</sup>, Prof. Jacinthe Dion<sup>1</sup>

<sup>1</sup>Université du Québec à Chicoutimi, Chicoutimi, Canada, <sup>2</sup>Université Laval, Québec, Canada, <sup>3</sup>Université du Québec à Montréal, Québec, Canada

**SO.2.15 - Hot topics in young adults nutrition and physical activity, UKK - K1 (+K2) (Level 3), June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** J. Young Adults

Many adults worldwide report maltreatment during childhood, including physical (23%) and emotional abuse (36%), sexual abuse (13%), and physical neglect (16%)(Stoltenborgh et al., 2014). Child maltreatment is associated with a greater risk of dealing with serious physical and psychological issues in adulthood (e.g., addiction, depression, obesity)(WHO, 2019). In addition to preventing child maltreatment, it is essential to identify potential factors to help promote resilience in victims. A huge body of literature supports the benefits of sports on physical and psychological health. However, the role of organized sports participation (OSP) (i.e., being part of a sports club or federation) as a potential factor sustaining positive adaptation despite adversity, has been understudied. Thus, the present study aimed to investigate the interaction of OSP on the association between child maltreatment and psychological adaptation. To do so, 1,802 adolescents aged 14-18 (Mean=14.74;  $SD=0.84$ ) were recruited in six Canadian high schools. Participants completed self-reported questionnaires on OSP, psychological adaptation (body satisfaction, disordered eating, self-esteem, life satisfaction, internalized and externalized symptoms), and child maltreatment. Moderation analyses were performed using the *Mplus* software, with 95% confidence intervals and 10,000 bootstraps, to assess the interaction effects of OSP on the relationships between child maltreatment and psychological adaptation outcomes, separately. They revealed that OSP significantly moderated the relationships between child maltreatment and life satisfaction [ $B=0.095$ , 95% C.I. (0.155,0.997),  $p<.05$ ], self-esteem [ $B=.076$ , 95% C.I. (0.01,0.429),  $p<.05$ ], and body satisfaction [ $B=0.105$ , 95% C.I. (0.094,0.467),  $p<.05$ ]. The negative relationships between child maltreatment and all three outcomes were more pronounced in adolescents who did not report OSP. Moreover, a chi-square test of independence showed that adolescents with an experience of child maltreatment were significantly less likely to report OSP ( $\chi^2(1) = 13.14$ ,  $p < .001$ ). In conclusion, our results showed that OSP could represent a resilience factor in individuals with a history of child maltreatment, to facilitate a better psychological adaptation. However, they also showed that adolescents with a past child maltreatment experience are less involved in those activities. The present results highlight the need to better understand barriers for those adolescents, to facilitate their participation in organized sports.

# Body weight perceptions among youth from six countries: Findings from the International Food Policy Study

**Ms. Karen Hock (corresponding author)**<sup>1</sup>, Dr. Lana Vanderlee<sup>2</sup>, Ms. Christine M. White<sup>1</sup>, Dr. David Hammond<sup>1</sup>

<sup>1</sup>University of Waterloo, Waterloo, Canada, <sup>2</sup>Université Laval, Quebec City, Canada

**SO.2.15 - Hot topics in young adults nutrition and physical activity, UKK - K1 (+K2) (Level 3), June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** J. Young Adults

**Purpose:** Body dissatisfaction is associated with poor psychological and physical health, particularly among young people. However, limited data exist on body size perceptions across countries and factors associated with body dissatisfaction. The current study examined prevalence of body dissatisfaction, and its association with sociodemographics and lifestyle correlates among youth in six countries. The study had three primary hypotheses: over one-third of youth will report body dissatisfaction across countries, and dissatisfaction for being larger than ideal will be associated with weight loss efforts and social media use.

**Methods:** National online surveys were conducted as part of the 2019 and 2020 waves of the International Food Policy Study Youth Survey, a cross-sectional sample of 21,277 youth aged 10-17 from six countries: Australia, Canada, Chile, Mexico, the United Kingdom, and the United States. Figural drawing scales assessed self-perceived and ideal body images, with the difference between scales representing body dissatisfaction. Multinomial logistic regression models examined differences in body dissatisfaction by country, and associations with sociodemographics, weight loss efforts, and either time spent on screens browsing social media (social media screen time) or social media platforms used.

**Results:** Overall, approximately 45% of youth reported matching perceived and ideal body sizes, while more than half reported dissatisfaction: 35% reported their body size was larger than ideal (from 33% in Canada and Australia to 42% in Chile), whereas 20% reported being thinner than ideal (15% in Chile to 22% in Mexico). Compared to youth with the intention of 'doing nothing/staying the same weight', youth reporting efforts to gain or lose weight were more likely to report dissatisfaction for being thinner or larger than ideal, respectively ( $p \leq 0.010$  for both contrasts). Greater social media screen time was associated with a higher likelihood of dissatisfaction for being larger than ideal ( $p < 0.001$ ), with greater dissatisfaction among users of YouTube and Snapchat ( $p \leq 0.005$  for both contrasts).

**Conclusions:** Body dissatisfaction for being both larger and thinner than a perceived ideal is prevalent among youth across diverse countries, and is associated with weight-related behaviours and social media use. These findings highlight the need to promote healthy body image among youth worldwide.

# Daily physical activity patterns among students in different vocational education and training programs

**Miss Yingyi Wu**<sup>1</sup>, Associate Professor Pascal Van Gerven<sup>1</sup>, Prof. Renate de Groot<sup>2</sup>, Prof. Bert O Eijnde<sup>3</sup>, Associate Professor Bjorn Winkens<sup>1</sup>, Prof. Hans Saveberg<sup>1</sup>

<sup>1</sup>Maastricht University, Maastricht, Netherlands, <sup>2</sup>Open University, Heerlen, Netherlands, <sup>3</sup>Hasselt University, Hasselt, Belgium

**SO.2.15 - Hot topics in young adults nutrition and physical activity, UKK - K1 (+K2) (Level 3), June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** J. Young Adults

**Purpose:** Students' total physical activity levels vary in vocational education and training (VET) programs. It remains unknown how students' physical activity behavior (PAB) in diverse VET programs change over the day during study and leisure time. We examined students' daily PAB patterns on weekdays and weekends and compare the hourly differences between four different VET programs: administrative, hairdressing nursing, and sports.

**Methods:** In this cross-sectional study, 155 students (66% women, mean age  $\pm$  SD = 19.2  $\pm$  3.4, mean BMI  $\pm$  SD = 23.5  $\pm$  4.1) wore ActivPAL accelerometers continuously for a week. Outcomes were sedentary time, activity score, sit-to-stand transitions, and number of steps per hour. Linear mixed models assessed hourly and group variation.

**Results:** VET students in different programs had different PAB patterns during the weekdays. On weekdays, from 9:00 to 19:00, administrative students sat the most with the least sit-to-stand transitions. Sports students sat about 30 minutes per hour with one physically active time period (10:00-14:00). Hairdressing students sat least. Nursing students sat for about 25 minutes per hour with more sit-to-stand transitions. Only sports students continued being physically active into the evening hours (19:00-22:00). On weekend days, VET students' sedentary behavior patterns did not differ by program. Their sitting time gradually increased during the day, reaching a peak during the evening (17:00-21:00). While sports students continued being physically active into the weekend with a peak in the afternoon (13:00-17:00) than other groups.

**Conclusions:** VET students who are required to be sedentary during school time (administrative > nurse > hairdresser), are also sedentary (i.e., do not compensate for sedentary behavior with increased physical activity) during non-study hours, including evening hours on workdays and leisure time on weekend days. Only sports students extended their active behavior beyond courses. These results warrant interventions reducing sedentary behavior during both study and leisure time among VET students.

# Physical activity and sedentary behaviour prior and subsequent to mood sampling

**Dr. Bronwyn Clark<sup>1</sup>**, Dr. Fiona Maccallum<sup>1</sup>, Dr. Eric Vanman<sup>1</sup>, Dr. Elisabeth Winkler<sup>1</sup>

<sup>1</sup>The University of Queensland, Brisbane, Australia

**SO.2.15 - Hot topics in young adults nutrition and physical activity, UKK - K1 (+K2) (Level 3), June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** J. Young Adults

**Purpose:** Physical activity and sedentary behaviour have been associated with following mood reported by ecological momentary assessment (EMA). Mood may also have an effect on subsequent behaviours. Identifying targets to improve mood requires an understanding of the timing of active and sedentary behaviour around mood dimensions.

**Methods:** Mixed models (n=1850 observations, 349 days, 75 participants) evaluated associations with six EMA reported mood dimensions (0-100) of thigh worn Movisens accelerometer derived sedentary and prolonged sedentary time (%) and step counts in time windows (1 5 10 15 20 30 60 90 120 minutes) beforehand and afterwards, adjusting for age, sex, education, ethnicity, work or study hours, and day of the week. Significance was set at  $p < 0.05$ .

**Results:** Participants (83% female) were aged  $20.1 \pm \text{SD } 3.3$  years. Bayes Information Criteria (BIC) showed no consistent preference for time window. For all time windows, lower previous and subsequent % of time spent sedentary and prolonged sedentary and higher previous and subsequent step counts were significantly associated with higher levels of feeling 'energetic' and 'awake'. Higher previous and subsequent % sedentary and prolonged sedentary and lower step counts were both associated with greater feeling 'calm' but reached statistical significance for some time windows only. Higher prior % sedentary and % prolonged sedentary and subsequent % sedentary but not step counts were associated with lower levels of feeling 'content' with significance reached in only some windows and BIC favoured prior behaviour over subsequent. Significantly greater feeling 'well' was seen with less % sedentary and prolonged sedentary and more step counts prior to mood but not subsequent behaviours. There was no large or significant association between prior or subsequent sedentary behaviour or step counts and feeling 'relaxed'.

**Conclusion:** This study showed less sedentary behaviour and more stepping were significantly associated with feeling more 'energetic', 'awake' and less 'calm' both beforehand and afterwards, while less sedentary behaviour and sometimes more step counts was significantly associated with subsequently feeling 'well' and 'content'. While not definitive, results suggest feeling 'well' and less 'content' follows the behaviours while feeling 'energetic', 'awake' and less 'calm' both follow and precede them.

# The process of co-creating an intervention focusing on parenting practices to optimize 24-hour movement behaviors in children with overweight

**Mrs. Marga Decraene<sup>1</sup>**, Dr. Vera Verbestel<sup>1</sup>, Prof. Greet Cardon<sup>1</sup>, Assistant Prof. Marieke De Craemer<sup>1</sup>

<sup>1</sup>Ghent University, Ghent, Belgium

**SO.2.16 - Parenting and health in young children, UKK - K3+4 (Level 3), June 16, 2023, 12:00 - 1:15 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose** Approximately 10% of European children comply with the guidelines for physical activity, sedentary behavior and sleep, the so-called 24-hour movement behaviors. Children with overweight are less likely to comply with such health behavior guidelines and are more at risk to develop non-communicable diseases later in life compared to children with normal weight. Parents have a major influence on the health behaviors of children. Active involvement of parents combining co-creation and Intervention Mapping (IM) may improve implementation and effectiveness of interventions. This study aims to describe the development process of an intervention focusing on parenting practices to optimize 24-hour movement behaviors in children with overweight combining co-creation and IM.

**Methods** Two groups of parents of children between 2,5 to 10 years were recruited through a hospital and a school. In the hospital group, all parents had children with overweight (n=10). The school group included parents of children with (n=5) and without overweight (n=5). The groups had seven (hospital group) and five (school group) co-creation sessions with an academic facilitator guided by IM. The process was evaluated through a reflection questionnaire and interview at the end of each session. The sessions were recorded, transcribed and thematically analyzed in Nvivo.

**Results** Throughout the sessions, the groups went through the first four steps of IM: (1)needs assessment, (2)program objectives, (3)methods and applications, (4)program development. On the one hand, participants reported they liked the sessions, learned a lot from the experiences from others and felt supported by sharing parenting struggles with regard to the behaviors. On the other hand, they perceived the process as intensive, they reported that it was not always clear what the purpose of each session was until the last two sessions and they struggled to be present in each session.

**Conclusions** Co-creating an intervention is an innovative and intensive process for both participants and researchers that has its strengths (e.g. empowerment of the participants) and pitfalls (e.g. making decisions for intervention components out of endless options). To evaluate whether this intervention optimizes 24-hour movement behaviors in children with overweight, a randomized-controlled trial of the co-created intervention will be conducted.



# Breastfeeding practices and reasons for cessation and associated maternal, infant and pregnancy characteristics: a cross-sectional study

**Dr. Jenna Hollis**<sup>1,2,3</sup>, Ms. Renee Reynolds<sup>1,2,3</sup>, Dr. Justine Daly<sup>1,2,3</sup>, Ms. Milly Licata<sup>1,3</sup>, Ms. Belinda Tully<sup>1,4</sup>, Ms. Emma Doherty<sup>1,2,3</sup>, Ms. Eva Farragher<sup>1,2,3</sup>, Ms. Clare Desmet<sup>1,3</sup>, Mr. Christophe Lecathelinais<sup>1</sup>, Ms. Julianne McKie<sup>5</sup>, Ms. Melanie Williams<sup>5</sup>, Prof. John Wiggers<sup>1,2,3</sup>, Dr. Melanie Kingsland<sup>1,2,3</sup>

<sup>1</sup>Population Health, Hunter New England Local Health District, Newcastle, Australia, <sup>2</sup>School of Medicine and Public Health, College of Health, Medicine and Wellbeing, The University of Newcastle, Newcastle, Australia,

<sup>3</sup>Hunter Medical Research Institute, Newcastle, Australia, <sup>4</sup>Gomerioi Nation, New South Wales, Australia,

<sup>5</sup>Hunter New England Area Health Service and Midwifery Services, Newcastle, Australia

**SO.2.16 - Parenting and health in young children, UKK - K3+4 (Level 3), June 16, 2023, 12:00 - 1:15 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Global rates of exclusive breastfeeding (EBF) for the first six months of life are suboptimal in many countries, including Australia (15.4%). There is limited evidence regarding whether reasons for EBF cessation are associated with maternal, infant and pregnancy characteristics. This study aimed to describe women's intention to breastfeed, breastfeeding practices and reasons for breastfeeding cessation prior to an infant reaching six months of age; and examine the associations between these factors and maternal, infant and pregnancy characteristics.

**Methods:** Telephone and online surveys were conducted between October 2019 and April 2020 with women who had given birth in the previous 8-21 weeks at four public maternity services in Australia. Multivariable and simple logistic regression models identified associations between all characteristics and whether women were EBF and reasons for breastfeeding cessation at the time of survey completion.

**Results/findings:** 536 women completed the survey. Most women intended to (94%), and initiated (95%) breastfeeding. At the time of the survey, 57% of women were EBF, 16% were mixed feeding and 27% of women were not breastfeeding. Adjusting for other characteristics, women who completed high school or less or TAFE certificate/diploma (OR=0.40; 95%CI: 0.22; 0.72; OR=0.46; 95%CI: 0.28; 0.76), had a pre-pregnancy BMI in the overweight or obesity range (OR=0.50; 95%CI: 0.30, 0.86; OR=0.30; 95%CI: 0.18, 0.50), and smoked tobacco at the time of the survey (OR=0.09; 95%CI: 0.02, 0.33) had lower odds of EBF at survey completion. Common self-reported reasons for breastfeeding cessation were breastfeeding challenges (47%) and perceived insufficient milk supply (40%). Women had greater odds of reporting breastfeeding cessation due to perceived insufficient milk supply if they were aged 26-35 years (OR=2.92, 95%CI: 1.11, 7.66) and 36+ years (OR=5.57, 95%CI: 1.70, 18.29) compared to women aged 18-25 years, or had completed University-level education compared to women who completed high school or less (OR=1.59; 95%CI: 0.63, 3.85) or TAFE certificate/diploma (OR=3.57; 95%CI: 1.37, 9.09).

**Conclusions:** The findings highlight the importance of supporting all women to EBF. The most common reasons for breastfeeding cessation may be modifiable through support in the early postpartum period. Women's age and education may influence the support needed.

# The needs and wishes of parents of 0-2-year-olds regarding sleep education in Youth Health Care.

**Ms. Marijn van de Sande<sup>1</sup>**, Ms. Lisa Verspeek<sup>2</sup>, Assistant Professor Sanne Gerards<sup>1</sup>, Associate Professor Ree Meertens<sup>1</sup>

<sup>1</sup>Department of Health Promotion, NUTRIM School of Nutrition and Translational Research in Metabolism, Maastricht University, Maastricht, Netherlands, <sup>2</sup>Department of Health Promotion, Maastricht University, Maastricht, Netherlands

**SO.2.16 - Parenting and health in young children, UKK - K3+4 (Level 3), June 16, 2023, 12:00 - 1:15 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Infant sleep problems are reported by a quarter of parents with children under 3 years of age. This can have a serious negative impact on the child as well as the parents. In the Netherlands, the Youth Health Care (YHC) services offer primary healthcare to all children, from birth until the age of 18 years. Therefore, this setting provides the opportunity to address and prevent infant sleep problems. The current study assesses parents' needs, wishes and experiences regarding sleep education in YHC, and parents' help-seeking behaviour regarding infant sleep.

**Methods:** A qualitative needs-assessment study was designed. Eight semi-structured interviews with first-time parents of 0-2 year-old infants living in the south of the Netherlands were conducted. The interviews were audio recorded, transcribed and analysed by inductive coding using Nvivo software. Data analysis was based on behavioural theories, including the Theory of Planned Behaviour, the Health Belief Model and Social Cognitive Theory.

**Results:** Parents were 30 to 34 years of age and children's age ranged from 4 to 27 months. Parents' education levels included low, medium and high level. All participants reported their infant's sleep to be of low quantity at least once post-partum. Parents often sought help on the internet or in their social network and less via the YHC. Most parents indicated that they did not receive adequate sleep advice from YHC-professionals. Parents wished to receive information in the first weeks after birth or even antenatal. Parents wanted more in-depth and tailored information from the YHC-professionals. Regarding methods to manage infant sleep problems, parents experienced difficulties with the extinction methods.

**Conclusion:** The current YHC services regarding sleep education do not meet the needs of first-time parents. This highlights the need for revision of the current YHC sleep education practices as well as the timing and content of sleep advice provided. We suggest to develop interventions optimizing sleep education in YHC to prevent infant sleep problems.

# Examination of how distinct food parenting approaches vary by parent, by meal and by day: A Cluster Analysis Study

**Dr. Katie Loth**<sup>1</sup>, Mr. Zuofu Huang<sup>1</sup>, Dr. Julian Wolfson<sup>1</sup>, Dr. Jerica Berge<sup>1</sup>, Dr. Dianne Neumark-Sztainer<sup>1</sup>, Dr. Jayne Fulkerson<sup>1</sup>, Dr. Jennifer Fisher<sup>2</sup>

<sup>1</sup>University of Minnesota, Minneapolis, USA, <sup>2</sup>Temple University, Philadelphia, USA

**SO.2.16 - Parenting and health in young children, UKK - K3+4 (Level 3), June 16, 2023, 12:00 - 1:15 PM**

**SIG - Primary Choice:** G. Children and families

Recent research shows most parents of young children use a variety of theoretically supportive (structure, autonomy support) and unsupportive (coercive control, indulgent) food parenting practices on a given day, challenging previously held assumptions that parents use one approach. This study's aim was to identify distinct food parenting approaches and examine how these approaches vary by meal and by day. Parents (n=98) reported food parenting practices, categorized within four higher-order domains (structure, autonomy support, coercive control, indulgent), used at each eating occasion [n=3382 total; 33.93 (SD: 13.93) per dyad] they shared with their preschooler over multiple days [Mean: 12.56 days (SD:4.63)]. Agglomerative hierarchical clustering was used to identify different clusters in food parenting approach by person, by meal, and by day. By person, three distinct clusters emerged: Cluster 1 parents (n=86) used low indulgent, coercive control and structure, moderate autonomy support; Cluster 2 parents (n=10) used moderate structure, autonomy support and indulgence, low coercive control; and Cluster 3 parents (n=2) used high levels across all four practice domains. By day, three distinct clusters emerged: Cluster 1 days (n=710) had low levels across all four practice domains; Cluster 2 days (n=470) had low indulgence and coercive control and moderate-to-high structure and autonomy support; Cluster 3 days (n=51) had high levels across all four practice domains. By meal, six distinct clusters emerged: Cluster 1 meals (n=985) were low across all four practice domains; Cluster 2 meals (n=1915) were similar, but with moderate autonomy support practices; Cluster 3 meals (n=132) were high in indulgent, structure and autonomy support, but low in coercive control; Cluster 4 meals (n=234) were high across all four practice domains; Cluster 5 meals (n=14) were high/very high in coercive control, indulgent and structure and low in autonomy support, and Cluster 6 meals (n=45) were high in indulgent, moderate in structure, and low in coercive control and autonomy support. Importantly, parents were found to transition between clusters meal-to-meal and day-to-day, supporting evidence that food parenting approaches are responsive to context and circumstance. Future research should examine the longitudinal impact of within-and between-day fluctuations in food parenting on child outcomes.

# Infant eating behaviour profiles and their associations with infant rapid weight gain and parent feeding practices.

**Dr. Alissa Burnett<sup>1</sup>**, Dr. Georgie Russell<sup>1</sup>

<sup>1</sup>Institute for Physical Activity and Nutrition, School of Exercise and Nutrition Sciences, Deakin University, Melbourne, Australia

**SO.2.16 - Parenting and health in young children, UKK - K3+4 (Level 3), June 16, 2023, 12:00 - 1:15 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** A range of child eating behaviours has been shown to individually associated with child weight status and parent feeding practices. Emerging research has shown that eating behaviours are latent constructs, however it is still unknown if eating behaviour profiles develop in infancy. Therefore, the aims of this study are to classify and describe groups of infants according to their eating behaviours, and examine associations between these groups of infants and infant rapid weight gain (RWG) and parent feeding practices.

**Methods:** A online survey of parents ( $n = 1474$ ) of infants aged less than 4 months was conducted via Qualtrics. Parents were recruited using paid advertisements on Facebook. The parents reported their feeding practices (using the FPSQ for infants and toddlers), infant eating behaviours (using the BEBQ) and infant weight and length at two timepoints (birth and <4 months). Latent profile analysis was used to identify distinct groups of infants who shared similar eating behaviours. Logistic and linear regression models were fitted to examine associations between the eating behaviour profiles and infant rapid weight gain (from birth to <4 months) and parent feeding practices.

**Results:** Three eating behaviour profiles were identified. Profile 1 (17%) was identified as food avoidant, profile 2 (59%) was identified as balanced, and profile 3 (24% of infants) was identified as food approach. There was an association between profile 1 and higher use of persuasive feeding and parent led feeding, when compared to profile 2. There was an association between profile 2 and higher use of persuasive feeding and using food to calm, when compared to profile 2. In total, 16% of infants experienced RWG from birth to <4 months. No association was found between the eating behaviour profiles and RWG from birth to <4 months of age.

**Conclusion:** This study provides evidence that three types of eating behaviour profiles develop very early in life and are associated with parent feeding practices. Because parents are known to use feeding practices in response to child eating behaviours, identifying infant eating profiles early allows for anticipatory tailored guidance to be provided to parents to support infant healthy eating.

# Feeding practices and their associations with infant rapid weight gain, and the moderating effects of infant eating behaviours on these associations.

**Dr. Alissa Burnett<sup>1</sup>**, Dr. Georgie Russell<sup>1</sup>

<sup>1</sup>Institute for Physical Activity and Nutrition, School of Exercise and Nutrition Sciences, Deakin University, Melbourne, Australia

**SO.2.16 - Parenting and health in young children, UKK - K3+4 (Level 3), June 16, 2023, 12:00 - 1:15 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Parent feeding practices are associated with child weight status, yet the impact of these feeding practices is dependent on child eating behaviours. However, it is unknown if eating behaviours moderate these associations from infancy. Therefore, the aims of this study are to examine the relationships between parent feeding practices and infant rapid weight gain (RWG) and whether infant's eating behaviours moderate these relationships.

**Methods:** A online survey of parents ( $n = 1474$ ) of infants aged less than 4 months was conducted via Qualtrics. Parents were recruited using paid advertisements on Facebook. The parents reported their feeding practices (using the FPSQ for infants and toddlers), infant eating behaviours (using the BEBQ) and infant weight and length at two timepoints; birth and <4 months. The parents will be followed up when the infants are 4 months, 6 months, 9 months and 12 months of age. Logistic regression assessed associations between feeding practices and infant RWG, including interactions between feeding practices and infant eating behaviours.

**Results:** If higher levels of persuasive feeding were used, the infant was at higher odds (0.77) of experiencing RWG from birth to <4 months. Additionally, if higher levels of parent led feeding were used, the infant was at higher odds (0.52) of experiencing RWG from birth to <4 months. The associations between parent led feeding and RWG were moderated by infant slowness in eating, satiety responsiveness, and general appetite. However, the associations between persuasive feeding and infant RWG were not moderated by infant eating behaviours. The results for associations between parent feeding practices and RWG beyond 4 months will be presented at the conference.

**Conclusion:** This study showed that non-responsive feeding practices are associated with rapid weight gain in infancy, and that some of these associations are moderated by infant eating behaviours. This study advances the knowledge regarding the influence of parent feeding practices on child weight gain. Previous studies have assumed that parent feeding practices influence all children in the same way, however this study shows that it is important to consider their individual eating behaviours when developing interventions targeting child overweight and obesity.

# Neighbourhood environments and physical activity in the early years: examining the moderating role of parent perceptions

Dr. Andrea Nathan<sup>1,2</sup>, Prof. Jasper Schipperijn<sup>3</sup>, Mrs. Trina Robinson<sup>1</sup>, **Ms. Phoebe George<sup>1,2</sup>**, Associate Professor Bryan Boruff<sup>2</sup>, Prof. Stewart Trost<sup>4</sup>, Associate Prof. Hayley Christian<sup>1,2</sup>

<sup>1</sup>Telethon Kids Institute, Perth, Australia, <sup>2</sup>The University of Western Australia, Perth, Australia, <sup>3</sup>University of Southern Denmark, Odense, Denmark, <sup>4</sup>University of Queensland, Brisbane, Australia

**SO.2.16 - Parenting and health in young children, UKK - K3+4 (Level 3), June 16, 2023, 12:00 - 1:15 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Parents act as gatekeepers to young children's early exposure to local neighbourhood environments. How parents perceive attributes of these neighbourhood environment may subsequently facilitate or hinder their young child's physical activity behaviour. We examined the moderating effects of parent perceptions on associations between objectively measured neighbourhood environment attributes and physical activity among young children.

**Methods:** We utilised data from the PLAY Spaces and Environments for Children's Physical Activity (PLAYCE) study conducted in Perth, Western Australia with 2-5 year olds recruited via childcare centres (n=1,038 children). Parent survey items modified from NEWS-Y assessed parent perceptions of six neighbourhood environment sub-scales. Objective GIS measures included count of pocket parks, local parks, neighbourhood parks, cul-de-sacs, street connectivity and low traffic exposure within 500m and 1600m service areas. Children wore GT3X+ accelerometers for seven days. Raw tri-axial acceleration signals were processed using an age-specific random forest physical activity classification model. Adjusted linear regression models estimated interaction effects of objectively measured neighbourhood environment attributes by parent perceptions on daily minutes of total physical activity and energetic play.

**Results/findings:** The mean age of children was 3.3 years (SD 0.8) and almost half were female (49.5%). Most parents completing the parent survey were female (91.8%). Average time spent in energetic play was 39.4 minutes per day (SD 14.3). We found the number of neighbourhood parks within a 500m service area was positively associated with daily minutes of energetic play, only when parents perceived land use mix-access to be above average (B=1.88; 95% CI 0.04, 3.72; p=0.045). Objective street connectivity within a 1600m service area was associated with fewer daily minutes of energetic play, only when parents perceived pedestrian and traffic safety to be below average (B=-0.02; 95% CI -0.03, 0.00; p=0.034).

**Conclusions:** We found some evidence of the important role played by parent perceptions on young children's physical activity levels. Greater understanding of how young children interact with their neighbourhood environment and the role of parents (in facilitating or negating their children's use of and interaction with environments), using age-appropriate, conceptually relevant measures of neighbourhood environments specific to the early years is needed.



# Exposure to the digital environment and cognitive functioning in children and adolescents – findings from the I.Family study

**Mrs. Elida Sina<sup>1</sup>**, Dr. Christoph Buck<sup>1</sup>, Prof. Wolfgang Ahrens<sup>2</sup>, Dr. Juul M.J. Coumans<sup>3</sup>, Dr. Gabriele Eiben<sup>4</sup>, Mrs. Annarita Formisano<sup>5</sup>, Dr. Valeria Pala<sup>6</sup>, Prof. Lauren Lissner<sup>7</sup>, Prof. Artur Mazur<sup>8</sup>, Dr. Nathalie Michels<sup>9</sup>, Prof. Dénes Molnar<sup>10</sup>, Prof. Luis Moreno<sup>11</sup>, Dr. Hermann Pohlabein<sup>1</sup>, Prof. Lucia Reisch<sup>12</sup>, Prof. Michael Tornaritis<sup>13</sup>, Prof. Toomas Veidebaum<sup>14</sup>, Dr. Antje Hebestreit<sup>1</sup>

<sup>1</sup>Leibniz Institute for Prevention Research and Epidemiology - BIPS, Bremen, Germany, <sup>2</sup>Institute of Statistics, Faculty of Mathematics and Computer Science, University of Bremen, Bremen, Germany, <sup>3</sup>Department of Health Psychology, Faculty of Psychology, Open Universiteit, Heerlen, Netherlands, <sup>4</sup>Department of Public Health, School of Health Sciences, University of Skövde, Skövde, Sweden, <sup>5</sup>Institute of Food Sciences, National Research Council, Avellino, Italy, <sup>6</sup>Department of Preventive and Predictive Medicine, Fondazione IRCCS, Istituto Nazionale dei Tumori, Milan, Italy, <sup>7</sup>School of Public Health and Community Medicine, University of Gothenburg, Gothenburg, Sweden, <sup>8</sup>Faculty of Medicine, University of Rzeszów, Rzeszów, Poland, <sup>9</sup>Department of Public Health and Primary Care, Ghent University, Ghent, Belgium, <sup>10</sup>Department of Pediatrics, Medical School, University of Pécs, Pécs, Hungary, <sup>11</sup>GENUD (Growth, Exercise, Nutrition and Development) Research Group, Instituto Agroalimentario de Aragón (IA2), Instituto de Investigación Sanitaria Aragón (IIS Aragón), Centro de Investigación Biomédica en Red Fisiopatología de la Obesidad y Nutrición (CIBEROBN), University of Zaragoza, Zaragoza, Spain, <sup>12</sup>Cambridge Judge Business School, University of Cambridge, Cambridge, United Kingdom, <sup>13</sup>Research and Education Institute of Child Health, Strovolos, Cyprus, <sup>14</sup>Department of Chronic Diseases, National Institute for Health Development, Tallinn, Estonia

**SO.2.16 - Parenting and health in young children, UKK - K3+4 (Level 3), June 16, 2023, 12:00 - 1:15 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Digital media (DM) have penetrated all aspects of children's lives, but little is known about how DM exposure is related to their cognitive functioning. This study aims to investigate the association of daily duration and type of DM exposure with cognitive functioning in European children and adolescents, being the first study to examine the aforementioned associations in free-living participants.

**Methods:** This study examines data from children aged 8-18 years that participated in the pan-European I.Family study (2013-2014). Participants reported information on DM use (hours/day) for television viewing (TV), computer/game console (PC), smartphone, and internet. Media multitasking (MTT) was self-reported and defined as using PC with another DM simultaneously. Measures of cognitive functioning, namely decision-making ability (making advantageous vs. disadvantageous choices) and cognitive inflexibility (continued erroneous responses following a rule switch) were assessed via computerized tests. Latent class analyses were conducted to identify underlying patterns of DM use, based on the duration of individual media use in categories (low: 0-1 h/day, medium: 1-2 h/day, high: >2 h/day). Generalized linear mixed regressions adjusting for potential confounders, including weight status and psychosocial well-being were used to calculate regression coefficients ( $\beta$ ) and 99.8% confidence intervals (CI – these limits were chosen to adjust for multiple testing based on the Sidak method).

**Results/findings:** Respectively, 4046 and 3441 children provided data for decision-making ability (mean age/SD=11.6/1.9) and cognitive inflexibility (11.7/2.0), where 50% were girls and 26% were classified with overweight/obesity. The adjusted models showed that one additional hour of smartphone exposure and engaging in one additional MMT activity were positively associated with cognitive inflexibility ( $\beta_{\text{smartphone}}=0.32$ ; 99.8%CI=-0.001,64;  $\beta_{\text{MMT}}=0.39$ , 99.8%CI=0.03,0.75) and negatively associated with the decision-making ability of children ( $\beta_{\text{smartphone}}=-0.47$ ; 99.8%CI=-1.44,0.48;  $\beta_{\text{MMT}}=-0.70$ ; 99.8%CI=-1.75,0.34). The latent class analyses identified four patterns of DM use. Children with high smartphone/internet use, but medium TV/low PC use were more likely to have higher cognitive inflexibility, but lower decision-making ability, compared to children with low use of all media.

**Conclusion:** Prolonged DM exposure is unfavorably associated with the cognitive functioning of children and adolescents. These findings shed light on an underlying mechanism by which DM environment may impact cognitive development during childhood.

# Measuring and Improving all Dimensions of Food Security among Low-Income Families with Children aged 0-5 years – An Australian and American Collaboration

**Dr. Rebecca Lindberg<sup>1</sup>**, Dr. Courtney Parks<sup>2</sup>, Dr. Amber Bastian<sup>1</sup>, Associate Professor Fiona McKay<sup>1</sup>, Dr. Paige van der Pligt<sup>1</sup>, Ms. Julia Zinga<sup>1</sup>, Prof. Sarah McNaughton<sup>1</sup>, Prof. Amy Yaroch<sup>2</sup>  
<sup>1</sup>Deakin University, Geelong, Australia, <sup>2</sup>Gretchen Swanson Center for Nutrition, Omaha, USA

**SO.2.16 - Parenting and health in young children, UKK - K3+4 (Level 3), June 16, 2023, 12:00 - 1:15 PM**

**SIG - Primary Choice:** G. Children and families

**Purpose** The prevalence of food insecurity was estimated to have doubled during the COVID-19 pandemic. Our international collaborative conducted mixed methods studies in 2020-22, to gain an understanding of differences and similarities between the USA and Australia in terms of food systems, food assistance, and food insecurity in families with children aged 0-5 years. Our objectives were to strengthen food security for families through a two-country collaboration.

**Methods** A policy and program review established the dominant solutions and disciplinary approaches in both nations, and a scoping review investigated constructs of food insecurity pertinent to young families. Semi-structured interviews with pregnant women and mothers were conducted in 2020 in Melbourne, Australia (n=22) and Omaha, U.S.A (n=19), to investigate the six dimensions of food security.

**Results** Our findings indicate both countries have inconsistent and limited measurement of five of the six dimensions of food security. Similar factors affect low-income families in both cities and there's a paucity of effective multi-faceted programmatic and policy responses. Of particular concern is the impact of food insecurity on young children: infants have greater odds of having poor health, being nutrient deficient, experiencing developmental challenges, and being hospitalized. Lived experience of this phenomena suggests particularly for the access, availability, utilization and agency dimensions of food security, the pandemic had substantial impacts. Whilst localized strategies, including less austere social safety nets were mobilized during the crisis, these were not sufficient to overcome the barriers to food security experienced; many of which were present prior to the pandemic.

**Conclusions** In measuring and responding to food insecurity, all dimensions should be considered. Our collaboration has attempted to spotlight the need for joined up efforts and future studies can build upon this foundational work, examining the factors identified across food insecure populations in these two high-income countries.

# Testing the Public Health 12 framework using community-based systems thinking case studies

**Dr. Kristy Bolton**<sup>1</sup>, Mrs. Penny Fraser<sup>2</sup>, Prof. Colin Bell<sup>2</sup>, Mr. Andrew Brown<sup>2</sup>, **Dr. Jillian Whelan**<sup>2,3</sup>

<sup>1</sup>Institute for Physical Activity and Nutrition, Deakin University, , Geelong, Australia, <sup>2</sup>Global Centre for Preventive Health and Nutrition, Institute for Health Transformation, , Geelong, Australia, <sup>3</sup>Telethon Kids Institute, Perth, Australia

**SO.2.17 - Experience from implementation research in various settings, Clarion Hotel Gillet - Room Gillesalen, June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** Participatory community-based systems approaches (for example, group model building), allow community stakeholders to create a shared systems map reflecting their understanding of the drivers of a complex issue in their community, such as childhood obesity. Community stakeholders then develop and implement actions to influence these drivers. To date there has been limited guidance regarding the best places to act to maximise impact. Recently, the Meadows 12 places to act in a system was translated into language familiar to public health practitioners, termed Public Health 12 (PH12); where level 1 is most impactful; and level 12 the least impactful.

The aim of this study was to test the PH12 using documented actions from community-driven systems approaches to childhood obesity prevention in rural and regional areas of Australia.

**Methods:** Communities documented more than 250 implemented actions that arose from their group model building workshops and ongoing planning activities. This documentation was examined by an external reviewer with public health expertise and coded to one of the PH12 levels. Blinded double coding was conducted by a co-author of PH12, where required consensus was reached in consultation with the wider research team. Descriptive statistics were used to describe the system levels most targeted.

**Results:** To date, the majority of actions were coded in levels 8-12. In one Victorian case study, of the 106 actions registered between 2015-2017, 16% were level 8, 25% level 10, 4% level 11 and 55% level 12. A further 96 actions were implemented during 2018-2019, 1% were level 4, 5% level 8, 30% level 10, 7% level 11 and 56% level 12. Coding of actions from other case studies in 2020-2022 is ongoing.

**Conclusion:** Coding community actions revealed a gap in action in levels 1 to 7 - the leverage points which have been suggested to be more effective at achieving and sustaining change in a system. In the future, PH12 can be used to guide action planning and help stakeholders identify gaps in planning, prioritising and implementing actions and has potential to guide thinking to higher leverage points.

# Feasibility and acceptability of CHARMING: a school-based physical activity intervention

**Dr. Kelly Morgan**<sup>1</sup>, Mr. Jordan Godwin<sup>1</sup>, Dr. Rebecca Cannings-John<sup>1</sup>, Dr. Rachel Granger<sup>3</sup>, Dr. Britt Hallingberg<sup>2</sup>, Prof. Graham Moore<sup>1</sup>, Ms. Bethan Pell<sup>1</sup>, Dr. Esther van Sluijs<sup>4</sup>, Prof. Rhiannon Tudor Edwards<sup>3</sup>, Dr. Holly Whiteley<sup>3</sup>, Dr. Jemma Hawkins<sup>1</sup>

<sup>1</sup>Cardiff University, Cardiff, United Kingdom, <sup>2</sup>Cardiff Metropolitan University, Cardiff, United Kingdom, <sup>3</sup>Bangor University, Bangor, United Kingdom, <sup>4</sup>University of Cambridge School of Clinical Medicine, Cambridge, United Kingdom

**SO.2.17 - Experience from implementation research in various settings, Clarion Hotel Gillet - Room Gillesalen, June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** The CHARMING (**CH**oosing **A**ctive **R**ole **M**odels to **IN**spire **G**irls) intervention was co-designed and theory-informed (integrating self-determination theory and the socio-ecological model) to increase and sustain physical activity levels among 9–10-year-old girls. The intervention is delivered on primary school premises, with different 1-hour weekly activity taster sessions led by community role models. Peer role models (pupils from linked secondary schools) participate in sessions alongside the primary school-aged girls. This study aimed to examine the feasibility and acceptability of the CHARMING intervention and future evaluation trial design.

**Methods:** This feasibility study used a cluster randomised controlled trial including embedded process and health economic evaluations. In South Wales, United Kingdom, secondary schools were recruited, followed by their adjoining primary schools to recruit Year 5 girls (aged 9-10-years). A survey and accelerometer were administered at baseline and at 12-months. Following baseline, primary schools were randomly allocated to intervention (6-week programme) or control (usual practice) on a 2:1 basis. Observation and attendance data were collected for intervention sessions. Focus groups (N=13) and interviews (N=22) were conducted post-intervention to explore evaluation and intervention acceptability, feasibility, and fidelity. Analyses were intention to treat, and qualitative data were analysed thematically (deductive and inductive).

**Results/findings:** One hundred and fifty-six girls from six primary schools (four intervention: two control) were eligible to participate. Of these, 96 (62%) and 97 (62%) Year 5 girls participated in the survey and accelerometer measures respectively, with 78 (81%) and 77 (79%) participating at 12-month follow-up. Despite the COVID-19 pandemic, three of five criteria for progressing to a full-scale evaluation were met. Process evaluation data provided understandings of why two criteria were not met. Data suggested that acceptability and feasibility of the intervention were high, and the intervention was broadly delivered as intended. Alterations to study measures and the intervention were suggested to increase programme acceptability and feasibility, including extending the length of delivery in line with original intentions (12-weeks).

**Conclusions:** The novel role model intervention, CHARMING, and study design are shown to be acceptable and feasible. Future work will seek to optimise the intervention and evaluation design prior to a full-scale effectiveness trial.

# Nutritional assessment of plant-based milk alternatives in the Swedish market

**Dr. Hanieh Moshtaghian<sup>1</sup>**, Dr. Elinor Hallström<sup>2</sup>, Dr. Marta Bianchi<sup>1</sup>, Dr. Susanne Bryngelsson<sup>2</sup>

<sup>1</sup>Department of Agriculture and Food, Research Institutes of Sweden (RISE), Gothenburg, Sweden,

<sup>2</sup>Department of Agriculture and Food, Research Institutes of Sweden (RISE), Lund, Sweden

**SO.2.17 - Experience from implementation research in various settings, Clarion Hotel Gillet - Room Gillesalen, June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** One of the strategies for promoting diet sustainability is the replacement of animal-based products with plant-based alternatives. However, the nutritional quality of these products should be assessed to ensure their nutritional adequacy. This study aims to evaluate the nutritional quality of plant-based milk alternatives in the Swedish market.

**Methods:** The main dairy alternative manufacturers were identified through the Swedish supermarkets' websites. Energy and nutrient data per 100 g of unflavoured plant-based milk alternatives (UPBMAs) were collected from the manufacturer's website. The International Choices criteria (saturated fat  $\leq 1.1$  g, sodium  $\leq 100$  mg, total sugars  $\leq 5$  g and energy  $\leq 40$  kcal) were used for the nutritional assessment of these products. Furthermore, their energy, macronutrients and key micronutrients (vitamin D, B12 and calcium) were compared to Sweden's most commonly consumed milk product (1.5% fat).

**Results:** Sixty-four UPBMAs were identified. Of these, 50 products were fortified, and 13 were organic. Regarding International Choices criteria, the proportion of UPBMAs meeting the saturated fat, total sugars, sodium and energy criteria was 94%, 89%, 98% and 53%, respectively. In terms of comparison with milk, 32%, 42%, 2%, 44%, 10% and 26% of fortified products had higher energy, fat, saturated fat, carbohydrate, total sugars and sodium compared to milk, respectively. Furthermore, 98% of fortified UPBMAs had less protein and vitamin B12, and 59% and 100% had less vitamin D and calcium than milk, respectively. Likewise, 79% of unfortified products had less protein and 100% had less vitamin D, B12 and calcium compared to milk. Among organic UPBMAs, 23%, 38%, 15%, 31%, 8% and 38% had higher energy, fat, saturated fat, carbohydrate, total sugars and sodium than milk, respectively. However, 85% had less protein and 100% had less vitamin B12 and calcium compared to milk. Only three organic products were fortified with vitamin D, similar to milk.

**Conclusions:** Most UPBMAs can be considered healthy in terms of meeting the International Choices criteria. However, their protein content is less than milk and most products provide less vitamin D, B12 and calcium compared to milk despite fortification. Similarly, the nutritional quality of organic UPBMs appears inferior to milk.



# Effectiveness of a Whole-of-School Intervention to Improve Physical Activity for Children: Evidence from Cohort Study in Primary Schools in Thailand

**Dr. Dyah Anantalia Widyastari<sup>1</sup>**, Associate Professor Piyawat Katewongsa<sup>1</sup>, Mr. Panya Choolers<sup>2</sup>

<sup>1</sup>Institute for Population and Social Research, Mahidol University, Salaya, Phutthamonthon, Nakhon Pathom, Thailand, <sup>2</sup>Thailand Physical Activity Knowledge Development Centre (TPAK), Salaya, Phutthamonthon, Nakhon Pathom, Thailand

**SO.2.17 - Experience from implementation research in various settings, Clarion Hotel Gillet - Room Gillesalen, June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** This study employed a whole-of-school approach as the health promotion strategy to improve physical activity (PA) of children. We developed the 4PC model (Active Policy, Active People, Active Program, Active Place and Active Classroom) as the prototype model of PA promotion. This study aimed to examine the effectiveness of 4PC model in improving PA and reducing sedentary behavior (SB) of school children in Thailand.

**Methods:** A quasi-experimental cohort design involved fourth graders of primary schools and followed for 2-years (2017-2019). Participants for both the intervention and control schools were matched and randomly selected based on their characteristics (i.e., school size, grade, and sex). A total of 119 of 184 students in the intervention group, and 173 of 254 students in the control group were present in all five rounds of data collection and included in the analysis. All students in the intervention schools were exposed to the 4PC model, whereas those in the control schools performed their regular program. In every round, PA and SB was measured objectively using the Feel-fit accelerometer, which was attached to the students' waist for a period of 7 hr. for five consecutive days (Monday–Friday). The independent t-test was employed to compare PA and SB between intervention and control groups, whereas the paired t-test was used to compare the mean difference of the two behavioral outcomes.

**Results:** Compared to students in the control group without the 4PC exposure, students in the intervention group accumulated an additional 19–25 min of PA ( $t = 15.539$ ,  $p = .000$ ) and experienced a 31-min reduction in sedentary time ( $t = -13.999$ ,  $p = .000$ ). The effectiveness of 4PC in improving the PA level of students can also be seen by the consistent increase of PA throughout the four rounds of data collection during the intervention (Round 2–5).

**Conclusion:** As a whole-of-school intervention, the 4PC model was effective in increasing PA and reducing SB by providing opportunities and support system for children. The prototype model 4PC is now being scale-up to be implemented in primary schools across Thailand.

# Schools Working to Improve Staff Health (SWISH): A health promotion program targeting the physical activity and nutrition of school staff

**Dr. Alix Hall<sup>1</sup>**, Dr. Beatrice Murawski<sup>1</sup>, Prof. Luke Wolfenden<sup>1,2</sup>, Dr. Rachel Sutherland<sup>1,2</sup>, Mr. Christophe Lecathelinais<sup>2</sup>, Mrs. Nicole McCarthy<sup>2</sup>, Mr. Adam Shoesmith<sup>1</sup>, Dr. Cassandra Lane<sup>1</sup>, Associate Professor Serene Yoong<sup>1,2,3</sup>, Dr. Kathryn Reilly<sup>2</sup>, Dr. Kirsty Hope<sup>2</sup>, Dr. Rebecca Hodder<sup>1,2</sup>, Dr. Nicole Nathan<sup>1,2</sup>

<sup>1</sup>University of Newcastle, Newcastle, Australia, <sup>2</sup>Hunter New England Population Health, Wallsend, Australia,

<sup>3</sup>Deakin University, Melbourne, Australia

**SO.2.17 - Experience from implementation research in various settings, Clarion Hotel Gillet - Room Gillesalen, June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** The workplace is a recommended setting for targeting key health behaviours, including physical activity and nutrition. There are numerous, existing, school-based physical activity and healthy eating programs that are delivered to students in an attempt to improve their health behaviours. Encouraging school staff to take part in these existing student-focused programs is a potentially simple way to improve staff physical activity and health eating.

**Methods:** We developed and evaluated the feasibility, acceptability and potential impact of the Schools Working to Improve Staff Health (SWISH) program in a pilot trial. A cluster randomised controlled design was used. Eighteen primary schools from one Local Health District in New South Wales Australia completed baseline, and were then randomised to receive SWISH (n=9), or to a waitlist control (n=9). The SWISH program is a multi-component intervention consisting of five main strategies designed to support school staff participation in existing, student-focused, healthy eating and physical activity school-based programs. Quantitative data was collected via accelerometers (to assess physical activity) and surveys (to assess fruit and vegetable consumption, and acceptability). Qualitative data were also collected to further explore staff views of SWISH. Descriptive and qualitative data were used to assess acceptability. Generalised linear mixed models were used to assess differences in staff physical activity and diet outcomes.

**Results:** Surveys were completed by 276 staff and valid accelerometer data was provided by 289 staff. Staff who received SWISH had greater odds of consuming vegetables (OR: 1.77; 95% CI: 0.16, 19.07) and fruit (OR: 1.04; 95% CI: 0.09, 11.76) consistent with guidelines; as well as participating in student-directed classroom physical activity (OR: 1.78; 95% CI: 0.20, 15.77) and fruit and veg breaks (OR: 2.89; 95% CI: 0.28, 29.60). Although these results were not statistically significant. There was minimal impact on physical activity outcomes. Acceptability was high, with more than 50% of staff rated the SWISH resources as useful.

**Conclusions:** SWISH is a feasible and acceptable intervention for addressing school staff physical activity and nutrition. A large randomised controlled trial is warranted to further explore the effect of SWISH on staff outcomes.

# Implementation and scale-up of the Daughters and Dads Active and Empowered Program: A case study of adaptations.

**Dr. Anna Rayward**<sup>1,2</sup>, Dr. Emma Pollock<sup>4</sup>, Dr. Myles Young<sup>2,5</sup>, Associate Professor Narelle Eather<sup>1,2</sup>, Prof. David Lubans<sup>1,2</sup>, Dr. Alyce Barnes<sup>1,2</sup>, Dr. Rachel Sutherland<sup>2,3,4</sup>, Dr. Lee Ashton<sup>1,2,6</sup>, Ms. Stevie-Lee Kennedy<sup>1</sup>, Prof. Philip Morgan<sup>1,2</sup>

<sup>1</sup>School of Education, University of Newcastle, Callaghan, Australia, <sup>2</sup>Hunter Medical Research Institute, New Lambton, Australia, <sup>3</sup>School of Medicine and Public Health, University of Newcastle, Callaghan, Australia, <sup>4</sup>Hunter New England Population Health, Wallsend, Australia, <sup>5</sup>School of Psychological Sciences, University of Newcastle, Callaghan, Australia, <sup>6</sup>School of Health Sciences, University of Newcastle, Callaghan, Australia

**SO.2.17 - Experience from implementation research in various settings, Clarion Hotel Gillet - Room Gillesalen, June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose** Tailored adaptation of evidence-based programs is often required during scale-up to ensure an appropriate fit for different contexts, populations and providers whilst ensuring reasonable fidelity with the original intervention. However, the adaptation process is infrequently systematically monitored and/or reported. The Daughters And Dads Active and Empowered program (DADAE) is an evidence-based, education program targeting fathers/father-figures to improve their daughters' physical activity levels, sport skills and social-emotional wellbeing. The aim of this study is to document the reasoning, process and nature of adaptations of DADAE during scale-up across NSW, Australia in partnership with the NSW Office of Sport (NSW OoS).

**Methods** We used the Framework for Reporting Adaptations and Modifications to Evidence-based interventions-Expanded (FRAME) to guide adaptations of DADAE associated with context, training, resources, cost, and settings. We used an iterative process and collaborated with stakeholders involved in the program scale-up at multiple levels within the NSW OoS, as well as program participants. Program modifications were made in response to organisational, provider and participant barriers identified through consultation with, and feedback from, stakeholder groups using a variety of methods including advisory panel meetings, semi-structured interviews, and surveys. FRAME was used to track the process and reasons for making adaptations whilst ensuring preservation of core program elements.

**Results** Prior to implementation, a new condensed 'Weekender' version was developed (based on the original 9-week, 90-minute/session program) to capitalise on the unique setting of NSW OoS Sport and Recreation Centres and to best utilise the available workforce (highly-skilled program officers) located at these centres. During implementation, reactive modifications included 1) redesign of the program structure; 2) redesign of the participant handbook 3) reduction of fitness content in the 'Weekender' program; 4) redesign of facilitator training and 5) redesign of implementation protocols/guidance. Subsequent program fidelity checks indicated good program fidelity. Adaptations led to improved ease of delivery, decreased infrastructure requirements, and reduced workforce and participant burden and costs, whilst maintaining core program elements.

**Conclusion** Our stakeholder-engaged adaptation process augurs well for minimising voltage-drop, fostering program sustainability and informing the adaptation for scale-up of Daughters and Dads sport-specific program variants.

# Identifying the role of contextual factors in the relationship between physical activity and cognition: a systematic review and meta-analysis

Dr. Myrto Mavilidi<sup>1</sup>, **Prof. David Lubans<sup>2,3</sup>**, Prof. Anthony D. Okely<sup>1</sup>, Associate Professor Spyridoula Vazou<sup>4</sup>, Dr. Valentin Benzing<sup>5</sup>, Mrs. Sofia Anzeneder<sup>5</sup>, Mrs. Katie Robinson<sup>2</sup>, Dr. George Thomas<sup>6</sup>, Mr. Andrew Woods<sup>1</sup>, Associate Professor Caterina Pesce<sup>7</sup>

<sup>1</sup>University of Wollongong, Wollongong, Australia, <sup>2</sup>University of Newcastle, Newcastle, Australia, <sup>3</sup>University of Jyväskylä, Jyväskylä, Finland, <sup>4</sup>Michigan State University, Michigan, USA, <sup>5</sup>University of Bern, Bern, Switzerland, <sup>6</sup>Curtin University, Perth, Australia, <sup>7</sup>University of Rome "Foro Italico", Rome, Italy

**SO.2.17 - Experience from implementation research in various settings, Clarion Hotel Gillet - Room Gillesalen, June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** A large number of systematic reviews and meta-analyses have focused on the effects of physical activity interventions on cognitive outcomes. However, the contextual mechanisms that may moderate intervention effects or trigger different mechanisms underlying these effects are largely neglected. This study aimed at quantifying the evidence on what mechanisms work under what contextual conditions, considering potential task-level moderators that may jointly influence the effects of physical activity interventions on cognitive outcomes in children, adolescents and adults.

**Methods:** We conducted a search of experimental studies using five electronic databases to October 2022. Grey literature and published studies conducted with typical populations in English, German, and Italian were included. Cognitive outcomes involved executive function, memory, academic achievement, creativity, intelligence, and metacognition.

Studies were coded and analysed based on the following characteristics: physical activity type (e.g., resistance exercise, exergame), cognitive demand (low, moderate, high), intervention delivery mode (face-to-face, remote), style (theory-/evidence-based, atheoretical), domain (e.g., school, leisure) and setting (e.g., in-/outdoors, virtual), and social environment (individual, group). Using a multilevel structural equation modelling approach, a series of meta-regressions will examine the interaction between context-level (e.g., cognitive demand, setting) with individual (e.g., age) and task-level (e.g., physical activity type) moderators of physical activity on cognition. Effect sizes will be calculated using post-test mean values and standard deviations from control and intervention groups.

**Results:** Out of 10,769 outputs found, 7,209 titles and abstracts, and 655 full-texts were screened. 233 studies were included in the systematic review. Preliminary descriptives from a subsample of 36,543 children and adolescents in 56 studies, showed that most studies involved face-to-face, school-based interventions (51). Twenty-nine studies looked at the chronic effects of physical activity on cognition. Only five studies were conducted outdoors, while the majority was classroom-based (23). Aerobic exercise was the most predominant type (26), with mixed cognitive demand (17 high and 21 low). Forty studies reported positive cognitive outcomes of intervention compared to the control groups.

**Conclusions:** Our quantitative review will inform the development of future physical activity interventions based on relevant contextual characteristics that should be considered along with individual- and task-level factors to reap largest cognitive benefits.

# Translation and feasibility of an efficacious school-based resistance training intervention

Ms. Caroline R. Hartmann<sup>1,2</sup>, **Associate Professor Lars B. Christiansen<sup>1,2</sup>**

<sup>1</sup>Department of Sports Science and Clinical Biomechanics, University of Southern Denmark, Odense, Denmark, <sup>2</sup>Research and Implementation Centre for Human Movement and Learning, Odense, Denmark

**SO.2.17 - Experience from implementation research in various settings, Clarion Hotel Gillet - Room Gillesalen, June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose** WHO recommend strengthening physical activities three times per week, but few adolescents' meet systematic and motivating resistance training (RT) in school. The aim of this mixed method feasibility study was to adapt and evaluate the Australian school-based intervention, Resistance Training for Teens (RT4T), in Danish upper secondary schools. The evaluation included effect analyses of pupils' muscle strength, motivation, and experienced competency for RT as well as analyses of acceptability and feasibility in the Danish context.

**Methods** RT4T is developed and thoroughly tested by a research group at University of Newcastle, Australia. The aim of RT4T is to give pupils competencies and motivation to do RT. Translation and adaptation were conducted based on the PRACTIS-guide by Koorts et al. and involved interviews with physical education (PE) teachers. Three 7<sup>th</sup>-grade classes and three 9<sup>th</sup>-grade classes were recruited for the study. All six classes followed the RT4T concept over 8 weeks. Before and after the intervention the pupils completed a push-up test, a standing long jump test, and a beep test for measuring muscle strength and endurance. In addition, they answered an adapted survey about motivation and competencies and completed a RT Skill Battery. Four qualitative interviews were performed with pupils and PE teachers.

**Results** A total of 69 pupils completed the physical tests and answered the survey. Statistical analyses were conducted in STATA and using t-tests to compare the results before and after the intervention. A significant intervention effect for Self-efficacy (0,23 95% (CI) 0,08-0,39) and beep-test (202,2 meters 95% CI 75,2-329,6) was found. Qualitative data were analyzed based on central aspect for implementation: acceptability, reach, dose, fidelity, adaptation, and resources. The pupils expressed a need for variation and were motivated by games, challenges and to follow the progress in the physical tests in the program. Teachers found difficulties advising all pupils about technical aspects of the program and observed a decline in motivation and concentration during the 8 weeks.

**Conclusion** Overall, the RT4T was acceptable and feasible to implement in upper secondary schools in Denmark, but adjustment can be made to increase the reach and effect of the program.

# Measuring implementation indicators of school and university nutrition programs: a systematic review

**Ms. Ana Mitchell<sup>1</sup>**, Ms. Shelly Palmer<sup>1</sup>, Dr. Femke van Nassau<sup>2</sup>, Dr. Melissa Pflugh Prescott<sup>1</sup>

<sup>1</sup>University of Illinois Urbana-Champaign, Urbana, USA, <sup>2</sup>Amsterdam University Medical Center, Amsterdam, Netherlands

**SO.2.17 - Experience from implementation research in various settings, Clarion Hotel Gillet - Room Gillesalen, June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** Addressing the research-to-practice gap is a significant public health priority, especially in school settings where the opportunity for scale-up is possible. No reviews have assessed the use of implementation indicators in the evaluation of school programs aimed to improve student dietary quality. To move the field forward, a systematic review was conducted to determine 1) what implementation indicators were evaluated and 2) how and to what extent the indicators were assessed in relation to program outcomes.

**Methods:** Studies published between January 2010 and March 2021 were selected from a systematic search of six bibliographic databases. Studies quantitatively measuring implementation indicators were included if they focused on improving student dietary quality in a school or University setting and if the intervention was implemented by school staff as part of standard operation. Data extraction was performed to determine the program characteristics and how implementation indicators were measured. The quality of each indicator was scored and then rated as high (>75%), moderate (50-75%), or low (<50%).

**Results/findings:** A total of 12,340 articles were retrieved and 50 articles representing 44 studies were included. Most studies took place in the US (n=24), in K-12 schools (n=41) and a third were conducted with low-income populations. Most studies had a physical activity component (n=27), measured 1 or 2 implementation indicators (n=26), and did not report an evaluation framework (n=27). In total, 118 indicators were measured: fidelity (n=29), reach (n=15), acceptability (n=12), adoption (n=10), sustainability (n=9), dose (n=9), feasibility (n=7), satisfaction (n=7), self-efficacy (n=6), and (n≤5) appropriateness, cost, context, adaptability, complexity, and culture. The indicators were primarily measured at the provider level (64%) using questionnaires (66%) and rated low in quality (72% and mean quality was 40.6%). Only 16% of indicators were related to program outcomes—most were fidelity and dose.

**Conclusions:** More research is needed to strengthen methods for all indicators, especially for adaptability, culture, complexity, and context. The use of an implementation theory or framework and relating implementation indicators to program outcomes needs to be prioritized. A core set of indicators would allow comparisons to be made between studies.



# Key elements across systems frameworks for childhood obesity prevention: a scoping review

**Ms. Laura Belmon<sup>1</sup>**, Ms. Alejandra Sotomayor Sainz<sup>1,3</sup>, Dr. Heide Busse<sup>2</sup>, Ms. Irma Huiberts<sup>4</sup>, Dr. Stefanie Vandevijvere<sup>5</sup>, Ms. Lara Christianson<sup>2</sup>, Prof. Wolfgang Ahrens<sup>2</sup>, Prof. Stefaan De Henauw<sup>3</sup>, Dr. Teatske Altenburg<sup>1</sup>

<sup>1</sup>Amsterdam UMC, Department of Public and Occupational Health, Amsterdam, Netherlands, <sup>2</sup>Leibniz Institute for Prevention Research and Epidemiology - BIPS, Bremen, Germany, <sup>3</sup>Ghent University, Department of Public Health and Primary Care, Ghent, Belgium, <sup>4</sup>Mulier Instituut, Utrecht, Netherlands, <sup>5</sup>Sciencono, Department of Epidemiology and Public Health, Brussel, Belgium

**SO.2.17 - Experience from implementation research in various settings, Clarion Hotel Gillet - Room Gillesalen, June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose** Childhood obesity is a complex problem. A systems approach takes into account this complexity by considering nonlinear relationships, accumulations, feedback loops, effects of time and delays in systems and unintended consequences that emerge. To date, it is unclear how a systems approach can best be implemented. Therefore, this scoping review aimed to summarize existing systems frameworks focused on childhood obesity prevention, and with that provide insight into the key elements of systems approaches.

**Methods** Studies were identified from searches in Medline, PsycINFO, Web of Science, CINAHL, and Sociological Abstracts, until October 2022, and from hand-searches for grey literature in five languages (i.e. English, French, Spanish, German, and Dutch). Systems frameworks were included if they focused on childhood obesity prevention and were informed by systems science or complexity theory. Data extracted from the frameworks were information regarding the goal, key elements, definition(s) of systems/complexity theory, development process, and the (boundaries of the) system wherein the framework was developed. To extract the key elements across included frameworks, a thematic content analysis was performed.

**Results/findings** We identified 16 systems frameworks for childhood obesity prevention. Twelve key elements were derived from these frameworks: (1) Understanding the local system; (2) Underpin with theory and evidence; (3) Adaptive and dynamic action development; (4) Continuous, adaptive and sustainable implementation of actions; (5) Continuous and adaptive monitoring and evaluation; (6) Upscaling of program actions; (7) Social marketing and communication; (8) Systematic program planning and organization; (9) Supporting leadership for whole system coordination; (10) Community partnership development; (11) Supporting political environment; and (12) Program outcomes of a systems approach, e.g. specific behavioural- and environmental factors on different system levels. Elements 1 and 10 were mentioned most often across frameworks.

**Conclusions** A systems approach for childhood obesity prevention requires long-term multi-sectoral collaboration to understand the local context and to adaptively develop, implement and evaluate coordinated actions together with actors aimed at changing the complex system. These key elements from systems frameworks provide guidance for research, policy and practice on how to effectively implement a systems approach for preventing childhood obesity.

# (In)voluntary telework and 24-h physical behaviors: A cross sectional analysis of white-collar workers in Sweden

Dr. Leticia B Januario<sup>1</sup>, Prof. Marina Heiden<sup>1</sup>, Prof. Svend Erik Mathiassen<sup>1</sup>, Prof. Gunnar Bergström<sup>1</sup>,  
**Associate Professor David M Hallman<sup>1</sup>**

<sup>1</sup>University of Gävle, Gävle, Sweden

**SO.2.18 - From cohort studies to interventions, Clarion Hotel Gillet - Room Akademien, June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** N. Other

**Purpose:** To investigate associations between the extent and voluntariness of telework and 24-h physical behaviors on working days during the COVID-19 pandemic.

**Methods:** We included 298 white-collar workers, working  $\geq 50\%$  of full time. They were asked about the extent and voluntariness of telework (categorized into low or high), and physical activity was assessed for 7 days in terms of time spent sedentary (sitting, lying), standing, and moving (walking, running, cycling) using a thigh-worn accelerometer. Work, leisure, and sleep were identified using a diary. Data were transformed to isometric log ratios (ILRs) using compositional data analysis. We ran multivariate analysis of variance to estimate the effects of voluntariness and extent of telework on physical behaviors adjusting for age, gender, and BMI.

**Results/findings:** We found that a high extent of telework was associated with more sleep relative to time awake ( $F=15.33$ ;  $p<0.01$ ;  $\eta^2=0.06$ ), less work relative to leisure ( $F=12.22$ ;  $p<0.01$ ;  $\eta^2=0.05$ ), and more sedentariness relative to active behaviors at work ( $F=15.56$ ;  $p<0.01$ ;  $\eta^2=0.06$ ). The interaction between telework extent and voluntariness was significant ( $F=3.24$ ;  $p<0.01$ ;  $\eta^2=0.07$ ) indicating that the effects of telework extent on physical behaviors were more pronounced among those with low voluntariness.

**Conclusions:** Our findings suggest that the association between the extent of telework and 24-h physical behaviors depends on the individual's possibility to choose whether to telework or not. Workers who remained at the office during the pandemic, with limited possibility to choose to telework, spent less time in sleep relative to awake, more time at work relative to leisure, and less time in sedentary relative to active behaviors at work. The results can have implications for how to implement telework in post-pandemic workplaces.

# Weight bias in adults from the NutriNet-Santé study: associations with weight status, socioeconomic position and demographic characteristics

Ms. Olivia Branche<sup>1</sup>, Dr. Camille Buscail<sup>1</sup>, Dr. Sandrine Péneau<sup>1</sup>, Dr. Julia Baudry<sup>1</sup>, Prof. Christine Poitou<sup>3,4</sup>, Prof. Jean-Michel Oppert<sup>1,3</sup>, Prof. Sébastien Czernichow<sup>5</sup>, Dr. Emmanuelle Kesse-Guyot<sup>1</sup>, Dr. Mathilde Touvier<sup>1</sup>, Prof. Chantal Julia<sup>1,2</sup>, **Dr. Alice Bellicha<sup>1</sup>**

<sup>1</sup>Sorbonne Paris Nord University, Inserm U1153, INRAE U1125, CNAM, Nutritional Epidemiology Research Team (EREN), Epidemiology and Statistics Research Center – University Paris Cité (CRESS), Bobigny, France, <sup>2</sup>Public Health Department, GHU Paris Seine-Saint-Denis, Assistance Publique-Hôpitaux de Paris (APHP), Bobigny, France, <sup>3</sup>Department of Nutrition, Pitié-Salpêtrière Hospital, Assistance Publique-Hôpitaux de Paris (APHP), Sorbonne University, CRNH-Ile de France, Paris, France, <sup>4</sup>Inserm, Nutrition and Obesity: Systemic Approaches (NutriOmics) Team, Sorbonne University, Paris, France, <sup>5</sup>Department of Nutrition, Hôpital Européen Georges Pompidou, Assistance Publique-Hôpitaux de Paris (APHP), Université Paris Cité, Paris, France

**SO.2.18 - From cohort studies to interventions, Clarion Hotel Gillet - Room Akademien, June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** N. Other

**Purpose:** Weight stigma experienced by people living with obesity has been well described but the degree of explicit weight bias (EWB) among the general population received less attention. We aimed to assess EWB in French adults and to explore associations with individual characteristics.

**Methods:** French adults from the NutriNet-Santé study (n=33 948, 52% women after weighting procedures) completed the validated Anti-Fat Attitudes Questionnaire assessing three EWB subscales: *Dislike* (antipathy towards people with obesity), *Fear of fat* (concerns about body weight) and *Willpower* (belief in weight controllability). Responses were rated on a 9-point Likert scale (0 to 8), a higher score indicating greater levels of EWB. Cross-sectional associations between weight status, socioeconomic position, demographic characteristics and EWB were examined using gender-stratified multi-variable ANCOVA models. Pairwise post-hoc testing corrected for multiple comparisons was performed.

**Results:** *Fear of fat* was higher among women (mean [SD]: 4.3 (1.7) in women, 3.6 (2.7) in men,  $P<0.0001$ ), while *Dislike* and *Willpower* scores were higher among men (*Dislike*: 1.7 (1.0) in women and 2.2 (1.8) in men; *Willpower*: 3.0 (1.4) in women and 3.7 (2.3) in men; all  $P<0.0001$ ). People with obesity reported greater *Fear of fat* scores compared to those with normal weight ( $P<0.0001$ , mean difference, MD, [95% CI]: 0.3 [0.2;0.4] in women and 0.3 [0.1;0.5] in men), lower *Dislike* scores (MD [95% CI]: -0.4 [-0.4;-0.3] in women and -0.4 [-0.5;-0.2] in men) and lower *Willpower* scores (MD [95% CI]: -1.0 [-0.1;-0.9] in women and -0.3 [-0.5;-0.2] in men). In both genders, lower income was associated with lower *Dislike*, *Fear of fat* and *Willpower* scores (all  $P<0.0001$ ), and low education with greater *Fear of fat* and *Willpower* scores (all  $P<0.0001$ ).

**Conclusions:** EWB was widespread in this large sample of French adults and largely driven by the fear of gaining weight in women and the belief in weight controllability in men. Our findings show that dimensions of EWB are differentially associated with individual characteristics and provides new insights into which population subgroups should preferably be targeted by future interventions.

# Dietary outcomes in youth with intellectual disabilities who participated in a family-based weight loss intervention

**Dr. Linda Bandini**<sup>1</sup>, Dr. Misha Eliasziw<sup>2</sup>, Ms. Gail Rogers<sup>3</sup>, Dr. Carol Curtin<sup>1</sup>, Dr. Gretchen Dittrich<sup>4</sup>, Dr. Richard Fleming<sup>5</sup>, Ms. Katherine Rancaño<sup>2</sup>, Dr. Aviva Must<sup>2</sup>

<sup>1</sup>University of Massachusetts Chan Medical School, Worcester, USA, <sup>2</sup>Tufts University School of Medicine, Boston, USA, <sup>3</sup>Jean Mayer USDA Human Nutrition Research Center on Aging, Boston, USA, <sup>4</sup>Simmons University, Boston, USA, <sup>5</sup>University of Massachusetts, Boston, USA

**SO.2.18 - From cohort studies to interventions, Clarion Hotel Gillet - Room Akademien, June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** N. Other

**Purpose:** To assess whether youth with intellectual disabilities (ID) enrolled in a family-based multi-component behavioral weight loss intervention: 1) adhered to their healthy eating plan (HEP); 2) experienced changes in parent-offered treat foods; 3) increased the variety of foods eaten; and/or 4) showed an improvement in their Healthy Eating Index (HEI) score.

**Methods:** This is a sub-analysis of dietary data from our intervention (Bandini, Pediatric Obesity, 2021). Individualized HEPs were tailored to youth's estimated energy needs with a modest energy deficit to promote weight loss. The HEP is a visual tool that depicts the recommended daily servings from six food groups and allocates 400 calories weekly (allotted as 8 'coins') to 'spend' on treats (e.g., cookies, chips, soda). Parents attended a pre-intervention orientation and were provided a food guide to assist with HEP implementation. Three-day food records were collected at baseline and at the end of the 6-month intervention. Data were entered into the Nutrition Data System for Research. Linear mixed models estimated adherence, using an intraclass correlation coefficient (ICC), and assessed changes.

**Results/Findings:** Twenty-four participants were enrolled (mean age 17.9 years, 66.7% female). HEP adherence improved significantly, from slight to moderate (ICC=0.17 vs. 0.43,  $p=0.004$ ). The largest change in consumption observed was a decrease of 'coin' foods, from a daily average of 7.2 to 3.0 ( $p<0.001$ ). Only small changes were observed among the other food groups. Parent-offered treat foods decreased by 21.9% ( $p=0.002$ ). Of 97 food items considered, youth ate 9.6 different foods on average at 6 months that they had not consumed at baseline ( $p<0.001$ ). The average total HEI score improved from 56.8 to 67.3 ( $p<0.001$ ).

**Conclusions:** The HEP represents a novel approach to promote healthy eating in youth with ID. Despite observing only small changes in servings consumed in the various food groups, the decrease in treats consumed and offered by parents, as well as the increase in dietary variety, may have contributed to the improved HEI score. The observed changes suggest a successful implementation of the HEP and a positive impact of the nutrition sessions and the behavioral components of the intervention.

# Examining the mediating effects of sleep variables on mental health in older adolescents: Findings from the Burn 2 Learn randomized controlled trial

**Dr. Angus Leahy**<sup>1,2</sup>, Dr. Thierno Diallo<sup>3</sup>, Associate Professor Narelle Eather<sup>1,2</sup>, Associate Professor Mitch Duncan<sup>1,2</sup>, Dr. Jordan Smith<sup>1,2</sup>, Prof. David Lubans<sup>1,2,4</sup>

<sup>1</sup>University of Newcastle, Callaghan, Australia, <sup>2</sup>Hunter Medical Research Institute, New Lambton Heights, Australia, <sup>3</sup>Western Sydney University, Penrith, Australia, <sup>4</sup>University of Jyväskylä, Jyväskylä, Finland

**SO.2.18 - From cohort studies to interventions, Clarion Hotel Gillet - Room Akademien, June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** N. Other

**Purpose:** This study explored the mediating effect of sleep-related outcomes on older adolescents' mental health in the context a school-based physical activity intervention.

**Methods:** The Burn 2 Learn (B2L) physical activity intervention was evaluated using a cluster randomized controlled trial, which was conducted in two cohorts. The current investigation is a sub study that involved participants from cohort 2. Study participants ( $n = 292$ ) were older adolescents (mean age = 16.0 [0.5]) from 10 secondary schools in New South Wales, Australia. Participants were randomised at the school level to the B2L intervention ( $n = 146$ ) or a wait-list control condition ( $n = 146$ ). Two teachers from intervention schools were recruited as school champions to deliver high-intensity activity breaks (approximately 15 mins) to students during academic lessons. Teachers received training, resources, and support to deliver two high-intensity activity breaks per week for 16 weeks. Older adolescents completed measures of mental health (i.e., perceived stress, and internalizing symptoms) and hypothesized mediators (i.e., sleep duration, sleep latency, awakenings, and daytime sleepiness) via questionnaires at baseline (February-April 2019) and post-intervention (August-September 2019). Separate single mediation analyses were conducted to explore the potential mediating effects of sleep variables on mental health outcomes using a product-of-coefficient test.

**Results:** No significant mediated effects were found for mental health outcomes. We did observe a small significant effect for perceived stress ( $\beta = -0.11$ ,  $SE = 0.034$ ,  $p = 0.002$ ), but not for internalizing symptoms ( $\beta = 0.02$ ,  $SE = 0.051$ ,  $p = 0.760$ ). There were no statistically significant effects of the intervention on measures of sleep variables. Several significant associations were observed for changes in sleep-related outcomes and mental health in the hypothesized direction.

**Conclusion:** The B2L intervention had a small beneficial effect on older adolescents' perceived stress, however, changes in sleep were not responsible for mediating these effects. Changes in markers of sleep were associated with changes in mental health, highlighting the importance of sleep for good psychological health. Despite recognized links between regular physical activity in improved sleep parameters, short duration high-intensity activity may not be the most useful exercise modality for influencing adolescents' sleep.

# The mediating effect of maternal adiposity on diet and physical activity interventions in pregnancy for prevention of gestational diabetes

**Miss Anna Boath<sup>1</sup>**, Dr. Louise Hayes<sup>1</sup>, Prof. Luke Vale<sup>1</sup>, Dr. John Allotey<sup>2</sup>, Dr. Nicola Heslehurst<sup>1</sup>

<sup>1</sup>Newcastle University, Newcastle-Upon-Tyne, United Kingdom, <sup>2</sup>University of Birmingham, Birmingham, United Kingdom

**SO.2.18 - From cohort studies to interventions, Clarion Hotel Gillet - Room Akademien, June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** N. Other

**Purpose:** Weight management interventions in pregnancy, comprising of diet and/or physical activity components, aim to reduce adverse pregnancy outcomes (e.g. gestational diabetes; GDM). Interventions are typically targeted by body mass index (BMI); however, this does not adequately identify all women who develop GDM. Therefore, exploring novel ways of targeting interventions, by alternative adiposity measures (e.g. waist circumference) may better predict GDM risk. This study aimed to estimate the relative performance of alternative measures of adiposity as predictors of GDM.

**Methods:** The International Weight Management in Pregnancy (i-WIP) collaboration has a living database of Individual Participant Data (IPD) from RCTs of weight management interventions in pregnancy. IPD from trials that collected data on adiposity were available from 9 trials (n=6089). A two-stage random effects IPD meta-analysis assessed overall intervention effectiveness for GDM prevention. The IPD meta-analytical framework was extended to explore treatment-covariate interactions, to investigate the mediating effect of adiposity measures on intervention effectiveness.

**Results:** Of the 9 trials, 2 recruited women with a BMI >18.5kg/m<sup>2</sup>, 3 recruited women with overweight, and 4 recruited women with obesity. Meta-analysis showed no evidence of effect of weight management interventions, compared to standard care, on GDM risk (OR: 0.99 95% CI: 0.79, 1.25). Treatment-covariate interactions did not identify any adiposity measures that were significantly associated with intervention effectiveness for GDM prevention (BMI: Interaction effect (IE): 0.000, 95% CI: -0.003, 0.003; waist circumference: IE: -0.002, 95% CI: -0.005, 0.002; Hip circumference IE: -0.001, 95% CI: -0.005, 0.002; Mid-upper arm circumference IE: 0.001 95% CI: -0.004, 0.007; Bicep skinfold: IE: -0.002, 95% CI: -0.006, 0.001; Tricep skinfold: IE: 0.001 95% CI: -0.002, 0.005; Subscapular skinfold: IE 0.001, 95% CI -0.002, 0.004; Suprailiac skinfold: IE 0.002, 95% CI -0.009, 0.013).

**Conclusions:** 7 of the 9 trials recruited women with overweight/obesity, limiting exploration of adiposity effect as the population may be skewed towards high adiposity. Development of a larger, more diverse, dataset that would allow for the exploration of adiposity across different maternal weights, the effect of characteristics associated with adiposity (e.g ethnicity), and effect of mode of interventions (e.g. diet/physical activity/combined), which was not possible due to limited data.



# Active Mums and Bumps: A mixed-method study into the feasibility and effectiveness of an online programme to increase physical activity levels in pregnant and postnatal women

Dr. Gaynor Creaby<sup>1,2</sup>, Dr. Laura Britten<sup>1</sup>, **Dr. Camilla Nykjaer<sup>1</sup>**

<sup>1</sup>School of Biomedical Sciences, Faculty of Biological Sciences, University of Leeds, Leeds, United Kingdom,

<sup>2</sup>Harrogate and District NHS Foundation Trust, Harrogate, United Kingdom

**SO.2.18 - From cohort studies to interventions, Clarion Hotel Gillet - Room Akademien, June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** N. Other

**Purpose:** Few pregnant or postnatal women meet physical activity (PA) recommendations, despite the known health benefits. COVID-19 exacerbated this, but also created a stimulus for innovation and opportunity. This study aimed to determine the feasibility of a 12-week online PA intervention tailored towards pregnant and postnatal women.

**Methods:** A mixed method approach was used. Women aged 18+ years, 12-20 weeks pregnant or 6-52 weeks postnatal with no contraindications to PA were recruited via social media in December 2020. The intervention, which coincided with the start of the third National UK COVID-19 lockdown, consisted of two weekly free midwife-led 45 minutes exercise classes (N=15) delivered via Zoom. Data were collected via online surveys at baseline, 6 and 12 weeks. Feasibility was assessed through acceptability, demand, practicality, and limited efficacy. Adherence was calculated as percentage of classes attended out of the number of classes available at each follow-up. Changes in self-reported PA (MET-minutes/week) and sitting time (hours/day), assessed using the IPAQ-SF, were explored using the Friedman test and Wilcoxon signed-rank tests. Qualitative outcomes were explored using a focus group (N=7) and thematic analysis.

**Results/findings:** Eighty-six eligible women expressed interest, of which 48 were invited to participate. Thirty-three signed up to the intervention, and 27 (age:  $34.8 \pm 4.3$  years) pregnant (n=9,  $18.1 \pm 3.0$  weeks gestation) and postnatal (n=18,  $17.7 \pm 7.5$  weeks since birth) women completed the surveys and attended at least one class. Mean adherence decreased from 67.5% to 54.3%, with postnatal women reporting a greater adherence at both time points. There was a statistically significant increase in median PA (MET-minutes/week) from baseline (912.0, IQR: 594.0, 1332.8) to 6 weeks (1173.0, IQR: 844.5, 1786.5,  $p=0.001$ ) as well as a statistically significant reduction in median sitting time (hours/day) from baseline (8.5, IQR: 6.0, 11.3) to 12 weeks (6.5, IQR: 5.0, 8.5,  $p=0.004$ ). Thematic analysis found four themes: 'accessibility', 'personalised', 'me time' and 'instructor qualities'.

**Conclusions:** There was a high demand for this intervention and findings indicate it as a feasible way of increasing PA and decreasing sitting time. A larger randomised-controlled trial with a control group is required to test this intervention further.

# Hidden hunger: Patterns of diet quality among slum-dwelling pregnant women in India

**Ms. Swapna Deshpande<sup>1,2</sup>**, Dr. Rubina Mandlik<sup>1</sup>, Dr. Anuradha Khadilkar<sup>1</sup>, Dr. Tarun Reddy Katapally<sup>3</sup>, Dr. Jasmin Bhawra<sup>4</sup>, Dr. Tarja I Kinnunen<sup>2</sup>

<sup>1</sup>Hirabai Cowasji Jehangir Medical Research Institute, Pune, India, <sup>2</sup>Tampere University, Tampere, Finland,

<sup>3</sup>Western University, Ontario, Canada, <sup>4</sup>Toronto Metropolitan University, Toronto, Canada

**SO.2.18 - From cohort studies to interventions, Clarion Hotel Gillet - Room Akademien, June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** N. Other

**Purpose:** Presently, 17% (65 million) of the urban Indian population resides in slums, which are socioeconomically backward neighbourhoods in urban areas. Given the dearth of nutrition studies on slum-dwelling Indians, this study aims to identify the determinants of dietary adequacy among slum-dwelling pregnant women in India.

**Methods:** This prospective observational study was conducted with slum-dwelling pregnant women (N=238) in the Western Indian city of Pune. Participants were between 18 to 40 years, recruited <12 weeks into pregnancy and followed till delivery. Data on socio-demographic characteristics, anthropometrics, and diet (3-day, 24hr recall at 21-25 weeks) were collected using interviewer-administered questionnaires. Nutrient Adequacy Ratio and Mean Adequacy Ratio for 9 micronutrients (calcium, iron, zinc, vitamins A, C, B1, B2, B3, folic acid) were calculated using the Estimated Average Requirement (EAR) for Indians. Principal component analysis and linear regression analysis were performed to identify nutrient intake patterns and their sociodemographic determinants.

**Results:** Mean age of the sample was 24.4±4.5 years, with 46% completing ≥12 years of formal education (higher secondary). Approximately 60% women were nulliparous, and over 85% were homemakers. Further, 25% of women were underweight, while 26% were overweight and 10% obese. Mean daily energy intake was 1912±540 kcal (EAR – 2010 kcal), where energy obtained from carbohydrates, proteins, and fats was 63%, 10%, and 26%, respectively. Approximately 42% of women exceeded the suggested energy intake from carbohydrates, whereas all participants' protein intake was within the recommended value. Mean Adequacy Ratio was 52%, implying that the diet was devoid of most micronutrients, particularly folic acid. Broadly, two nutrient intake patterns were identified: 1) Group 1: High macro and micronutrient intake (66%); 2. Group 2: High intake of vitamins (A, C, Folic Acid) (9%). Obtaining >12 years of formal education ( $\beta=0.63$ ,  $p=0.020$ ) was significantly associated with pattern 1 after adjusting for other demographic and anthropometric covariates. Overall, higher education was associated with better diet quality.

**Conclusion:** On average, the diets of Indian slum-dwelling pregnant women had sufficient macronutrient, but inadequate micronutrient composition, indicating hidden hunger. Given the long-term impacts of diet quality on maternal and child health, nutritional literacy programs should be prioritized.

# A Christmas themed physical activity intervention to increase participation in physical activity during Advent: pilot randomised controlled trial

**Dr. Gregory Biddle**<sup>1</sup>, Dr. James Sanders<sup>1</sup>, Dr. Kajal Gokal<sup>1</sup>, Dr. Claire Madigan<sup>1</sup>, Mr. Jonah Thomas<sup>1</sup>, Ms. Alexandra Pyle<sup>1</sup>, Dr. Andrea Roalfe<sup>1</sup>, Prof. Amanda Daley

<sup>1</sup>Loughborough University, Loughborough, United Kingdom

**SO.2.18 - From cohort studies to interventions, Clarion Hotel Gillet - Room Akademien, June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** N. Other

**Purpose:** To examine the recruitment, retention, and preliminary effects of a Christmas themed physical activity intervention designed to increase participation in physical activity and decrease sedentary behaviour in inactive adults.

**Methods:** A pilot randomised controlled trial recruited inactive adults and randomised them 2:1 to the intervention or the comparator group. The intervention group received an email each day of Advent (1-24 December 2021), containing a Christmas themed physical activity idea to be completed that day. Each physical activity idea was presented in three intensity formats, including Easy Elf (light intensity), Moderate Mrs Claus (moderate intensity), and Strenuous Santa (vigorous intensity). The comparator group received a leaflet about healthy living on the 1 December. Primary outcomes were recruitment rate, retention, and weekly minutes of participation in self-reported moderate-to-vigorous intensity physical activity (MVPA) using the exercise vital signs questionnaire. Primary analysis used repeated measures linear modelling to compare minutes of moderate-to-vigorous intensity physical activity between groups at one, two-, and three-weeks follow-up. Secondary outcomes were muscle strengthening physical activity (days per week), accelerometer measured MVPA and sedentary time (minutes per day), and enjoyment of and adherence to the intervention.

**Results:** 323 individuals expressed an interest in the trial and 107 were randomly assigned to the intervention (n=71) or the comparator (n=36) group. The recruitment target (n=105) was reached within 19 days of starting recruitment. 23 (21%) of 107 participants were lost to follow-up. At three weeks, the adjusted mean difference between groups was 20.6 minutes of participation in moderate-to-vigorous intensity physical activity per week (95% CI -29.7 to 70.9) in favour of the intervention group. Accelerometer data showed that the intervention group spent fewer minutes sedentary per day than comparators (-58.6 (-113.5 to -3.8)). Overall, 70% participants reported that they liked the intervention and 69% reported that they completed the activity ideas each day.

**Conclusions:** The public were interested in a Christmas themed physical activity intervention during Advent, which might increase physical activity and reduce time sedentary. Enjoyment of, and adherence to the intervention shows the potential benefit that Christmas themed physical activity campaigns/initiatives might have for improving public health.

# Preferred Physical Activity Type and Relationship with meeting Physical Activity Guidelines by Urban-Rural Residence among Adults in the US, 2019

**Dr. Christiaan Abildso**<sup>1</sup>, Dr. Eugene Fitzhugh<sup>2</sup>

<sup>1</sup>West Virginia University School of Public Health, Morgantown, USA, <sup>2</sup>University of Tennessee, Knoxville, Knoxville, USA

**SO.2.18 - From cohort studies to interventions, Clarion Hotel Gillet - Room Akademien, June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** N. Other

**Purpose:** The purpose of this study was to compare urban- and rural-residing US adults' participation in specific types of leisure-time (LT) physical activity (PA), and the relationship of LT PA types with the prevalence of meeting aerobic, muscle strengthening, and combined PA guidelines.

**Methods:** 2019 Behavior Risk Factor Surveillance System data from adults (N=396,261) were analyzed. Respondents that indicated they engaged in any LT PA in the previous month could report up to two LT PAs they engaged in the most from among 75 options, including "other." These were condensed to 13 categories using the Compendium of PAs. Age-adjusted prevalence of engaging in specific LT PAs and the overarching activity categories were compared by urban/rural county of residence using the 2013 NCHS Urban/Rural Classification Scheme. The relationship of PA categories with meeting aerobic, muscle strengthening, and the combined PA guidelines, stratified by urban/rural status was analyzed using chi-square analyses with  $p \leq 0.004$  adjusted for multiple comparisons.

**Results/findings:** For all adults, walking (44.1%), running (11.7%), weightlifting (10.7%), and gardening (5.8%) were the four most commonly reported LT PAs. Running and weightlifting were reported more often by urban (12.2% and 11.2%, respectively) than rural adults (8.9% and 7.8%, respectively) ( $p < .0001$ ); gardening more often by rural than urban adults (6.9% v 5.7%) ( $p < .0001$ ). "Recreational" LT PA categories (e.g., walking/hiking, cycling, conditioning, sports, running/jogging) were more prevalent among urban residents whereas "purposeful" LT activities (e.g., household activities, lawn/garden) were more prevalent among rural residents. Interestingly, individuals reporting walking (44.1%) had the highest rate of not meeting the combined PA guidelines (22.2% urban, 22.4% rural). Categories of LT PA associated with the highest rates of meeting the combined PA guidelines (all > 40%) were dancing/aerobics, conditioning, running/jogging, and "other" activities.

**Conclusions:** The results highlight uniqueness between rural and urban US adults in the LT PA types that they engage in and those that are associated with PA guidelines. These analyses are innovative and important for addressing the significant rural/urban PA disparities that exist in the US by developing our understanding of which activities may or may not appeal to specific populations.

# Associations between dietary patterns with objective and subjective sleep duration and quality in the Rotterdam study

**Ms. Auke J.C.F. Verkaar<sup>1</sup>**, Associate Professor Renate M. Winkels<sup>1</sup>, Prof. Ellen Kampman<sup>1</sup>, Assistant Professor Annemarie I. Luik<sup>2</sup>, Associate Professor Trudy Voortman<sup>2</sup>

<sup>1</sup>Division of Human Nutrition and Health, Wageningen University & Research, Wageningen, Netherlands,

<sup>2</sup>Department of Epidemiology, Erasmus MC, University Medical Center Rotterdam, Rotterdam, Netherlands

**SO.2.18 - From cohort studies to interventions, Clarion Hotel Gillet - Room Akademien, June 16, 2023, 12:00 PM - 1:15 PM**

**SIG - Primary Choice:** N. Other

**Purpose:** Healthier dietary patterns have been associated with better sleep quality and longer sleep duration. Most studies however have relied on self-reported sleep measurements which reflect the experience of sleep. Associations of dietary patterns with sleep consequently might differ when sleep is assessed objectively. We therefore comprehensively examined associations of different types of dietary patterns with both actigraphy-estimated and self-reported sleep duration and quality in a population-based sample of middle-aged and elderly persons.

**Methods:** In 2,589 participants (median age 56.9 years, IQR: 52.5-60.3; 58% female) of the Rotterdam study, an ongoing prospective cohort, dietary intake was assessed with a 389-item food frequency questionnaire. Five different dietary patterns were defined: two pre-defined scores developed to measure adherence to the Dutch dietary guidelines and Mediterranean diet, and three previously derived data-driven scores indicating a prudent, unhealthy, and typical Dutch diet. Self-rated sleep quality was assessed with the Pittsburgh Sleep Quality Index. In 533 participants (median age 56.2 years, IQR: 51.3-59.5; 61% female), we used actigraphy for an average of 6.8 days (SD: 0.7) to estimate total sleep time, sleep onset latency, wake after sleep onset, and sleep efficiency. Multiple linear regression was used to assess associations between dietary patterns and sleep outcomes, adjusting for multiple confounders. Stratified analyses were performed by sex, age and BMI categories.

**Results/findings:** No statistically significant associations were observed between the different dietary patterns and objective sleep outcomes or subjective sleep quality. Stratified analyses did not reveal meaningful differences between groups.

**Conclusions:** No associations between dietary patterns with subjective sleep quality or objective sleep outcomes were observed in this population-based sample of middle-aged and elderly persons. This suggests that overall dietary patterns are not associated with sleep in a general population. Potentially, more specific aspects of dietary intake may affect sleep or dietary intake might be more relevant in relation to sleep for specific groups.

# An online tool to support pediatric providers and parents in addressing child weight management

**Assistant Professor Marlyn Allicock<sup>1</sup>**, Mr. Joshua Yudkin<sup>1</sup>, Miss Victoria Nelson<sup>3</sup>, Dr. Sarah Barlow<sup>2,3</sup>

<sup>1</sup>The University of Texas Health Science Center at Houston, Dallas, USA, <sup>2</sup>University of Texas Southwestern Medical Center, Dallas, USA, <sup>3</sup>Children's Medical Center of Dallas, Dallas, USA

**SO.3.19 - What we know about weight management from children and families studies, UKK - Main Hall (Level 6), June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Systemic, structural, and social factors have contributed to a high burden of overweight and obesity among African American and Latino children in the United States, but weight management programs are scarce. Pediatric providers have opportunities to address weight management with children in healthcare settings, but they have limited time to implement interventions. This study created an eHealth solution to extend the abilities of pediatric providers to support parents in child weight management. Dynamo Kids/¡Niños Dinámicos! is a novel online tool (in English and Spanish) to assist pediatric providers in counseling parents of children with overweight or obese.

**Methods:** Families with children (6-12 years), with BMI  $\geq$  85<sup>th</sup> percentile, and receiving pediatric primary healthcare at three safety-net clinics in Dallas, TX were recruited by pediatric providers via EHR alerts. Dynamo Kids/¡Niños Dinámicos! focused on positive behavior changes for sugar-sweetened beverages (SSB), physical activity, and MyPlate (nutrition) over the 3-month intervention, plus behavior tracking, text messages, provider endorsement, and self-pacing to encourage parental engagement. Parent-use information was sent to the patient's EHR so that providers could assess progress and provide counseling during scheduled follow-up visits. Providers received a brief motivational-interviewing training to model clinical conversations and a guide with questions and talking points to support counseling. Parents completed baseline and follow-up surveys that evaluated behavior change including the Family Nutrition and Physical Activity Assessment (FNPA) and parent BMI. Postintervention interviews with parents and providers offered insight into engagement, intervention design, and fit/need.

**Results:** 73 families enrolled, majority Latino (87%), and 63% used the program. Improvements in FNPA 3.0 (6.3),  $p=0.01$  and parent BMI = -0.69 (1.76),  $p=0.04$  were observed. 61% started with SSB and spent an average 109 minutes over 21 days. Experiences with engagement and lessons learned from providers and parents regarding implementation, content, and engagement will be discussed.

**Conclusions:** Promising evidence in parent-related behaviors demonstrates that an eHealth platform may be valuable for delivering parent education and a tool for providers to collaboratively engage with parents for weight management.



# Designing a communication strategy to promote the use of warning labels among Mexican children and adolescents

**Dr. Alejandra Jáuregui<sup>1</sup>**, Mrs. Selene Pacheco-Miranda<sup>1</sup>, Miss Yatziri Ayvar-Gama<sup>1</sup>, Mr. Nelson Alejandro-Torres<sup>1</sup>, Mrs. Amalia Cuno<sup>2</sup>, Dr. Anabelle Bonvecchio-Arenas<sup>1</sup>, Dr. Simón Barquera-Cervera<sup>1</sup>

<sup>1</sup>Instituto Nacional de Salud Pública, Cuernavaca, Mexico, <sup>2</sup>Instituto Politécnico Nacional, Mexico City, Mexico

**SO.3.19 - What we know about weight management from children and families studies, UKK - Main Hall (Level 6), June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** G. Children and families

**Background:** The health and economic burdens due to childhood obesity and poor dietary habits among the youth are key pressing matters in Mexico. In October 2020 front-of-package warning labels were implemented in Mexico to improve the food environment and guide consumers to select healthier foods. We aimed to describe the process used to design a communication strategy aimed at promoting the use of warning labels and choosing healthy foods among Mexican children and adolescents.

**Methods.** Between June a December 2021, we conducted a mixed-methods study among youth (6-18 years) and their caretakers with low- and high-income backgrounds from urban and rural settings in Morelos, Mexico. The study consisted of four phases: 1) Formative research (18 focus groups, n=179); Co-creation workshops with children and adolescents (n=33); 3) Design of the communication strategy, and 4) Pilot-testing of the proposed strategy (6 focus groups, n=52). The COM-B model and the conceptual model of front-of-package nutrition label influence guided all the phases of the study.

**Results.** We identified key priorities to be addressed by the communication strategy: 1) Improve the understanding of how warning labels work, 2) Explain the link between key ingredients (calories, saturated fat, trans fat, sodium, sweeteners, and caffeine), and disease; 3) Remind that not all processed products are healthy, 4) Highlight the negative effects of the excessive consumption of foods with warning labels, 5) Highlight the other benefits of healthy eating beyond health (academic achievement and feeling lively and more energized), 6) Empower youth to promote healthy eating within their families, 7) Encourage youth and their caretakers to speak up and demand the food industry to produce healthier food products, 8) Highlight that natural foods are cheaper and of better quality than foods with warning labels, and 9) Provide options of healthy and attractive food preparations with natural foods.

**Conclusion.** Formative research and the participation of children and adolescents in creating the strategy were essential for designing a culturally relevant strategy with impact potential, which was later implemented at the national level in June 2022. The process and results of this study may inform efforts in contexts similar to Mexico.

# Geographical location matters: Differences in dietary behaviours of children living with obesity who participate in Shapedown-BC, a Provincially funded weight management program in British Columbia, Canada (2015-2019)

Ms. Alexandra J. Heidl<sup>1</sup>, **Dr. Ana Carolina B. Leme<sup>2</sup>**, Ms. Judith de Niet<sup>3</sup>, Ms. Thumri Waliwitiya<sup>4</sup>, Ms. Madelaine Gierc<sup>3</sup>, Ms. Kiran Kalkat<sup>3</sup>, Ms. Arlene Cristall<sup>3</sup>, Associate Professor Eli Puterman<sup>3,5</sup>, Assistant Professor Tamara Cohen<sup>2,3</sup>

<sup>1</sup>School of Nutrition, McGill University, Sainte-Anne-De-Bellevue, Canada, <sup>2</sup>Faculty of Land and Food Systems, The University of British Columbia, Vancouver, Canada, <sup>3</sup>British Columbia Children's Hospital, Vancouver, Canada, <sup>4</sup>Faculty of Medicine, The University of British Columbia, Vancouver, Canada, <sup>5</sup>School of Kinesiology, The University of British Columbia, Vancouver, Canada

**SO.3.19 - What we know about weight management from children and families studies, UKK - Main Hall (Level 6), June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Population health is known to vary between rural versus urban population centres. Shapedown BC is a provincially funded weight-management program in British Columbia, Canada, that provides support to families of children (9-11y) and adolescents (12-18 y) living with obesity throughout the province. The purpose of this study was to examine the associations between geographic locations within British Columbia and differences in dietary behaviours of those enrolled in the program.

**Methods:** This study reports on a cross-sectional analysis of data from participants enrolled in Shapedown BC from 2015-2019 (n=1,079, BMI z-score  $2.77 \pm 0.67$ , mean age  $14.0 \pm 1.7$  years). Parent-proxy frequencies of vegetables and sugar-sweetened beverages intake were reported for children <11 years and child self-report frequencies for children >12 years. Statistics Canada definitions of geographic locations were used: rural ( $\leq 1,000$  inhabitants), small (1,000 to 29,999 inhabitants), medium (30 to 99,999 inhabitants), and large ( $\geq 100,000$  inhabitants). Due to a small number of children living in rural areas (n=3), data for rural and small centres were merged to one category (n= 3). Descriptive statistics and logistic regression with generalized estimating equations were used to calculate the association between geographic location and dietary behaviours.

**Results:** Most of the children were living in urban centres (66.2%) followed by medium (30.8%) and rural/small (3.1%) centres. Those residing in medium centres consumed more salads/greens (OR: 0.42; 95%CI 0.14, 0.70), fewer sugar-sweetened beverages (OR: -0.36; 95%CI -0.64, -0.09), and fewer family meals (OR: -0.30; 95%CI -0.57, -0.03) compared to large populations, but not compared to rural and small centres. However, children residing in rural and small locations were found to eat more at fast-food restaurants (OR: 1.19; 95%CI 0.25, 2.12) compared to large populations.

**Conclusion:** Study results provide insight into the dietary behaviours of Canadian children living with obesity across different geographic locations in British Columbia. Those living in medium centres present with healthier eating patterns compared to those residing in rural and large centres. These findings have important implications for understanding how geographic locations might affect dietary behaviours in children living with obesity.

# Cross-sectional and longitudinal associations of vigorous and moderate-to-vigorous physical activity with cardiovascular disease risk factors in children from 4 to 9 years of age

Dr. Christine Delisle-Nyström<sup>1</sup>, **Dr. Jairo H. Migueles**<sup>1</sup>, Dr. Pontus Henriksson<sup>2</sup>, Prof. Marie Löff<sup>1,2</sup>

<sup>1</sup>Karolinska Institutet, Huddinge, Sweden, <sup>2</sup>Linköping University, Linköping, Sweden

**SO.3.19 - What we know about weight management from children and families studies, UKK - Main Hall (Level 6), June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Although physical activity guidelines for children encourage moderate-to-vigorous intensity activities (MVPA), some studies have found that only vigorous intensity activities (VPA) might promote health benefits in young children. To investigate the longitudinal associations of VPA and MVPA with cardiovascular risk factors measured at 4 and 9 years of age.

**Methods:** This study pooled data from three cohorts under the umbrella of SPINACH. Of the 632 children originally measured, 411 children participated in the follow-up measurements at 9 years of age. Movement behaviours (i.e., physical activity, sedentary behaviour, and sleep) were measured with accelerometers. Cardiovascular disease risk factors included blood pressure (BP), high- and low-density lipoprotein cholesterol (HDL, LDL), triglycerides, insulin, glucose, the Homeostatic model assessment of insulin resistance (HOMA-IR), and waist circumference. A normalized metabolic syndrome risk score (MetS-score) was derived from these indicators. Cross-sectional and longitudinal linear regression models were built using compositional data analysis standards.

**Results:** Reallocating time to VPA from lower-intensity behaviours at 9 years was associated with a lower waist circumference ( $B = -3.219$ ,  $P = 0.002$ ), diastolic BP ( $B = -1.836$ ,  $P = 0.036$ ), triglycerides ( $B = -0.214$ ,  $P < 0.001$ ), glucose ( $B = -0.189$ ,  $P = 0.033$ ), insulin ( $B = -2.997$ ,  $P < 0.001$ ), and HOMA-IR ( $B = -0.778$ ,  $P < 0.001$ ) measured at 9 years of age. Similarly, reallocating time to VPA at 4 years was associated with MetS-score ( $B = -0.831$ ,  $P = 0.049$ ), waist circumference ( $B = -4.211$ ,  $P = 0.015$ ), systolic BP ( $B = -5.572$ ,  $P = 0.015$ ), diastolic BP ( $B = -2.931$ ,  $P = 0.044$ ), triglycerides ( $B = -0.229$ ,  $P = 0.034$ ), glucose ( $B = -0.325$ ,  $P = 0.032$ ), insulin ( $B = -5.114$ ,  $P = 0.001$ ), and HOMA-IR ( $B = -0.673$ ,  $P = 0.001$ ) at 9 years of age. Reallocations of time to MVPA were not associated with cardiovascular disease risk factors, neither at 4 nor 9 years of age.

**Conclusion:** Allocating more time to VPA was associated with cardiovascular health in children both cross-sectionally and longitudinally. Interestingly, MVPA seemed not to be a stimulus of enough intensity to trigger these potential cardiometabolic benefits in apparently healthy children.

# Energy intake mediates the association between evening food consumption and adiposity among children

Miss Jenna Rahkola<sup>1</sup>, Mr. Aku-Ville Lehtimäki<sup>1</sup>, Dr. Henna Vepsäläinen<sup>2</sup>, Dr. Ilona Merikanto<sup>3</sup>, Prof. Eva Roos<sup>1</sup>, **Dr. Reetta Lehto<sup>1,2</sup>**

<sup>1</sup>Folkhälsan Research Center, Helsinki, Finland, <sup>2</sup>Department of Food and Nutrition, University of Helsinki, Helsinki, Finland, <sup>3</sup>Faculty of Medicine, University of Helsinki, Helsinki, Finland

**SO.3.19 - What we know about weight management from children and families studies, UKK - Main Hall (Level 6), June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Timing of eating has recently gained special interest as it has been found to impact metabolism and relate to obesity in adults. Among young children, some studies have shown an association between late eating and adiposity. The role of energy intake as a possible mediator in such association is unclear. We studied whether late timing of eating associates with adiposity among young children and whether the association is mediated by energy intake.

**Methods:** We used cross-sectional data of 577 Finnish preschoolers (aged 3-6 years) from the DAGIS survey. Children's 3-day food records and at least 3 days' Actigraph-derived sleep data on the same days were used. Children's weight, height and waist circumference (WC) were measured by research staff. Following mean variables were calculated and used as exposure variables: time of last eating occasion, elapsed time between last eating occasion and sleep onset (evening latency), and % of daily energy intake within two hours prior to sleep onset. Mean daily energy intake (MJ) was used as the mediator and WC (log<sub>10</sub>-transformed) and BMI z-score as outcome variables. Age, gender, height (only with WC), parental education level, sleep duration, moderate-to-vigorous physical activity, and sleep midpoint were used as confounders.

**Results:** There were negative indirect (estimate -6.74e-04, 95% CI -1.49e-03, -7.78e-05, p 0.01), direct (estimate -5.02e-03, 95% CI -8.78e-03, 1.16e-03, p. 0.008) and total (estimate -5.693x10<sup>-3</sup> 95% CI -9.47e-03, 1.80e-03 p. 0.004) effects of evening latency to WC via energy intake. Also, no direct, but positive indirect (estimate 5.86e-05, 95% CI 1.44e-05, 1.20e-04, p. 0.002), and total (estimate 3.28e-04, 95% CI 7.14e-05, 6.18e-04, p. 0.02) effects of % of evening energy intake to WC via energy intake was found. Similar, but fewer effects were found to BMI z-score. Time of last eating occasion had no mediation or direct effects to either WC or BMI z-score.

**Conclusions:** Eating close to sleep onset and higher proportional energy intake in the evening associated with higher adiposity among preschool-aged children and the effects were mediated by energy intake. Further, preferably longitudinal studies confirming these preliminary results are needed.

# Environmental impacts of current diet and two healthy and sustainable scenario diets among young children in Norway

**Ms. Ellen Cecilie Wright<sup>1</sup>**, Mr. Bob van Oort<sup>2</sup>, Ms. Marie Michaelsen Bjøntegaard<sup>1</sup>, Associate Professor Monica Hauger Carlsen<sup>1</sup>, Prof. Lene Frost Andersen<sup>1</sup>

<sup>1</sup>University of Oslo, Oslo, Norway, <sup>2</sup>CICERO Centre for International Climate Research, Oslo, Norway

**SO.3.19 - What we know about weight management from children and families studies, UKK - Main Hall (Level 6), June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** G. Children and families

**Purpose** The study aimed to estimate environmental impacts and nutritional adequacy of the current diet among 2-year-olds in Norway and compare this with two alternative healthy and environmentally sustainable scenario diets.

**Methods** The current diet was estimated based on a national dietary survey among 2-year-olds in Norway (food frequency questionnaire, n= 1413). Two scenario diets were constructed based on the Norwegian Food-Based Dietary Guidelines (FBDGs) and the EAT-Lancet Planetary Health Diet using culturally acceptable foods for this age group. The nutritional content and environmental impacts of diets were calculated using the food and nutrient calculation system Kostberegningssystem (KBS) at the Department of Nutrition, University of Oslo. Indicators for environmental impacts were based on a newly developed database including life cycle assessments for foods on the Norwegian market with system boundaries from cradle to fork. Impact categories include global warming potential (GWP), marine and freshwater eutrophication (ME and FE), terrestrial acidification (TA), water consumption (WC) and land use (LU/LUC).

**Results/Findings** All diets were nutritionally adequate for young children 2-5 years of age. However, the current diet among 2-year-olds included lower amounts of vegetables, legumes, nuts, and whole grains, and more dairy and processed meat products than the scenario diets. For four of the six impact categories (GWP, FE, TA, and WC), the analysis showed a decreasing gradient from the current diet to the EAT-Lancet scenario, with impacts from the FBDGs scenario falling in between the two. For the current diet, high consumption of dairy and dairy products was responsible for the majority of contributions to these impact categories. Meanwhile, the EAT-Lancet scenario diet had a higher ME impact than the two other diets, mainly due to a higher content of legumes and vegetable oils. The impacts from LU/LUC were similar for all diets.

**Conclusion** In conclusion, environmental impacts from diets among 2-year-olds in Norway could be reduced by shifting to a diet more in line with the Norwegian FBDGs, and further reduced by transitioning to a diet following EAT-Lancet Planetary Health Diet guidelines. This shift would involve the inclusion of more vegetables and legumes, and a reduction in total dairy consumption.

# What are young people's views and understanding of physical activity calorie equivalent (PACE) food labelling? A mixed methods study

**Ms. Natalia Iris<sup>1</sup>**, Prof. Fehmidah Munir<sup>2</sup>, Prof. Amanda Daley<sup>1</sup>

<sup>1</sup>Centre for Lifestyle Medicine and Behaviour, School of Sport, Exercise and Health Sciences, Loughborough University, Loughborough, United Kingdom, <sup>2</sup>School of Sport, Exercise and Health Sciences, Loughborough University, Loughborough, United Kingdom

**SO.3.19 - What we know about weight management from children and families studies, UKK - Main Hall (Level 6), June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Childhood obesity is a public health challenge. Food labelling may help children make healthier food choices but current approaches (i.e. traffic light labelling) are complex to understand. PACE food labelling may be easier for children to understand/more appealing because it contextualises the energy content of food/drinks. The mixed methods study aimed to examine the views/understanding of PACE food labelling.

**Methods:** An online questionnaire was completed by 808 young people aged 12-18 years in England. The questionnaire explored their views and understanding of traffic light and PACE food labels. Analyses assessed associations between variables and tested differences in the proportions of views about food labels. A sub-sample (n=17) of questionnaire responders participated in an online semi-structured interview to explore their perceptions of PACE labelling in more depth. Interview transcripts were analysed using the framework method.

**Results/findings:** More participants reported PACE labels were easier to understand than traffic light labels (69% vs 31%,  $p < 0.001$ ). Forty-two percent reported they would look at PACE labels often/always if they were implemented. The most common reason why participants never/would never look at food labels was because they are not interested in making healthy food choices. Fifty-two percent said PACE labels would make it easier for them to choose healthy food/drinks. Half of participants reported PACE labels would encourage them to be physically active. Interview findings revealed the acceptability and perceived usefulness of PACE labels was generally high because of the potential to help participants choose healthier food/drinks and encourage physical activity. It was felt that PACE labelling could have negative impacts on some people such as feeling pressure to do physical activity. PACE labels would be particularly useful in 'grab and go' contexts/where quick decisions are made (e.g. convenience stores and fast food outlets).

**Conclusions:** Young people generally had positive views about PACE labelling. PACE labelling may help young people choose healthier food/drinks and encourage physical activity, although consideration must be given to the concerns raised about the potential negative effects it may have. Research is needed to understand the impact of PACE labelling on food choice among young people in real settings.



# Transforming obesity prevention for children through collaboration and innovative methods

Ms. Kylie Hunter<sup>1,2</sup>, **Dr. Brittany Johnson<sup>1,3</sup>**, Mr. Mason Aberoumand<sup>1,2</sup>, Dr. Jonathan Williams<sup>1,2</sup>, Prof. Rebecca Golley<sup>1,3</sup>, Dr. Sol Libesman<sup>1,2</sup>, Ms. Angie Barba<sup>1,2</sup>, Prof. Louise Baur<sup>1,4</sup>, Dr. Anna Lene Seidler<sup>1,2</sup>

<sup>1</sup>Transforming Obesity Prevention for CHILDren (TOPCHILD) Collaboration, Sydney, Australia, <sup>2</sup>NHMRC Clinical Trials Centre, University of Sydney, Sydney, Australia, <sup>3</sup>Caring Futures Institute, Flinders University, Adelaide, Australia, <sup>4</sup>Sydney Medical School, University of Sydney, Sydney, Australia

**SO.3.19 - What we know about weight management from children and families studies, UKK - Main Hall (Level 6), June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** It is imperative to intervene early if childhood obesity and associated lifelong health risks are to be prevented. Yet, whilst there is convincing evidence that early interventions can be effective, there are major gaps in the evidence base on which elements of interventions are effective and for whom. To address this, we brought together researchers around the world in an international collaboration.

**Methods:** We conducted systematic searches of medical databases and clinical trial registries to identify randomised controlled trials of parent-focused behavioural interventions aimed at preventing childhood obesity that started antenatally or within the first year of life. All eligible trials were invited to join the Transforming Obesity Prevention for CHILDren (TOPCHILD) Collaboration and asked to share their intervention materials and individual participant data upon completion. We mapped characteristics of all completed trials that have joined TOPCHILD to date, including their location, delivery features, target behaviours and effectiveness.

**Results:** We identified 78 eligible trials (55 completed, 23 ongoing) with a total of >60,000 infant-parent dyads (participants). To date, 50 (64%) of these trials, including ~40,000 (65%) eligible participants have joined the TOPCHILD Collaboration. Thirty-five of these trials (including a total of 41 active intervention arms) are complete; these are set in 15 countries, including 4 middle and 11 high income countries. Reported effectiveness varied among published trials, with 7 out of 26 (27%) reporting a statistically significant difference for an infant weight-related outcome. Many included trials alone were statistically underpowered to detect potential differences in weight-related outcomes. The 41 intervention arms of completed TOPCHILD trials varied in content and delivery features, and targeted a range of behaviours, with 31 (76%) targeting infant feeding practices, 36 (88%) food provision feeding practices, 24 (59%) movement practices, and 7 (17%) sleep health practices.

**Conclusions:** No individual trial or simple meta-analysis alone can solve the complex issue of early childhood obesity prevention. The TOPCHILD Collaboration is using innovative collaborative and meta-analytic methodologies to compare a broad range of interventions delivered to diverse populations. This will enable us to develop effective and targeted approaches that lead to sustainable behaviour change in at-risk populations.

# Evaluation of Universal Free School Meals

**Dr. Juliana Cohen**<sup>1,2</sup>, Dr. Michele Polacsek<sup>3</sup>, Dr. Christina Hecht<sup>4</sup>, Dr. Ken Hecht<sup>4</sup>, Mrs. Margaret Read<sup>5</sup>, Dr. Deborah Olarte<sup>1</sup>, Dr. Anisha Patel<sup>6</sup>, Dr. Marlene Schwartz<sup>7</sup>, Dr. Lindsey Turner<sup>8</sup>, Dr. Monica Zuercher<sup>4</sup>, Dr. Wendi Gosliner<sup>4</sup>, Dr. Lorrene Ritchie<sup>4</sup>

<sup>1</sup>Merrimack College, North Andover,, USA, <sup>2</sup>Harvard TH Chan School of Public Health, Boston, USA,

<sup>3</sup>Westbrook College of Health Professions, University of New England, Portland, USA, <sup>4</sup>Nutrition Policy Institute, Division of Agriculture and Natural Resources, University of California, Berkeley, USA, <sup>5</sup>Share Our Strength, No Kid Hungry, Washington DC , USA, <sup>6</sup>Division of General Pediatrics, Stanford University, Palo Alto, USA, <sup>7</sup>Rudd Center for Food Policy and Obesity, Hartford, USA, <sup>8</sup>College of Education, Boise State University, Boise, USA

**SO.3.20 - School-related studies on behavioral nutrition and physical activity, UKK - Level 6 Foyer, June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Universal School Meal (USM) policies can increase access to healthy foods for millions of children. During the COVID-19 pandemic, the United States implemented a UFSM policy, but this ended in Fall 2022. However, several states (e.g., California and Maine) have adopted policies to continue USM. Therefore it is essential to examine the challenges and strategies for successful continuation of USM policies (including differences by school characteristics), along with studying pandemic-related challenges that are likely to persist in schools.

**Methods:** In Spring 2022, all school food authorities (SFAs) in California (n=1116) and Maine (n=121) were invited to complete an online survey (developed in collaboration with the School Nutrition Association, Center for Science in the Public Interest, and California Department of Education). Descriptive statistics, ANOVA, and logistic regression were used to examine differences by school demographic characteristics (urbanicity, school size, and school poverty levels [e.g., percent of students eligible for free or reduced-price meals [FRPM]]).

**Results:** A total of 581 SFAs in California and 43 SFAs in Maine completed the survey (response rate of 52% and 36%, respectively). The majority of SFAs in California and Maine reported benefits of USM including increased student meal participation (79% and 75%, respectively) and reduced stigma (40% and 51%, respectively). The top challenge for implementing USM was staffing (77% and 69%, respectively). Nearly all SFAs reported pandemic-related challenges procuring the necessary types and amounts of foods and non-food supplies/equipment. Additionally, over 40% of SFAs in both California and Maine reported that federal reimbursements were insufficient to cover costs. When examining differences by school demographics, rural schools reported significantly more challenges compared with urban and suburban schools. Additionally, SFAs with lower poverty levels (<40% of students eligible for FRPM) and/or higher student enrollment reported more current challenges and future concerns than those with ≥40% FRPMs and lower student enrollment. The top resources requested to implement state-level USM policies included additional facilities/equipment, communications/marketing, increasing meal participation, and financial management.

**Conclusions.** USM may have multiple important benefits for students and schools, and state and federal resources should consider urbanicity, student enrollment, and poverty for successful implementation.

# Differences between adolescents' and their parents' perceived benefits and barriers to actively commute to school: PACO y PACA Project

Mr. Iván Pinilla Quintana<sup>1</sup>, Miss Evelyn Martin-Moraleda<sup>1</sup>, Dr. Alberto Dorado<sup>1</sup>, Dr. Virginia García-Coll<sup>1</sup>, Mr. Fabio Jimenez-Zazo<sup>1</sup>, Dr. Esther Cabanillas-Cruz<sup>1</sup>, Dr. Cristina Romero-Blanco<sup>2</sup>, Dr. Ana Queralt<sup>3</sup>, Dr. Manuel Herrador-Comenero<sup>4</sup>, **Prof. Susana Aznar<sup>1</sup>**

<sup>1</sup>PAFS Research Group, Faculty of Sports Science, University of Castilla-La Mancha, Toledo, Spain, <sup>2</sup>PAFS Research Group, Faculty of Nursing, University of Castilla-La Mancha, Toledo, Spain, <sup>3</sup>AFIPS Research Group, Faculty of Nursing, University of Valencia, Valencia, Spain, <sup>4</sup>PROFITH Research Group, Faculty of Sport Sciences, University of Granada, Granada, Spain

**SO.3.20 - School-related studies on behavioral nutrition and physical activity, UKK - Level 6 Foyer, June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Active commuting to and from school (ACS) plays an important role in the physical activity recommendations achievement. There are several factors perceived by parents and their adolescents that affect the way adolescents commute to school. The aim of this study is to (1) describe the benefits and barriers to walk to school perceived by parents and adolescents, (2) analyze the differences between parents' and adolescents' perceived benefits and barriers, and (3) analyze those perceptions according to the means of transport to school.

**Method:** A sample of 464 adolescents (age Mean=14.86 years; SD=0.51) from four cities in Spain (Toledo, Sevilla, Granada, and Valencia) and their parents (n=499, age M=48.0; SD=5.42) participated in the study. Adolescents were asked about the way they commute to school. Both, parents and adolescents reported their perceived benefits and barriers to walking to school. Data was analyzed using paired samples t-test and Wilcoxon test.

**Results:** Adolescents actively commuting to school represented a 46.1% of the sample. Adverse weather was seen as an important barrier for both study groups. Parents were mainly concerned about additional planning and traffic safety, while for adolescents, the time they saved with motorized transport, was especially important. Adolescents who walked to school perceived significantly ( $p<0.01$ ) less barriers than the ones who commuted by motorized transport (Mean= 2.75; SD=0.72 vs Mean= 4.08; SD=0.57). In contrast, there were only one significant difference in the benefits perceptions to walk to school between parents whose children actively commute to school vs the ones who did not, in "walking to school gives the opportunity to socialize" (Mean=4.58 (0.81) vs Mean=4.26 (1.14)  $p>0.01$ )

**Conclusions:** Benefits were perceived as important for both parents and adolescents. The means of transport seem to be associated with the barriers' perception for adolescents who reported more barriers to walk to school when they commuted by motorized transport. The opportunity of socializing when walking to school was considered a benefit only for parents whose children actively commuted to school.

# Nutrition Quality of Elementary School Meals in the United States During the COVID-19 Pandemic

**Dr. Leah Chapman**<sup>1,2</sup>, Dr. Scott Richardson<sup>2</sup>, Mr. Colin Schwartz<sup>3</sup>, Ms. Meghan Maroney<sup>3</sup>, Dr. Juliana Cohen<sup>1,2</sup>

<sup>1</sup>Center for Health Inclusion, Research, and Practice (CHIRP) & Department of Public Health and Nutrition, Merrimack College, North Andover, USA, <sup>2</sup>Department of Nutrition, Harvard T.H. Chan School of Public Health, Boston, USA, <sup>3</sup>Center for Science in the Public Interest, Washington, D.C., USA

**SO.3.20 - School-related studies on behavioral nutrition and physical activity, UKK - Level 6 Foyer, June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** In the United States (U.S.), roughly 30 million children receive school meals daily from the U.S. Department of Agriculture's (USDA) federal school lunch and breakfast programs. Given this large reach, setting strict nutrition standards for school meals may significantly improve diet quality among school-aged children in the U.S. However, various federal policies have weakened school meal nutrition standards, including nutrition waivers for school meals during the COVID-19 pandemic. The impact of these waivers on the nutritional quality of school meals is currently unknown. This study therefore examined school meal quality during COVID-19 compared with prior to the pandemic, as well as differences by region and urbanicity, among a nationally representative sample of schools.

**Methods:** This study used publicly available school menu and nutrient data from a nationally representative sample of 128 elementary schools to examine differences in nutrients (average calories, total fat, saturated fat, sodium, total sugar, and fiber) and alignment with USDA sodium targets in 2019 (pre-pandemic) and in 2022 (post-pandemic). Data were analyzed using analysis of variance accounting for repeated measures within school districts, adjusting for geographic region and urbanicity.

**Results/findings:** Overall, only small differences in the nutrient content for breakfast and lunch were observed between 2019 and 2022. Despite the meal pattern waivers and impact of COVID-19, sodium levels decreased by 10.2% for breakfast and 5.0% for lunch between the two time points. Most weeks (>92%) met the USDA sodium Targets 1 and 1A for breakfast and lunch, although this lowered slightly when condiments were included. Additionally, total sugar levels in meals were high, with breakfast and lunch providing on average 57g of total sugar. Differences by region and urbanicity were observed; in particular, rural schools served meals with higher sodium, total sugar, and fiber levels.

**Conclusions:** Despite the exigencies of the COVID-19 pandemic and USDA waivers, school meal standards were largely maintained in the U.S. during the pandemic. Simple strategies, such as offering lower sodium condiments, can support efforts to further reduce sodium in school meals. Additionally, the total sugar levels observed highlight the need for limits on added sugars in school meals.

# Top sources of energy, sodium, sugar and saturated fat consumed by Canadian children at school: results from the 2015 Canadian Community Health Survey – Nutrition

**Ms. Emily Ziraldo<sup>1</sup>**, Dr. Mavra Ahmed<sup>1</sup>, Ms. Chelsea McPherson<sup>1</sup>, Prof. Daniel W Sellen<sup>1</sup>, Prof. Mary L'Abbé<sup>1</sup>

<sup>1</sup>University of Toronto, Toronto, Canada

**SO.3.20 - School-related studies on behavioral nutrition and physical activity, UKK - Level 6 Foyer,  
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**SIG - Primary Choice:** H. Policies and environments

**Purpose:** The diets of Canadian children do not meet Canadian dietary guidelines and a significant portion of children's daily dietary intakes are consumed at school. Understanding the foods and beverages that children consume at school can help inform the development of school-based nutrition interventions and a national school food policy; a recently announced federal priority. Therefore, the objective was to identify the top dietary sources of energy and three nutrients of concern (i.e., sugar, sodium and saturated fat) consumed by children at school.

**Methods:** The 2015 Canadian Community Health Survey – Nutrition first day 24hr recall was used to assess top sources of energy and nutrients of concern for children 1-18 years old (n=1,977). Only foods and beverages consumed at schools were included. Foods and beverages were grouped into 58 mutually exclusive categories (e.g., Fresh and frozen fruit, Canned and bottled fruit, Fruit juice and drinks). The top 10 categories contributing to intake of energy, sugar, sodium and saturated fat based on total consumption were identified overall and by Dietary Reference Intake age and sex group. For each category, the proportion consumed and the proportion of consumers were also evaluated.

**Results/findings:** Overall, Sandwiches and submarines were the top contributors to children's energy, sodium and saturated fat intakes at school. For sugar, Frozen fruit and Fruit juice and fruit drinks were the top contributors to children's sugar intakes accounting for 20.0% and 19.4% of sugar consumed at school. Sandwiches and submarines and Cookies were in the top 10 contributors for energy and all three nutrients. Five categories were in the top 10 contributors for 3 of energy, sugar, sodium and saturated fat, namely, Pasta and pasta dishes, Meat and poultry dishes, Pizza, Granola bars and Other bakery products (breads, flatbreads, crackers, rolls, bannock, bagels, English muffins).

**Conclusions:** Results highlight categories that are top contributors to children's intakes of energy and nutrients of concern at schools. These categories should be prioritized by policymakers as targets for improvements in nutritional quality when developing school food policies or interventions such as a national school food program.

# Corporate food sponsorship agreements are associated with higher frequency of food and beverage marketing in recreation and sport facilities in Canada

**Dr. Rachel Prowse<sup>1</sup>**, Dr. Erin Hobin<sup>2</sup>, Dr. Sara Kirk<sup>3</sup>, Dr. Dana Lee Olstad<sup>4</sup>, Dr. Hassan Vatanparast<sup>5</sup>, Dr. Kim Raine<sup>6</sup>

<sup>1</sup>Memorial University of Newfoundland, St. John's, Canada, <sup>2</sup>Public Health Ontario, Toronto, Canada,

<sup>3</sup>Dalhousie University, Halifax, Canada, <sup>4</sup>University of Calgary, Calgary, Canada, <sup>5</sup>University of Saskatchewan, Saskatoon, Canada, <sup>6</sup>University of Alberta, Edmonton, Canada

**SO.3.20 - School-related studies on behavioral nutrition and physical activity, UKK - Level 6 Foyer, June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** This study examined associations between the presence of corporate food sponsorship agreements and the frequency of food and beverage marketing in recreation and sport facilities in Canada.

**Methods:** 135 recreation and sport facilities that offered hockey, soccer, or swimming for children under 18 years were randomly selected from an open-source list of facilities in Canada, supplemented by researchers through google searches. An observational audit and survey was conducted in each facility to count instances of food and beverage marketing (including alcohol) using the validated Food and beverage Marketing Assessment Tool for Settings (FoodMATS). Facility managers/directors reported the number of corporate sponsors of their facility from the previous fiscal year and listed sponsors' names and their type (food and non-alcoholic beverage, alcohol, other). We examined associations between the presence of sponsorship agreements and the number of food and beverage marketing instances using Mann-Whitney U tests, due to non-normal distributions and unequal variances.

**Results:** Full data were available for 78 facilities. The median (25<sup>th</sup> percentile, 75<sup>th</sup> percentile) count of food and beverage marketing was 16.0 (6.5, 34.0) per facility. A total of 333 non-unique sponsors were named: food and non-alcoholic beverage sponsors (n=70) made up 21% of all sponsors; alcohol sponsors (n=4) were rare. Coca-Cola and Pepsi accounted for 16% of all food and beverage sponsors, and contributed to 60% of food and beverage marketing instances recorded in the FoodMATS that we could link to corporate sponsors named in facility surveys. Food marketing was more frequent in facilities with food sponsorship agreements (26.5 [13.0, 56.75], n=28) than facilities without food sponsorship agreements (12.5 [3.0, 21.5], n=58) (U=1179.5, z=3.390, p<0.001).

**Conclusions:** This is the first nation-wide study in Canada to assess associations between corporate food sponsorship agreements and the frequency of food and beverage marketing in recreation and sport facilities. Recreation and sport facilities with food sponsorship agreements displayed more than twice the number of food and beverage marketing instances than facilities with no food sponsorship agreements. Children's exposure to food and beverage marketing in Canada could be mitigated through restricting or regulating food sponsorship agreements in recreation and sport.



# Youth's self-reported location of exposure to sugary drink advertisements across the COVID-19 pandemic in six countries: implications for public health

**Miss Élisabeth Demers-Potvin**<sup>1,2</sup>, Prof. Simone Lemieux<sup>1,2</sup>, Dr. Rachel Acton<sup>3</sup>, Dr. Tarra Penney<sup>4</sup>, Dr. Gary Sacks<sup>5</sup>, Ms. Christine White<sup>3</sup>, Dr. David Hammond<sup>3</sup>, Dr. Lana Vanderlee<sup>1,2</sup>

<sup>1</sup>Centre de recherche Nutrition, Santé et Société (NUTRISS), Université Laval, Québec, Canada, <sup>2</sup>Institut sur la nutrition et les aliments fonctionnels, Québec, Canada, <sup>3</sup>School of Public Health Sciences, University of Waterloo, Ontario, Waterloo, Canada, <sup>4</sup>Faculty of Health - School of Kinesiology & Health Science, York University, Toronto, Canada, <sup>5</sup>School of Health & Social Development, Deakin University, Melbourne, Australia

**SO.3.20 - School-related studies on behavioral nutrition and physical activity, UKK - Level 6 Foyer, June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** COVID-19 pandemic-related lockdowns and reductions in social activities may have impacted youth's exposure to sugary drink (SD) marketing. This study aimed to explore youth's self-reported location of exposure to SD advertising at three timepoints during the COVID-19 pandemic in six countries.

**Methods:** Data are from the International Food Policy Study Youth Surveys (November/December 2019/2020/2021), repeat cross-sectional web-based surveys conducted in Australia, Canada, Chile, Mexico, the United Kingdom (UK) and the United States (US) among youth ages 10-17 (N=33,598). The outcome of interest was location of exposure (TV, digital, retail settings) to advertising for major soft drink (cola), energy drink and fruit juice brands. Weighted logistic regression models stratified by country examined differences in reported exposure to SD advertisements for each advertising location by year, adjusting for socio-demographics and total screen time. Differences in exposure between students in online-only or in-school classes were explored.

**Results/findings:** The percentage of participants who self-reported exposure to SD advertisements was highest for TV (range 38-70% between countries), followed by digital (range 24-54%) and retail settings (range 16-54%). Compared to 2019, youth in 2020 were more likely to report exposure to SD advertisements on digital media in Australia and the US ( $p < 0.005$  for both) and less likely to report exposure in retail settings in Canada, Chile, Mexico and the US ( $p < 0.001$  for all). Compared to 2020, youth in 2021 were less likely to report exposure to advertisements on TV in Canada and Australia ( $p < 0.002$  for both), more likely to report exposure in retail settings in the US ( $p = 0.008$ ) and less likely to report exposure in retail settings in Mexico ( $p = 0.003$ ). In separate models for 2020/2021, youth completing only online classes were more likely to report exposure to SD advertisements on digital media in Canada, Australia and the UK ( $p < 0.003$  for all), compared to youth attending all classes in-person.

**Conclusions:** Lockdowns due to the COVID-19 pandemic likely contributed to increase likelihood of youth being exposed to digital advertising for SD. As digital media use shifts among youth, comprehensive restrictive marketing policies may protect youth from negative influences of marketing on dietary behaviours.

# Reliability and Validity of a Tool to Assess Kids' Menu Compliance with Healthy Default Beverage Policies on Restaurant Websites and Mobile Applications in the United States

**Miss Carolyn Bresnahan**<sup>1</sup>, Mr. Hayden Hayes<sup>1</sup>, Dr. Attia Goheer<sup>1</sup>, Dr. Alyssa Moran<sup>1</sup>, Dr. Angie Cradock<sup>2</sup>

<sup>1</sup>Johns Hopkins Bloomberg School of Public Health, Baltimore, USA, <sup>2</sup>Harvard T.H. Chan School of Public Health, Boston, USA

**SO.3.20 - School-related studies on behavioral nutrition and physical activity, UKK - Level 6 Foyer, June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** In the United States, more than a dozen jurisdictions have enacted healthy default beverage policies, which require that restaurants serve healthy beverages (water, milk or 100% juice) as the “default” option with kids’ meals. No prior policy has addressed implementation in online settings. This study developed and tested a tool to assess kids’ menu compliance with healthy default beverage policies on online ordering platforms.

**Methods:** We randomly selected ten locations of ten top-grossing fast-food and full-service restaurant chains in California, where a healthy default beverage law was enacted in 2018 (n=100 locations). Kids’ menus were audited, when available, on the following platforms: restaurants’ websites/mobile application, GrubHub, UberEats, and DoorDash (n=263 menus). A tool was developed to capture the ways in which the “default” beverage could be defined on online kids’ menus and the types of beverages offered under these definitions. In 2021, two coders coded all kids’ menus and captured screenshots. We calculated Gwet’s agreement coefficient (GAC), descriptive statistics, and mean percent agreement across restaurants within each chain and across platforms within each restaurant.

**Results:** Inter-rater reliability was excellent for most measures (87%, GAC>0.9). Most menus (96%) offered a kids’ meal with a drink. The most common beverage available with the kids’ meal without an upcharge was milk (90%) followed by sugary drinks (68%). When a drink was listed in the kids’ meal description (n=207; 82%), it was most often described as a fountain/kids’ drink (78%), but when a drink was pictured with the meal (n=158; 63%) it was most often milk (78%). On some menus, the customer could select a beverage from a list (n=231; 92%), with milk (41%) or sugary drinks (34%) typically listed first. When the ordering platform automatically selected a drink (n=50; 22%), either milk (80%) or a fountain/kids’ drinks (20%) were pre-selected. Data on variability across restaurants and platforms is forthcoming.

**Conclusion:** Restaurant compliance with healthy default beverage policies on online kids’ menus is highly dependent on how the online “default” is defined. Governments and decision-makers should consider policy language that is inclusive of this new food environment to maximize public health impact.

# School Environments in Jamaica – in urgent need of Healthy Food Policies

**Dr. Suzanne Soares-Wynter (Corresponding Author)**<sup>1</sup>, Mr. Maxime Bercholz<sup>2</sup>, Mrs. Annalee Gray Brown<sup>1</sup>, Dr. Shu Wen Ng<sup>3</sup>

<sup>1</sup>Caribbean Institute for Health Research, The University of the West Indies, Kingston, Jamaica, <sup>2</sup>Carolina Population Center, The University of North Carolina at Chapel Hill, Chapel Hill, USA, <sup>3</sup>Department of Nutrition, Gillings School of Global Public Health, The University of North Carolina at Chapel Hill, Chapel Hill, USA

**SO.3.20 - School-related studies on behavioral nutrition and physical activity, UKK - Level 6 Foyer, June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Obesity among Jamaican children has doubled in recent years and school-based interventions are among the strategies being considered to improve children's consumption patterns. An audit of the school environment was conducted to support development of a national school nutrition policy.

**Methods:** A cross-sectional, multi-level study of food and built environments and health initiatives in a random sample of 60 schools located in Kingston, Jamaica was conducted in 2018. The sample comprised 50 public funded and 10 independently funded (private) schools. Interviews with school administrators and street vendors provided details on existing meal initiatives, food availability and marketing practices to supplement audit findings. To describe the school environment, information about food and beverage exposures and the built environment were summarized into median scores and interquartile ranges (IQR) with comparisons using Wilcoxon's rank sum tests ( $p < 0.05$ ). Scores were created for each category (e.g. food and beverage presence) by summing the total possible number of elements.

**Results/Finding:** Unsweetened beverage options (excluding water) and fresh fruits were available in only 19 (32%) and 15 (25%) of schools respectively. When compared with private schools, public schools had significantly higher median (IQR) scores for sweetened beverage availability (7 (4) vs. 3.5 (2)), unhealthy food and beverage marketing (12 (7) vs. 7 (3)) and sponsorships and donations from food industry (4 (5) vs. 1.5 (4)). Built environments and resources related to food preparation were similar; however, private schools had significantly lower student:teacher ratios (14:1 vs 21:1) and more resources for physical activity (score 4.5 (2) vs 3 (1)) and safety features (score 3 (1) vs 2 (2)). Street vendors sold mostly pre-packaged processed foods, and were primarily located near public schools. A third of schools reported healthy food initiatives.

**Conclusions:** Children have high exposure to unhealthy foods and beverages in Jamaican schools. Curtailing the availability of high-sugar drinks and unhealthy snack foods, while promoting healthier options should be a priority intervention. Policies must consider the role of street vendors as they are integral to lower-income school communities. A comprehensive school nutrition policy is needed to regulate school food environments and for monitoring existing school meal programs.

# Could it ever be too late to adopt an active lifestyle? Longitudinal patterns of physical activity and health-related quality of life in a cohort of middle-aged Australian women

**Dr. Binh Nguyen**<sup>1,2</sup>, Dr. Philip Clare<sup>1,2,3</sup>, Prof. Wendy Brown<sup>4</sup>, Dr. Gregore Mielke<sup>5</sup>, Associate Professor Melody Ding<sup>1,2</sup>

<sup>1</sup>Prevention Research Collaboration, Sydney School of Public Health, Faculty of Medicine and Health, The University of Sydney, Camperdown, Australia, <sup>2</sup>Charles Perkins Centre, The University of Sydney, Camperdown, Australia, <sup>3</sup>National Drug and Alcohol Research Centre, UNSW Sydney, Australia, <sup>4</sup>School of Human Movement and Nutrition Sciences, Faculty of Health and Behavioural Sciences, University of Queensland, Brisbane, Australia, <sup>5</sup>School of Public Health, Faculty of Medicine, University of Queensland, Brisbane, Australia

**SO.3.21 - The Latest Research on Disease Prevention and Management, UKK - Hall B (Level 3), June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** To examine the associations between longitudinal patterns of physical activity (PA) over 12 years and health-related quality of life (HRQoL) among middle-aged Australian women. We hypothesized that consistent adherence to PA guidelines over time would lead to improved HRQoL. Few longitudinal studies have assessed PA at multiple time points, over the long-term.

**Methods:** We analysed data collected at 3-year intervals from 1998 to 2019 from 11,937 participants in the Australian Longitudinal Study on Women's Health (cohort born in 1946-51). Women whose physical functioning was in the lowest 5th percentile in 1998 were excluded. Primary outcomes were the physical health component (PCS) and mental health component (MCS) summary scores, derived from the 36-item Short Form Survey subscales. We analysed associations between meeting the WHO PA guidelines (150 min/week of moderate-to-vigorous PA) in 2001-2016 and outcomes in 2019. Analysis was based on a counterfactual framework, using models to construct expected mean outcomes, had everyone in the sample experienced those particular patterns of exposure. Using causal inference modelling, we evaluated the counterfactual effect of 1) meeting or not meeting PA guidelines at all surveys and 2) meeting PA guidelines upon reaching a particular age but not prior to that, with a range of age thresholds considered (50, 55, 60, and 65 years). Analyses were adjusted for a range of sociodemographic and health variables.

**Results:** Women who did not meet PA guidelines in any wave (PCS: 42.10 [95% CI: 40.98, 43.22]), or first started to meet guidelines at ages 60 (PCS: 42.92 [95% CI: 41.66, 44.19]) or 65 (PCS: 42.03 [95% CI: 40.85, 43.20]) had significantly lower expected mean PCS scores in 2019 than women who started to meet guidelines at ages 50 (PCS: 45.85 [95% CI: 45.23, 46.47]) or 55 (PCS: 46.05 [95% CI: 44.76, 47.34]) and those who met guidelines in all surveys (PCS: 45.98 [95% CI: 45.37, 46.58]). The age of starting to meet guidelines was not associated with MCS scores.

**Conclusions:** Middle-aged women should be encouraged to be physically active for as long as they can, to gain the most benefits for future HRQoL.

# A health and wellbeing profile of Nordic Walking participants in the United Kingdom

**Dr. Clare Stevinson<sup>1</sup>**, Mr. Charley Brown<sup>1</sup>

<sup>1</sup>Loughborough University , Loughborough , United Kingdom

**SO.3.21 - The Latest Research on Disease Prevention and Management, UKK - Hall B (Level 3), June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** Nordic Walking is a popular form of all-body exercise with the use of poles making it a suitable activity for individuals with musculoskeletal problems or other conditions that restrict weight-bearing exercise. Furthermore, elements integral to Nordic Walking such as group interaction and exposure to outdoor natural environments are recognised contributors to psychological wellbeing. This study examined the health and wellbeing profile of Nordic Walkers in the United Kingdom and explored factors associated with wellbeing.

**Methods:** A health and wellbeing questionnaire was distributed via British Nordic Walking communication channels to adult Nordic Walkers in the United Kingdom. Self-report measures included health, disability and pain status (based on the UK Census), wellbeing (Warwick Edinburgh Mental Wellbeing Scale), group cohesion (Group Cohesiveness Scale) and nature connectedness (Nature Relatedness Scale). Descriptive statistics were used to create a profile of participant health and wellbeing and linear regression was used to examine variables associated with wellbeing.

**Results:** Among the sample of 411 participants (mean age  $61.1 \pm 9.9$  years; 84.4% female), the proportion reporting a limiting disability/illness (25%) was higher than documented in national statistics for the general adult population (18%), as was the percentage reporting chronic pain (47% versus 34% in the general population). Nonetheless overall wellbeing scores were higher among Nordic Walkers (53.1) than the general population (50.1). Three factors had small independent associations with wellbeing scores. Group cohesion ( $\beta = 0.18$ ;  $p = 0.001$ ) and nature relatedness ( $\beta = 0.13$ ;  $p = 0.011$ ) were positively related to wellbeing and pain scores ( $\beta = -0.15$ ;  $p = 0.003$ ) were negatively related.

**Conclusion:** Nordic Walking is a suitable activity for individuals with limiting disabilities or chronic pain and is associated with high levels of psychological wellbeing. The associations of group cohesion and nature relatedness with wellbeing point to the value of joining Nordic Walking groups to benefit from social support and exposure to natural environments.

# Genetic susceptibility to type 2 diabetes, screen-based sedentary activities, and risk of cardiovascular disease: the UK Biobank study

**Ms. Mengyao Wang<sup>1</sup>**, Miss Zhu Liduzi Jiesisibieke<sup>1</sup>, Ms. Haeyoon Jang<sup>1</sup>, Dr. Shan Luo<sup>1</sup>, Dr. Shiu Lun Au Yeung<sup>1</sup>, Dr. Youngwon Kim<sup>1,2</sup>

<sup>1</sup>School of Public Health, The University of Hong Kong Li Ka Shing Faculty of Medicine, Hong Kong, Hong Kong, <sup>2</sup>University of Cambridge School of Clinical Medicine, Cambridge, United Kingdom

**SO.3.21 - The Latest Research on Disease Prevention and Management, UKK - Hall B (Level 3), June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** Type 2 diabetes (T2D) is a major risk factor for cardiovascular disease (CVD). Little is currently known about to what extent the risk of CVD associated with high genetic risk of T2D can be offset through less time spent in screen-based sedentary activities. This study examined the prospective associations of genetic susceptibility to T2D and two prevalent screen-based sedentary activities (TV viewing, computer use) with incident CVD.

**Methods:** This study included 352,369 white British individuals from the UK Biobank. Weighted polygenic risk score for T2D (PRS-T2D), an indicator of individual's genetic risk for T2D, was calculated based on 89 genetic variants associated with T2D. Time spent in TV viewing and leisure-time computer use was categorized into three groups:  $\leq 1$ h/day, 2-3h/day, and  $\geq 4$  h/day. Incident CVD ( $n=15,890$  during a median 12.6-year follow-up) was defined as the first occurrence of coronary heart disease or stroke.

**Results:** Compared with low genetic susceptibility to T2D, high and medium genetic susceptibility had 12% (95%CI: 1.06-1.17) and 6% (95%CI: 1.01-1.10) higher hazards of CVD, respectively. Watching TV for  $\leq 1$ h/day and 2-3h/day was associated with 14% (95%CI: 0.82-0.90) and 4% (95%CI: 0.92-0.99) lower hazards of CVD, respectively, compared with watching TV for  $\geq 4$ h/day after adjusting for PRS-T2D. The joint association analyses using a combined category of low genetic risk and  $\leq 1$ h/day of TV viewing as the reference revealed no increased risk of CVD in individuals at high or medium genetic risk for T2D but watching TV for  $\leq 1$ h/day, while  $\geq 2$ h/day of TV viewing combined with high genetic risk were associated with higher CVD hazards. Estimated 12-year absolute risk of CVD was lower for watching TV for  $\leq 1$ h/day at high genetic risk (2.01%) than for watching TV for  $\geq 4$ h/day at low (2.66%) or medium (2.77%) genetic risk.

**Conclusion:** Watching TV for  $\leq 1$ h/day has the potential to offset the risk of developing cardiovascular events associated with high genetic susceptibility to T2D. Individuals who have high genetic risk for T2D but watch TV for  $\leq 1$ h/day may have a lower risk of developing CVD, compared with those who have low or medium genetic risk but watch TV for  $\geq 4$ h/day.



# Associations between different intensities of physical activity and magnitude of ICAM-1 changes in response to acute psychological stress

**Dr. Nicola Paine**<sup>1,2</sup>, Dr. Aiden Chauntry<sup>1</sup>, Ms. Victoria Linsley<sup>1,2</sup>, Dr. Andrew Kingsnorth<sup>3</sup>, Prof. Mark Hamer<sup>4</sup>, Prof. Nicolette Bishop<sup>1,2</sup>

<sup>1</sup>School of Sport, Exercise and Health Sciences, National Centre for Sport and Exercise Medicine, Loughborough University, Loughborough, United Kingdom, <sup>2</sup>National Institute for Health Research (NIHR) Leicester Biomedical Research Centre, University Hospitals of Leicester NHS Trust and the University of Leicester, Leicester, United Kingdom, <sup>3</sup>Diabetes Research Centre, University of Leicester, Leicester, United Kingdom, <sup>4</sup>The Institute of Sport, Exercise and Health, Division of Surgery & Interventional Science, University College London, London, United Kingdom

**SO.3.21 - The Latest Research on Disease Prevention and Management, UKK - Hall B (Level 3), June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** M. Disease prevention and management

**Background:** Physical activity (PA), psychological stress and intracellular adhesion molecule-1 (ICAM-1) are risk factors for cardiovascular disease (CVD). ICAM-1 mediates vascular adhesion, is indicative of vascular endothelial cell activation/damage and can increase under acute psychological stress. PA can buffer against exaggerated cardiovascular reactivity to acute psychological stress, but the potential impact of PA and ICAM-1 changes under psychological stress is yet to be elucidated.

**Purpose:** To investigate the associations between different PA intensities and changes in ICAM-1 in response to acute psychological stress.

**Methods:** Healthy adults (n=61, mean (SD) age = 25.69 (8.86) years, 52.5% female, BMI = 24.38 (4.20) kg/m<sup>2</sup>) undertook seven days of device-based (wrist-worn ActiGraph) measurement of habitual levels of movement behaviours, including moderate-to-vigorous physical activity (MVPA) and light (LPA) physical activity. Participants then underwent stress reactivity testing (20-minute rest, 8-minute mental arithmetic stress task, 45-minute recovery), where ICAM-1 was assessed as a marker of vascular inflammation.

**Results:** Relationships between physical activity and ICAM-1 changes were seen immediately post-stress (MVPA: B= -1.672, 95% CI= -3.017 – -0.328,  $p = .015$ ; LPA: B= 0.672, 95% CI= 0.071 – 1.273,  $p = .028$ ). Similar direction of associations was evident for changes at 45 minutes post-stress (MVPA: B= -12.402, 95% CI= -20.472 – -4.332,  $p = .003$ ; LPA: B= 5.196, 95% CI= 2.524 – 7.867,  $p < .001$ ) were apparent. No relationship was observed between resting levels of ICAM-1 and any intensity of physical activity.

**Conclusion:** This is the first analysis of the potential impact of PA on ICAM-1 changes under stress. Future interventions are needed to determine the impact of PA on ICAM-1, including whether increases in PA benefit ICAM-1 responses and longer-term if this impacts on potential CVD risk via stress-induced mechanisms

# Mental Health Promotion in Australian Sporting Clubs

**Dr. Jasmine Petersen**<sup>1</sup>, Prof. Murray Drummond<sup>1</sup>, Associate Professor Ivanka Prichard<sup>1</sup>, Associate Professor Sam Elliott<sup>1</sup>, Associate Professor Claire Drummond<sup>1</sup>, Prof. James Smith<sup>1</sup>, Prof. Ben Wadham<sup>1</sup>

<sup>1</sup>Flinders University, Adelaide, Australia

**SO.3.21 - The Latest Research on Disease Prevention and Management, UKK - Hall B (Level 3), June 17, 2023, 9:40 AM - 10:55 AM**

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**Purpose:** Organised sports are increasingly recognised as an important setting to improve the provision of mental health support. There is, however, limited knowledge pertaining to the promotion of mental health in organised sporting contexts. Thus, this study aimed to examine the initiatives implemented in Australian sporting clubs to promote mental health. We also sought to examine preferences for mental health promotion in sport settings, important to informing the implementation of initiatives that will be acceptable, feasible and broadly scalable in future.

**Methods:** The study used a cross-sectional design. An online survey assessed the implementation of mental health initiatives in sporting clubs and preferences for such initiatives in future. Data were summarised using descriptive statistics.

**Results:** The sample comprised 246 stakeholders (e.g., sport participant, president, coach, committee member) of sporting clubs in Australia (aged 18-81 years,  $M_{\text{age}} = 40.3 \pm 16.0$  years, 56.5% female). Few stakeholders (25.0%) were satisfied with the current level of mental health support provided by their club. Over half of stakeholders (54%) reported that their sporting club has implemented initiatives to support mental health. The most commonly implemented initiatives were mental health days/ rounds (25.3%), provision of educational information and resources (23.0%), and promotion of mental health services and supports (19.0%). The prominent barriers to clubs supporting mental health included insufficient funding, lack of human resources (e.g., volunteers), and inadequate mental health knowledge. The findings further indicate that the provision of access to mental health first aid training is perceived as the most important (and preferred) way in which sporting clubs can support mental health in future.

**Conclusions:** The landscape of mental health promotion in Australian sporting clubs is currently “each club to its own”, and there is little guidance for clubs in how best to support mental health. This approach does not appear adequate with few stakeholders satisfied with the current level of mental health support provided by their club. The development of a gold standard or best practice for clubs in “how to” support mental health will pave the way to creating psychologically safe, inclusive, and mentally healthy environments across all sporting codes.

# A Cross-Sectional Nationwide Study of Australians' Health: are there differences in health-related behaviours among Teachers?

**Ms. Lucy Corbett<sup>1</sup>**, Mr. Joseph Van Buskirk<sup>1</sup>, Prof. Philayrath Phongsavan<sup>1</sup>, Prof. Adrian Bauman<sup>1</sup>

<sup>1</sup>University of Sydney, Sydney, Australia

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**Purpose:** The health-related behaviour of teachers is important both for their own health and because teachers play an important role in the communication of public health messages to students. Teachers in Australia have high current rates of burnout and leaving the profession. This study aims to [1] determine levels of psychological wellbeing and health-related behaviours among Australian teachers and other non-teacher professions, and [2] identify any differences that exist between Australian teachers and other professions across these domains.

**Methods:** We used data from the interview-based nationally-representative Australian National Health Survey (NHS). Employed adults aged 20-64years from the 2014/15 (n=8455), 2017/18 (n=9130) and 2020/21 (n=5753) waves of the NHS were analysed. Adjusting for demographics, we used logistic regression to compare eight indicators of health-related behaviours and psychosocial wellbeing (physical activity, fruit intake, vegetable intake, alcohol consumption, smoking status, body mass index, psychological wellbeing, and general health) between teachers (~4% of sample/wave) and two comparison groups: other managerial/non-teacher professional (NTP) occupations (~26% of sample/wave) and other general occupations (~69% of sample/wave).

**Results/findings:** In 2020/21, 9% of teachers met vegetable, 46% met fruit, 26% met physical activity, and 52% met alcohol guidelines. Additionally, 4% of teachers were smokers, 56% reported overweight or obesity, 67% had excellent/very good self-rated health and 22% had high or very high levels of psychological distress. After adjusting for demographics and survey wave, non-teacher professionals had similar odds of meeting physical activity (OR:1.12[0.90–1.41]), vegetable intake (OR:0.72[0.52-1.00]), and alcohol consumption (1.01[0.83-1.22]) guidelines compared to teachers. Teachers and NTPs reported similar general health (OR:1.05[0.86-1.27]) and smoking rates (OR:1.34[0.92-1.95]). However, compared with NTPs teachers were more likely to have high or very high levels of psychological distress (OR: 1.35[1.01-1.75]).

**Conclusions:** Our results suggest that in comparison to NTPs, teachers were either comparable or better off in all domains health-related behaviours except psychological distress. Higher levels of psychological distress among teacher may contribute to high rates of burnout in the profession. Issues around the aetiology of teacher stress and burnout need to be explored in more detail.

# Pain Management and Patient Education for Physical Activity in Intermittent Claudication (PrEPAID): Feasibility Randomised Controlled Trial

Dr. Christopher Seenan<sup>1</sup>, Dr. Ukachukwu Abaraogu<sup>1</sup>, **Dr. Philippa Dall<sup>1</sup>**, Mr. Andrew Elders<sup>1</sup>, Mr. Wesley Stuart<sup>2</sup>, Prof. Garry Tew<sup>3</sup>, Prof. Julie Brittenden<sup>2,4</sup>

<sup>1</sup>Glasgow Caledonian University, Glasgow, United Kingdom, <sup>2</sup>Vascular Services, NHS Greater Glasgow & Clyde, Glasgow, United Kingdom, <sup>3</sup>York St John University, York, United Kingdom, <sup>4</sup>University of Glasgow, Glasgow, United Kingdom

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**SIG - Primary Choice:** M. Disease prevention and management

**Purpose:** Current guidelines for peripheral arterial disease with intermittent claudication (PAD/IC) recommend increased physical activity, but barriers of patient understanding of the condition and pain management are rarely addressed. This study tested the feasibility of conducting a trial of pain management (Transcutaneous Electrical Nerve Stimulation (TENS)) and patient-centred education to increase physical activity in people with PAD/IC.

**Methods:** Participants diagnosed with PAD/IC were recruited from NHS Greater Glasgow & Clyde vascular service. The double-blind feasibility randomised controlled trial had four intervention arms: TENS; placebo TENS; Education +TENS; Education +placebo TENS. Education was a three-hour workshop aiming to modify patients' illness beliefs and perceptions, plus three follow-up phone calls. The TENS machine was worn during walking (TENS: 120 Hz, 200µs, intensity 'strong but comfortable'; placebo TENS: intensity below sensation). The primary outcome measure was absolute claudication distance (ACD; Gardner treadmill protocol). Secondary outcomes included physical activity behaviour, quality of life and pain. Assessment was at baseline (with second treadmill test for screening), post intervention (6 weeks) and follow-up (3 months). Participant experience of the intervention was explored with semi-structured interviews (3 months). Feasibility was assessed by recruitment, retention, intervention uptake and adherence, and outcome completion.

**Results:** Ninety-five potential participants completed baseline screening (1030 reviewed records; 267 eligible individuals). Individuals excluded during screening (n=38) had >20% variability in treadmill ACD. All randomised participants (n=56) received their allocated intervention, and outcome completion was 91% (6 weeks) and 80% (3 months). Attendance at the group education session was high (96%) with 63% taking follow-up phone calls. Compliance with TENS (>=30 min/day, >=3 days/week, >=3weeks) was 70% according to participant-completed logs, but only 28% using TENS machine records. Interviewed participants (n=9) were generally positive about the interventions and trial procedures, however experience of TENS use was mixed. Some participants were dissatisfied with the size and cables of the TENS machine.

**Conclusions:** The PrEPAID trial was feasible to run, however 40% of potential participants were excluded at screening due to issues of research fidelity and not participant suitability or willingness to participate. Future work should consider a revised primary outcome measure and smaller wireless TENS machines.

# Diet quality during pregnancy: associations with psychological distress and personality traits.

**Miss Marianne Gagnon**<sup>1,2,3</sup>, Miss Claudia-Béatrice Ratté<sup>4,6</sup>, Miss Marianne Rochette<sup>1,2,3</sup>, Mrs. Anne-Sophie Plante<sup>1,3</sup>, Prof. Simone Lemieux<sup>1,2</sup>, Prof. Julie Robitaille<sup>1,2</sup>, Prof. Catherine Bégin<sup>4</sup>, Prof. Andréanne Michaud<sup>1,2,5</sup>, Prof. Anne-Sophie Morisset<sup>1,2,3</sup>

<sup>1</sup>Centre Nutrition, santé et société (NUTRISS), Institut sur la nutrition et les aliments fonctionnels (INAF), Université Laval, Québec, Canada, <sup>2</sup>École de nutrition, Université Laval, Québec, Canada, <sup>3</sup>Axe Endocrinologie et Néphrologie, centre de recherche du CHU de Québec-Université Laval, Québec, Canada, <sup>4</sup>École de Psychologie, Université Laval, Québec, Canada, <sup>5</sup>Institut universitaire de cardiologie et de pneumologie de Québec (IUCPQ), Québec, Canada, <sup>6</sup>Axe Santé des populations et pratique optimales en santé, centre de recherche du CHU de Québec-Université Laval, Québec, Canada

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**Purpose:** We aimed to 1) compare diet quality between individuals with and without high levels of anxiety and depression during pregnancy and 2) examine associations between personality traits and diet quality during pregnancy.

**Methods:** In their 1<sup>st</sup> trimester, 29 participants completed the anxiety and depression portion of the Psychiatric Symptom Index (PSI) and the NEO five-factor inventory (NEO-FFI). Pregnant individuals were divided into two groups characterized by a clinically relevant threshold of low (PSI ≤20) or high (PSI >20) anxiety or depression. Three Web-based 24h dietary recalls were completed at each trimester, from which nutrient intakes and the Healthy Eating Food Index (HEFI-2019), a global diet quality score, was calculated.

**Results:** In this sample, 41.2% and 62.1% had clinically significant levels of anxiety and depression, respectively. Participants with high anxiety levels had higher daily intakes of free sugars in the first, second and third trimesters compared to individuals with low anxiety levels (77.2g ± 6.6 vs. 53.6g ± 5.6; 96.8g ± 10.2 vs. 59.0g ± 8.5; 106.4g ± 10.0 vs. 54.8g ± 8.4,  $p \leq 0.01$ ). Accordingly, HEFI-2019 subscores for free sugars intakes (/10 points; allocated according to the proportion of total energy intakes) were lower for participants with high anxiety levels in all trimesters (6.23 ± 0.90 vs. 8.95 ± 0.38, 5.45 ± 1.14 vs. 8.60 ± 0.54, 4.01 ± 3.42 vs. 9.13 ± 0.39,  $p < 0.05$ ). Participants with high depression levels had higher daily intakes of total sugars in the first trimester compared to individuals with low depression levels (70.7g ± 5.7 vs. 51.4g ± 7.2,  $p = 0.045$ ). Openness was positively associated with total HEFI-2019 scores in the 2<sup>nd</sup> and 3<sup>rd</sup> trimesters ( $r = 0.47$ ,  $p = 0.01$  and  $r = 0.38$ ,  $p = 0.04$ ), while neuroticism was positively associated with total sugar intakes in the 1<sup>st</sup> and 2<sup>nd</sup> trimesters ( $r = 0.39$ ,  $p = 0.04$  and  $r = 0.42$ ,  $p = 0.02$ ).

**Conclusions:** Psychological distress is prevalent and associated with components of a suboptimal diet quality during pregnancy. Furthermore, personality traits such as neuroticism and openness are associated with a poorer and better diet quality, respectively. While this remains to be confirmed in a larger sample, psychological variables should be further considered in antenatal care.

# Just Like That: Development of the Exercise & Depression Professional Training Program

**Dr. Madelaine Gierc<sup>1</sup>**, Prof. Guy Faulkner<sup>1</sup>

<sup>1</sup>University of British Columbia, Vancouver, Canada

**SO.3.21 - The Latest Research on Disease Prevention and Management, UKK - Hall B (Level 3), June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** M. Disease prevention and management

**Introduction:** Major depressive disorder is a chronic health condition characterized by low mood, sadness, and anhedonia. In 2016, the Canadian Network for Mood and Anxiety Treatments recognized exercise as a first-line monotherapy for mild-moderate depression, and an adjunctive therapy for moderate-severe depression. There is additional benefit if patients receive supervised and structured support. Though exercise providers are well-positioned to offer such programming, Canadian kinesiology programs do not typically include education on depression or cognitive-behavioural strategies.

**Objective:** To develop a continuing education program in exercise-based treatment for depression for exercise providers.

**Process:** Program development followed a three-stage process. In Stage One, an environmental scan was conducted to gauge training needs. Canadian undergraduate kinesiology programs were reviewed for coursework in psychology, mental health, and behaviour change. A search was conducted for pre-existing mental health training programs, and the mental health literature was consulted to develop an understanding of training standards. In Stage Two, a tentative curriculum was developed and presented to an international expert panel of researchers, clinicians, and patients. Stage Three involved content development, consultation with pedagogical experts, and peer review.

**Product:** A two-part continuing education program was developed. Part One is a 10-hour mental health literacy training program for exercise providers of all training backgrounds. Part Two is a 40-hour specialization on exercise-based treatment for depression for clinical exercise physiologists. Parts One and Two are available to Canadian exercise providers via the Canadian Society for Exercise Physiology.

**Next Steps:** The program is currently undergoing evaluation, and there are plans to revise the training modules based on user feedback and empirical developments. Dissemination activities are ongoing with Canadian and international partners, including in educational, research, and public health settings.

**Summary:** The Exercise & Depression Training Program is an evidence-based continuing education resource that aims to address knowledge gaps in exercise providers' (i) mental health literacy and (ii) capacity to deliver safe and effective interventions to people experiencing depression.



# Implementation and preliminary outcomes of a cooking intervention to supplement the Diabetes Prevention Program (DPP Cooks study): a pilot randomized controlled trial

**Dr. Julia Wolfson<sup>1</sup>**, Dr. Caroline Richardson<sup>2</sup>, Dr. Nisa Maruthur<sup>3</sup>

<sup>1</sup>Johns Hopkins Bloomberg School of Public Health, Baltimore, USA, <sup>2</sup>Brown University School of Medicine, Providence, USA, <sup>3</sup>Johns Hopkins University School of Medicine, Baltimore, USA

**SO.3.22 - The Latest Research on Behavior Change Studies, UKK - Hall C (Level 3), June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** The Diabetes Prevention Program (DPP) is a widely implemented, 12-month behavioral weight loss program for adults with pre-diabetes. However, the DPP does not include hands-on cooking instruction as part of the intervention. Lack of cooking skills can be a barrier to improving dietary quality and preventing type-2 diabetes. Therefore, we designed a new intervention, the DPP Cooks, to supplement the DPP and are testing it in a randomized controlled pilot trial.

**Methods:** The DPP Cooks intervention was informed by formative research with 13 former DPP participants and input from a Community Advisory Committee. In February-September 2022, in collaboration with community-based DPP providers, we randomized 45 adults in Baltimore, MD, USA with pre-diabetes to the DPP (Control) or DPP plus a 6-session cooking skills intervention (DPP Cooks). The primary outcome is weight loss as reported during DPP sessions. At baseline and at 4-months follow-up, we assessed dietary intake/quality by using the Remote Food Photography Method (RFPM) in which participants take photographs of all food and beverages they consume for 3 days. We also assessed food agency, cooking attitudes, behaviors, self-efficacy, and food security status at baseline, 4-month and 12-month follow-up. Preliminary changes in outcomes from baseline to 4-month follow-up were assessed using paired t-tests. Photographs taken for the RFPM diet quality assessment were also qualitatively coded and analyzed to assess pre/post changes.

**Results:** Thirty-nine (87%) of the 45 randomized participants attended Session 1 of the intervention; 82% of participants identified as Black and 87% identified as female. The presentation will focus on lessons learned during implementation and preliminary results of the intervention for primary and secondary outcomes. We will also highlight insights gleaned from qualitative analyses of the RFPM data. Initial results from participants who have completed 4-month follow-up indicate that participants in the DPP Cooks group lost more weight and gained more cooking confidence compared to participants in the control group.

**Conclusions:** Preliminary results from the DPP Cooks randomized controlled pilot trial indicate that adding hands-on cooking skills education to the DPP helps participants achieve greater weight loss and can improve participant engagement and behavioral outcomes.

# A randomised controlled trial to investigate the feasibility and acceptability of a small change approach to prevent weight gain

**Miss Henrietta Graham**<sup>1</sup>, Dr. Claire Madigan<sup>1</sup>, Prof. Amanda Daley<sup>1</sup>

<sup>1</sup>Loughborough University, Loughborough, United Kingdom

SO.3.22 - The Latest Research on Behavior Change Studies, UKK - Hall C (Level 3), June 17, 2023, 9:40 AM - 10:55 AM

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** A small change approach, which asks people to decrease their energy intake and/or increase their energy expenditure by 100-200 kcal each day, has shown merit, but research has only considered the effectiveness of this approach when delivered in intensive lifestyle/behavioural change interventions involving multiple contacts over time. The aim of this study was to investigate whether a small change approach might still be feasible and acceptable to participants for weight gain prevention when delivered within an intervention that is delivered remotely and potentially deliverable at scale.

**Methods:** This randomised controlled feasibility and acceptability trial allocated 122 participants to the small change weight gain prevention intervention (targeting dietary and/or physical activity behaviours) or a comparator using 2:1 randomisation for 12 weeks. The primary outcome was the feasibility (number of participants recruited each month & retention of participants at follow-up) and acceptability (adherence) of a small change approach intervention, assessed using three traffic light stop-go criteria. Secondary outcomes included weight change at follow-up.

**Results:** The traffic light stop-go criteria results were green for recruitment (11 participants randomised per month) and retention (91%) and red for intervention adherence (<60% of participants made at least seven small changes each week). Sixty-two percent of participants found a small change approach helpful/very helpful. The difference in weight between the trial groups at follow-up was -1.1kg (95% CI -1.7, -0.4), favouring the intervention group.

**Conclusion:** Although adherence to the small change approach intervention was lower than expected, this trial provides evidence that the public find a small change approach helpful/very helpful in preventing weight gain, and they gained less weight than comparators. A small change approach might be an effective strategy for reducing weight gain in the population and, with increased consideration of how to improve adherence, progress to an effectiveness trial is recommended.

# Modeled substitution of isocaloric foods for increased adherence to a Mediterranean style diet pattern in U.S. Adults

**Dr. Ambria Crusan<sup>1</sup>**, Dr. Francine Overcash<sup>2</sup>

<sup>1</sup>St. Catherine University, St. Paul, USA, <sup>2</sup>University of Minnesota, St. Paul, USA

SO.3.22 - The Latest Research on Behavior Change Studies, UKK - Hall C (Level 3), June 17, 2023, 9:40 AM - 10:55 AM

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Studies suggest Americans could benefit from greater adherence to a Mediterranean Diet (MedD) pattern for chronic disease management. A study assessing adherence to dietary prescriptions noted participants were more likely to continue substituting nutrient-dense options 6-months post intervention than to follow diet prescriptions. The purpose of this study is to provide targeted intervention data supporting simple isocaloric food substitutions for Americans to help increase adherence to a MedD pattern.

**Methods:** A validated scoring index for non-Mediterranean populations determined alignment to a MedD pattern in 19,978 adults from the National Health and Nutrition Examination Survey (2007–2018). The study population was divided into two groups based on their score: top quartile (TQ) vs. lower quartiles (LQ). Differentiation in adherence guided foods most predictive of improved alignment, optimizing the substitutions. Isocaloric food substitution modeling via multiple regression identified key dietary swaps to improve MedD alignment. Targeted intervention groups were determined via highest substitution frequency.

**Results:** The mean MedD score was significantly different in the LQ ( $7.1 \pm 0.05$ ) than the TQ ( $16.5 \pm 0.09$ ) ( $p < 0.0001$ ). Four individual food substitutions increased LQ and TQ MedD score independently: olive oil from no use to partial use, leafy greens for starchy vegetables, whole grains for refined grains, or whole fruit in place of fruit juice (all substitutions  $p < 0.0001$ ); however, a synergistic effect was seen as the mean MedD score increased to  $10.5 \pm 0.05$  in the LQ and  $20.5 \pm 0.09$  in the TQ when all substitutions were added to the model (within-group t-test p-values all  $< 0.0001$ ). The dietary substitutions for fruit, olive oil, and whole grains applied to a greater proportion of 30-49 year olds, females, individuals identifying as white, individuals that are obese, or those with some college education. Leafy greens showed similar demographic data, however, males or those in the age range of 50-59 were more likely to receive the dietary substitution.

**Conclusions:** Using foods that are already part of the average American diet underscores wide-spread acceptability to elicit behavior change. Simple dietary substitutions can help Americans more closely align with a MedD pattern to reduce chronic disease risk.

# Does boys' and girls' motivation behind their food habits differ? A systematic review of the underlying factors impacting eating in adolescents.

**Miss Alysha L Deslippe**<sup>1,2</sup>, Miss Coralie Bergeron<sup>1,2</sup>, Dr. Tamara Cohen<sup>1,2</sup>

<sup>1</sup>Faculty of Land and Food Systems, The University of British Columbia, Vancouver, Canada, <sup>2</sup>Healthy Starts, BC Children's Hospital Research Institute, Vancouver, Canada

**SO.3.22 - The Latest Research on Behavior Change Studies, UKK - Hall C (Level 3), June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Boys' and girls' food habits begin to diverge during adolescence (13-18 years). For example, greater reports of food restriction among girls versus higher consumption of high caloric foods among boys have been reported. These differences may contribute to unequal risk of certain health outcomes in adulthood. At present, there is no consensus of how gender impacts adolescents' food habits. Therefore, this study aimed to consolidate gender trends in adolescents' rationale behind eating.

**Methods:** A systematic review following PRISMA guidelines (Medline Ovid, Embase, Web of Science, CINAHL) was conducted using qualitative studies. To be eligible, studies had to report at least one unique gender theme. Quality appraisals were conducted using the Critical Appraisal Skills Programme checklist and a thematic analysis of themes was performed from all studies.

**Results:** Of the original 1706 articles returned, 34 met eligibility. Three themes emerged regardless of gender to explain adolescents' rationale behind their food habits: 1) *looking ahead*; 2) *eating in the moment*; and 3) *logistics*. *Looking ahead* encompassed adolescents' discussion of how long-term benefits like health outcomes, forming their identities, or controlling appearance influenced their food habits. Specifically, girls' food habits were influenced by a desire to be thin, control aesthetics or manage their health through weight. In contrast, boys emphasised the role of athletic performance, building muscle and the quantity of foods. Adolescents also mentioned how immediate gratification through physical feelings (e.g., avoiding feeling sick or giving into cravings) and socialization further played a role by *eating in the moment*. In this theme, girls highlighted using food to appear attractive to boys and eating healthier with their friends whereas boys did not. Finally, adolescents recognized that regardless of their motivation, their food habits were confined by *logistics* outside of their control (e.g., parent's rules, food availability or cost). No gender differences arose in this theme.

**Conclusions:** Boys' and girls' food habits are not motivated by the same factors. To create more effective interventions that address food habits, researchers should consider the unique factors important to different gender groups and include them in their designs.

# LOFIT: Lifestyle front Office For Integrating lifestyle medicine in the Treatment of patients. A novel care-model towards community-based options for lifestyle change – study protocol.

**Ms. Marlinde L. van Dijk**<sup>1,2,3</sup>, Ms. Leonie M. te Loo<sup>1,2,4</sup>, Dr. Joyce Vrijzen<sup>5</sup>, Dr. Inge van den Akker-Scheek<sup>5</sup>, Ms. Sanne Westerveld<sup>5</sup>, Mrs. Marjan Annema<sup>6</sup>, Dr. Andre van Beek<sup>7</sup>, Dr. Jip van der Berg<sup>8</sup>, Dr. Alexander L. Boerboom<sup>5</sup>, Dr. Adrie Bouma<sup>9</sup>, Prof. Martine de Bruijne<sup>1,3</sup>, Mr. Jeroen Crasborn<sup>10</sup>, Dr. Johanna M. van Dongen<sup>11</sup>, Ms. Anouk Driessen<sup>1,2</sup>, Dr. Karin Eijkelenkamp<sup>7</sup>, Dr. Nies Goelema<sup>6</sup>, Dr. Jasmijn Holla<sup>4,12</sup>, Dr. Johan de Jong<sup>13</sup>, Dr. Anoek de Jooide<sup>8</sup>, Dr. Arthur Kievit<sup>14</sup>, Mrs. Josine van 't Klooster<sup>15</sup>, Dr. Hinke Kruijsenga<sup>16</sup>, Dr. Marike van der Leeden<sup>17</sup>, Dr. Lilian Linders<sup>4</sup>, Dr. Jenny Marks - Vieveen<sup>1,12,18</sup>, Dr. Douwe Johannes Mulder<sup>19</sup>, Mrs. Femmy Muller<sup>20</sup>, Dr. Femke van Nassau<sup>1,2</sup>, Dr. Joske Nauta<sup>1,2</sup>, Mrs. Suzanne Oostvogels<sup>21</sup>, Mrs. Jessica Oude Sogtoen<sup>22</sup>, Associate Professor Hidde P. van der Ploeg<sup>1,2</sup>, Mr. Patrick Rijnbeek<sup>23</sup>, Mrs. Linda Schouten<sup>24</sup>, Dr. Rhoda Schuling<sup>13</sup>, Dr. Erik H. Serné<sup>25</sup>, Mrs. Simone Smuling<sup>22</sup>, Dr. Maarten R. Soeters<sup>26</sup>, Prof. Evert A.L.M. Verhagen<sup>1,2</sup>, Prof. Johannes Zwever<sup>27,28</sup>, Prof. Rienk Dekker<sup>9</sup>, Prof. Willem van Mechelen<sup>1,2</sup>, Dr. Judith G.M. Jelsma<sup>1,2,3</sup>

<sup>1</sup>Amsterdam UMC location Vrije Universiteit Amsterdam, Department of Public and Occupational Health, Amsterdam, Netherlands, <sup>2</sup>Amsterdam Public Health research institute, Health Behaviors & Chronic Diseases, Amsterdam, Netherlands, <sup>3</sup>Amsterdam Public Health research Institute, Quality of Care, Amsterdam, Netherlands, <sup>4</sup>Inholland University of Applied Sciences, Faculty of Health, Sports and Social Work, Haarlem, Netherlands, <sup>5</sup>University of Groningen, University Medical Center Groningen, Department of Orthopaedics, Groningen, Netherlands, <sup>6</sup>Ommeland Hospital Groningen, Department of Orthopaedics, Scheemda, Netherlands, <sup>7</sup>University of Groningen, University Medical Center Groningen, Department of Endocrinology and Metabolic Diseases, Groningen, Netherlands, <sup>8</sup>University of Groningen, University Medical Center Groningen, Department of Nephrology, Groningen, Netherlands, <sup>9</sup>University of Groningen, University Medical Center Groningen, Department of Rehabilitation Medicine, Groningen, Netherlands, <sup>10</sup>Health Insurance Expertise (formerly Zilveren Kruis), Leiden, Netherlands, <sup>11</sup>Vrije Universiteit Amsterdam, Amsterdam Public Health Research Institute, Department of Health Sciences, Amsterdam, Netherlands, <sup>12</sup>Reade, Amsterdam Rehabilitation Research Centre, Amsterdam, Netherlands, <sup>13</sup>Hanze University of Applied Sciences, Institute of Sports Studies, Groningen, Netherlands, <sup>14</sup>Amsterdam UMC location University of Amsterdam, Department of Orthopedics, Groningen, Netherlands, <sup>15</sup>University of Groningen, University Medical Center Groningen, Department of Strategy, Development and External Relations, Groningen, Netherlands, <sup>16</sup>Amsterdam UMC location Vrije Universiteit, Department of Nutrition & Dietetics, Amsterdam, Netherlands, <sup>17</sup>Amsterdam UMC location Vrije Universiteit, Department of Rehabilitation Medicine, Amsterdam Movement Sciences research institute, Amsterdam Public Health research institute, Amsterdam, Netherlands, <sup>18</sup>Amsterdam UMC location Vrije Universiteit, Department of Anesthesiology, Amsterdam, Netherlands, <sup>19</sup>University of Groningen, University Medical Center Groningen, Department of Internal Medicine, Amsterdam, Netherlands, <sup>20</sup>Zilveren Kruis, Leiden, Netherlands, <sup>21</sup>Menzis, Groningen, Netherlands, <sup>22</sup>Huis voor de Sport Groningen, Groningen, Netherlands, <sup>23</sup>NL Actief, Ede, Netherlands, <sup>24</sup>Team Sportservice Noord-Holland, Haarlem, Netherlands, <sup>25</sup>Amsterdam UMC location Vrije Universiteit, Department of Internal Medicine, Amsterdam, Netherlands, <sup>26</sup>Amsterdam UMC location University of Amsterdam, Department of Internal Medicine, Amsterdam, Netherlands, <sup>27</sup>University of Groningen, University Medical Center Groningen, Center for Human Movement Sciences, Groningen, Netherlands, <sup>28</sup>Sports Valley, Sports Medicine, Gelderse Vallei Hospital, Ede, Netherlands

**SO.3.22 - The Latest Research on Behavior Change Studies, UKK - Hall C (Level 3), June 17, 2023, 9:40 AM - 10:55 AM**

## **SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** A healthy lifestyle is indispensable for the prevention of non-communicable diseases. However, lifestyle medicine is hampered by time constraints and competing priorities of treating physicians. A dedicated lifestyle front office (LFO) in secondary/tertiary care may provide an important contribution to optimize patient-centered lifestyle care and connect to lifestyle initiatives from the community. The LOFIT study aims to gain insight into the (cost-)effectiveness of the LFO.

**Methods:** Two parallel pragmatic randomized controlled trials will be conducted for (cardio)vascular disorders (i.e. (at risk of) (cardio)vascular disease, diabetes) and musculoskeletal disorders (i.e. osteoarthritis, hip or knee prosthesis). Patients from three outpatient clinics in the Netherlands will be invited to participate in the study. Inclusion criteria are body mass index (BMI)  $\geq 25$  (kg/m<sup>2</sup>) and/or smoking. Participants will be randomly allocated to either the intervention group or a usual care control group. In total, we aim to include 552 patients, 276 in each trial divided over both treatment arms. Patients allocated to the intervention group will participate in a face-to-face motivational interviewing (MI) coaching session with a so called lifestyle broker. The patient will be supported and guided towards suitable community-based lifestyle initiatives. A network communication platform will be used to communicate between the lifestyle broker, patient, referred community-based lifestyle initiative and/or other relevant stakeholders (e.g. general practitioner). The primary outcome measure is the adapted-Fuster-BEWAT, a composite health risk and lifestyle score consisting of resting systolic and diastolic blood pressure, objectively measured physical activity and sitting time, BMI, fruit and vegetable consumption and smoking behaviour. Secondary outcomes include cardiometabolic markers, anthropometrics, health behaviours, psychological factors, patient reported outcome measures (PROMs), cost-effectiveness measures and a mixed-method process evaluation. Data collection will be conducted at baseline, 3, 6, 9 and 12 months follow-up.

**Discussion:** This study will gain insight into the (cost-)effectiveness of a novel care-model in which patients under treatment in secondary or tertiary care are referred to community-based lifestyle initiatives to change their lifestyle.

# The mediating effects of self-efficacy on psychological well-being – findings from the Burn to Learn cluster randomised controlled trial

**Dr. Levi Wade**<sup>1,2</sup>, Dr. Thierno M.O. Diallo<sup>3</sup>, Dr. Michael Noetel<sup>4</sup>, Prof. Chris Lonsdale<sup>5</sup>, Associate Professor Narelle Eather<sup>1,2</sup>, Dr. Jordan J. Smith<sup>1,2</sup>, Prof. Ronald Plotnikoff<sup>1,2</sup>, Prof. David R. Lubans<sup>1,2,6</sup>

<sup>1</sup>Centre for Active Living and Learning, College of Human and Social Futures, University of Newcastle, Callaghan, Australia, <sup>2</sup>Active Living Program, Hunter Medical Research Institute, New Lambton, Australia, <sup>3</sup>School of Social Sciences, Western Sydney University, Sydney, Australia, <sup>4</sup>School of Psychology, University of Queensland, Brisbane, Australia, <sup>5</sup>Institute for Positive Psychology and Education, Australian Catholic University, North Sydney, Australia, <sup>6</sup>Faculty of Sport and Health Sciences, University of Jyväskylä, Jyväskylä, Finland

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**Purpose:** Engagement in physical activity is known to benefit multiple markers of mental health in adolescence, including improvements in psychological well-being. However, there remains a gap in knowledge on the mechanisms responsible for these effects. The aim of this study is to examine the potentially mediating role of self-efficacy on psychological well-being in a sample of adolescents participating in a school-based high-intensity interval training (HIIT) program.

**Methods:** The current study uses data collected from 378 school students (mean age = 16.02, SD = 0.38) who participated in the first year of the Burn to Learn cluster randomised controlled trial. Teachers in the intervention schools were trained to deliver at least two HIIT sessions per week during academic lessons across two school terms. HIIT self-efficacy was assessed using the HIIT-SQ, and well-being was assessed using the 7-item Warwick-Edinburgh Mental Well-being Scale. A product-of-coefficient mediation analysis was conducted to assess the potentially mediating effect of HIIT self-efficacy at 6-months post intervention on well-being 12-months post intervention.

**Results:** After adjusting for baseline values, age, sex, BMI, and SES, the intervention did not have a significant effect on well-being (estimate [SE] = -0.648 [0.566], 95%CI = -1.545 to 0.339,  $p = 0.25$ ). However, there was a significant effect of the intervention on HIIT self-efficacy at 6-months (estimate [SE] = 0.994 [0.251], 95%CI = 0.581 to 1.403,  $p < 0.01$ ), and a significant mediated effect of HIIT self-efficacy on well-being at 12-months (estimate [SE] = 0.371 [0.162], 95%CI = 0.090 to 0.618,  $p = 0.02$ ).

**Conclusions:** The findings suggest that improving adolescents' HIIT self-efficacy has a sustained positive influence on their psychological well-being. Accordingly, targeting improvements in physical activity self-efficacy may be an effective strategy for improving well-being in adolescents in future trials.



# Shaping a personalized lifestyle program for colorectal cancer survivors experiencing cancer-related fatigue (the SoFiT program): identification and application of behavioural and environmental determinants, and behaviour change techniques

**Ms. Judith de Vries - ten Have<sup>1,2</sup>**, Associate Professor Renate M. Winkels<sup>1</sup>, Prof. Ellen Kampman<sup>1</sup>, Dr. Laura H.H. Winkens<sup>2</sup>

<sup>1</sup>Division of Human Nutrition and Health, Nutrition and Disease Chair Group, Wageningen University and Research, Wageningen, Netherlands, <sup>2</sup>Consumption and Healthy Lifestyles Chair Group, Wageningen University and Research, Wageningen, Netherlands

**SO.3.22 - The Latest Research on Behavior Change Studies, UKK - Hall C (Level 3), June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Cancer-related fatigue (CRF) is a severe long-term problem in colorectal (CRC) survivors. Some interventions suggest beneficial effects of healthy eating and/or physical activity or exercise on CRF in cancer survivors. Other interventions did not find beneficial effects on CRF, possibly because they did not achieve substantial behaviour change. Identifying behavioural and environmental determinants is an important step in the design of effective behaviour change interventions, so that they can be targeted by matching behaviour change techniques (BCTs). In the design of the SoFiT study we sought to identify behavioural and environmental determinants of health behaviours among CRC survivors and matched those with BCTs.

**Methods:** We conducted a mixed-method study, including a systematic literature review, focus groups, and interviews to identify behavioural and environmental determinants of healthy lifestyle behaviours among CRC survivors. Thematic content analysis was performed to identify themes in the focus groups and interviews. In a second systematic review, we summarized the literature on applied and promising BCTs in lifestyle interventions targeting CRF among cancer survivors. The BCT taxonomy was used to code BCTs in those interventions. We used our reviews and the BCT tool to connect BCTs to the identified determinants and decided on practical applications of this combination to design the SoFiT intervention.

**Results/findings:** We identified knowledge, motivation, beliefs, social surroundings, self-efficacy and disease-related effects and barriers as the most important determinants of healthy lifestyle behaviours in the mixed method study. In the second systematic review, the most frequently applied BCTs were Goal setting (behaviour), Instruction on how to perform the behaviour, Demonstration of the behaviour, Behavioural practice/rehearsal, and Credible Source. The BCT 'Generalisation of the target behaviour' was identified as promising to increase effectiveness of the intervention. An example of a practical application in SoFiT is that the skills needed for increasing the intake of vegetables, can be improved by giving instructions on how to cook with more vegetables and let the participant practice with this.

**Conclusions:** We used a systematic approach to design our SoFiT intervention, in which we match the most promising BCTs to personal and environmental determinants of CRC survivors with CRF.

# Tension and dynamics of weight management: A fresh theoretical perspective based on qualitative investigation of experiences of success and relapse in weight management.

Dr. Samantha van Beurden<sup>2</sup>, Dr. Sarah Morgan-Trimmer<sup>2</sup>, Dr. Leon Poltawski<sup>2</sup>, **Prof. Colin Greaves<sup>1</sup>**

<sup>1</sup>University of Birmingham, Birmingham, United Kingdom, <sup>2</sup>University of Exeter, Exeter, United Kingdom

**SO.3.22 - The Latest Research on Behavior Change Studies, UKK - Hall C (Level 3), June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** B. Motivation and behavior change

**Background:** People often lose weight successfully. However, few are able to keep the weight off in the long term. To investigate the reasons for this and build on emerging theoretical perspectives around "Tension Theory", we conducted an exploration of the psychological dynamics of weight management.

**Methods:** This qualitative study was conducted within a feasibility study of the Skills for weight loss and Maintenance (SkiM) intervention. Thirty-six participants were interviewed about their weight management journey before, immediately after and a year after the six-month intervention. Data were analysed thematically. We compared the accounts of those who were more and less successful in longer-term weight loss (12 months post-intervention) and key themes were linked in a conceptual model.

**Results:** Five interpretative themes were generated: encountering and managing key situations; impact of emotion; source of control; personal values; and acquiring knowledge and skills. These themes were linked through a model of decision-making during key situations in which decisions in weight management are taken. Behavioural decisions (conscious and non-conscious) emerge from a dynamic interplay between several drivers: emotional state and psychosocial needs that drive or motivate obesogenic behaviour, perceived control, personal values, the individual's knowledge and skills, and their existing habits. Individual's responses in key situations may generate experiential learning which in turn can influence the dynamics of decision-making in future situations. It is these decisional dynamics that appeared to differ between participants who were more successful and those who were less successful in weight management.

**Conclusions and implications:** Our model of the dynamics and fundamental drivers of decision-making in weight loss and weight loss maintenance has implications for the development and delivery of behavioural weight management interventions. By helping people to identify the core drivers of their decisions in key situations, interventions will be more likely to be able to equip them appropriately to manage these drivers and so optimise longer term intervention effectiveness.

# Compositional Data Analysis Behaviors in the 24-hr Period and their Association with Gestational Weight Gain in Pregnant Women with Overweight or Obesity

**Dr. Krista Leonard**, Dr. Abigail Pauley, Dr. Daniel Rivera, Dr. Jennifer Savage, Dr. Danielle Symons Downs  
<sup>1</sup>Arizona State University, Phoenix, USA

SO.3.22 - The Latest Research on Behavior Change Studies, UKK - Hall C (Level 3), June 17, 2023, 9:40 AM - 10:55 AM

**SIG - Primary Choice:** B. Motivation and behavior change

**Purpose:** Regulating gestational weight gain (GWG) lowers risks for maternal morbidity/mortality. Behaviors across the 24-hour (24hr) period (physical activity, sedentary behaviors, sleep) are modifiable factors that predict GWG. However, most studies have overlooked that these behaviors are mutually exclusive (i.e., time spent in one displaces time in another), potentially leading to inaccurate estimates of their association with GWG. This secondary analysis examined whether these behaviors, across pregnancy, and how they individually and in combination explained GWG.

**Methods:** Pregnant women with overweight/obesity (PW-OW/OB;  $N=19$ ) from a randomized feasibility trial to adapt intervention dosages to regulate GWG, wore a Jawbone daily from ~8-36 weeks gestation to obtain time spent in sleep, inactivity, and activity (light and MVPA), averaged for trimesters 1, 2, and 3. Women weighed themselves daily (Aria Wi-Fi scale); GWG was calculated as weight at ~36-weeks gestation minus pre-pregnancy weight. Compositional data analysis and descriptives were used to examine changes in sleep, inactivity and activity; linear regression was used to examine whether the composition of the behaviors in the 24hr period predicted GWG.

**Results:** On average, all women spent the majority of the 24hr period as sleeping (42-47%; 6.7-8.2hrs) or inactive (47-52%; 7.8-8.3hrs) and little time as active (5-7%; 0.9-1.2hrs), with minimal change in these behaviors across the trimesters. The behaviors in the 24hr period did not significantly predict GWG.

**Conclusion:** Women allocated most of their 24hr period to inactivity and sleep, and minimally to activity. The composition of this sample of PW-OW/OB did not predict GWG. Further research is needed to examine if other compositions (e.g., higher activity, lower inactivity, appropriate sleep) and/or changes in compositions over time may better explain GWG. Nevertheless, given the minimal activity time, identifying strategies to educate women on how to best reallocate their time to activity are warranted; for example, promoting small reallocations from sedentary behaviors such as standing to break up sitting, or 10-minute walks after meals. Further, implementing strategies in early pregnancy may be beneficial given women maintained behaviors over the course of pregnancy.

# Goldilocks and the Rail Drivers: Can physical behaviours at work be health-enhancing?

**Dr. Stephanie Chappel<sup>1</sup>**, Associate Professor Janine Chapman<sup>1,2</sup>, Prof. Corneel Vandelanotte<sup>3</sup>, Prof. Andreas Holtermann<sup>4</sup>, Prof. Leon Straker<sup>5</sup>, Prof. Anjum Naweed<sup>1</sup>

<sup>1</sup>Central Queensland University, Appleton Institute, Adelaide, Australia, <sup>2</sup>Flinders University, Adelaide, Australia, <sup>3</sup>Central Queensland University, Physical Activity Research Group, Appleton Institute, Queensland, Australia, <sup>4</sup>National Research Centre for the Working Environment, Copenhagen, Denmark, <sup>5</sup>Curtin University, Perth, Australia

**SO.3.23 - Working with participatory research designs in mental health, UKK - Hall D (Level 2 - main floor), June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose** The purpose of this presentation is to outline the Goldilocks in Rail project along with the initial findings and next steps. The aim of the project is to develop a 'just right job design' model through three key objectives; 1) identify the movement profiles of rail drivers, 2) explore how movement is accumulated within work, and 3) determine potential opportunities to apply the Goldilocks Work approach to redesigning rail driving.

**Methods** Tram, train, and freight organisations were recruited across Australia and New Zealand to participate in several phases. In Phase 1, the physical behaviours of drivers at work and away from work are monitored for eight days using thigh-worn Axivity devices. In Phase 2, detailed descriptions of the tasks drivers perform are created based on researchers directly observing drivers across an entire shift. Data from Phases 1 and 2 are used to create a physical behaviours-based description of rail driving tasks. Phase 3 involves rail drivers and management identifying potential job (re)designs to enhance health-promoting physical behaviours using a 'just right job design' conceptual model.

**Results** Data from 31 rail drivers show that on average across any shift, 79% was spent sitting, 10% was spent standing, and 11% was spent moving. On non-workdays, 63% of time was spent sitting, 18% was spent standing, and 19% was spent moving. Interestingly, tram drivers appear to be more sedentary at work, whilst train drivers were more sedentary during leisure time. According to the task analysis, the majority of rail drivers sitting time occurs when driving the tram/train, and the potential opportunities to introduce movement into the job appear to be limited by current timetables and roster designs.

**Conclusions** This is the first time the 'just right job design' model has been explored, with a focus on rail driving. Unsurprisingly rail driving is a highly sedentary occupation, and the opportunities for redesigns appear limited due to the complex nature of the rail environment. Using the Phases 1 and 2 findings, Phase 3 explores through a participatory approach possible job redesigns through implementation simulations.

# The development and evaluation of a physical activity promotion intervention for adolescents and young adults with intellectual disabilities: the Move it, Move ID! project

**Miss Laura Maenhout**<sup>1,2</sup>, Prof. Greet Cardon<sup>1</sup>, Prof. Geert Crombez<sup>1</sup>, Prof. Geert Van Hove<sup>1</sup>, Dr. Sofie Compernelle<sup>1,2</sup>

<sup>1</sup>Ghent University, Ghent, Belgium, <sup>2</sup>Research Foundation Flanders, Brussels, Belgium

**SO.3.23 - Working with participatory research designs in mental health, UKK - Hall D (Level 2 - main floor), June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** Evidence shows that people with intellectual disabilities (ID) face more health problems than their peers without ID. One suggestion to narrow these health inequalities, is to focus on supporting a healthy lifestyle in young people with ID, such as the promotion of physical activity (PA). Currently, adolescents and young adults with ID are considerably less physically active than their typically developing peers. Despite this need to find ways to promote PA in adolescents with ID, they are a neglected population in PA research. The aim of the present study is to describe the development and evaluation of the “Move it, Move ID!” intervention.

**Methods:** The Behaviour Change Wheel (BCW) was used as the framework to ensure a scientific and systematic intervention development, in combination with a co-creational approach (n=23). The project will investigate the effects of the intervention on total volume of PA among young people (16-22y) with mild to moderate ID using a single case multiple baseline design over an intervention period of max 10 weeks (February-May 2023).

**Results:** The application of the different steps of the BCW resulted in the formulation of ten intervention goals, which were linked to the COM-B components. The ultimate intervention consists of a buddy component and supporting app. It was indicated that a stand-alone app would not motivate adolescents with ID to be more physically active, instead it needs to be embedded in a larger PA promotion programme. Participants with ID will be paired with a buddy without ID (same age range) to do physical activities together in (the vicinity of) Ghent, Belgium. A range of activities will be proposed in the app, where also specific arrangements can be made using the chat and the agenda. Preliminary results on the participants' PA pattern will be available at the time of the conference.

**Conclusions:** This study will increase our understanding on whether a theory-based, co-created lifestyle intervention focusing on young people with ID can improve their PA behaviour and has important implications for future research and health policy.

# Community-Based Participatory Research Methodologies are an Effective way to Create Relevant Programming to Support Physical and Mental Health in Perinatal Individuals

**Ms. Leigh Neptune<sup>1</sup>**, Ms. Kayla Parsons<sup>1</sup>, Ms. Amelia Sullivan<sup>1</sup>, Ms. Emalee Harrington<sup>1</sup>, Ms. Kayla Raymond<sup>1</sup>, Dr. Jade McNamara<sup>1</sup>

<sup>1</sup>University of Maine, Orono, USA

**SO.3.23 - Working with participatory research designs in mental health, UKK - Hall D (Level 2 - main floor), June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose** This study aimed to examine the experiences of Community Advisory Board (CAB) members during the creation of a unique program to support physical and mental health during the perinatal period using a Community-Based Participatory Research (CBPR) approach.

**Methods** In this qualitative study, one-on-one interviews were conducted with CAB members (N=9) to examine their experiences participating in the CAB. Interviewees included recently postpartum individuals (n=4), registered dietitians (n=3), a community nutrition professional (n=1), and a research assistant (n=1). Interviews were transcribed and independently coded by three coders for primary and secondary themes using a grounded theory approach and basic thematic analysis.

**Results/Findings** Five primary themes emerged across interviews. The first was “collaboration,” with CAB members highlighting collaboration among researchers, professionals, and community members as a critical component of their experience with creating the program. Members felt the process was inclusive and that their input was valued. The second theme was “learning.” Participants revealed their primary motivator for participating in the CAB was the opportunity to learn about perinatal health and the research process. Members frequently reflected on what they learned from hearing diverse perspectives. The third theme was “community.” Interviewees stated they felt supported, connected to other members, and involved in the research process. Community and support were also described as primary needs for perinatal individuals. The fourth theme was “addressing a need.” Interviewees consistently identified their belief that the final program would result in a reliable resource that addresses the needs of perinatal individuals and that using CBPR methodologies was an innovative way to create relevant resources. The fifth and final theme was “CAB expansion.” Participants frequently mentioned involving more perspectives and offering alternate times to ensure adequate participation when asked what could be done to improve the process.

**Conclusions** CAB members from community and professional backgrounds highlighted collaboration, learning, and a sense of community as primary positive components of their experiences. This study highlights CBPR as an effective tool for bringing researchers and community members together in creating programming relevant to the needs of perinatal individuals.



# Connecting with Cultural Foods: Co-designing data collection methods with community members with lived refugee experiences

**Ms. Tina Gingell<sup>1</sup>**, Associate Professor Kate Murray<sup>1</sup>, Dr. Ignacio Correa-Velez<sup>1</sup>, Prof. Danielle Gallegos<sup>1</sup>  
<sup>1</sup>Queensland University of Technology, Brisbane, Australia

**SO.3.23 - Working with participatory research designs in mental health, UKK - Hall D (Level 2 - main floor), June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** Co-design is increasingly being used in research to design project outcomes with people with lived experience, to ensure those outcomes are tailored to the unique needs of the target population. However, co-design may also be used to design the project plan and tools to ensure the research is conducted in a trauma informed, strengths-based, and culturally appropriate manner. Connecting with Cultural Foods is an innovative research project that aims to improve food security for people from refugee backgrounds, by using a co-designed research plan.

**Methods:** Four workshops were conducted with community members to co-design data collection methods. Participants were recruited using convenience and purposive sampling. Workshop one utilised journey mapping to capture the lived experience of accessing food and identify key community roles that facilitate that access to food. Workshop two involved creating personas of key community roles to identify culturally appropriate communication methods, and consequently, data collection methods. Workshop three employed group discussions to collaboratively design data collection tools. Workshop four involved experiential learning to train participants on data collection methods and ethics.

**Results:** Workshops were held in Brisbane, Australia, between January and April 2022 with eight community members participating. Five key community roles were identified that facilitate access to food for people from refugee backgrounds: grocery store owner, market stall owner, restaurant owner, farmer, and community leader. Face-to-face interviews were determined as appropriate communication methods for all community roles. An interview guide was collaboratively designed with culturally appropriate language, and included trauma informed methods, such as monitoring the interviewee for signs of distress. Seven (88%) participants agreed to become research assistants and were trained to conduct interviews.

**Conclusions:** Co-designing data collection methods with community members that had a lived experience, ensured the research was trauma informed, culturally appropriate, and incorporated consideration of aspects that would not have been otherwise included, for example, showing respect when speaking to community leaders. This method may lead to new insights into the experience of accessing food in Brisbane, and create outcomes that produce a higher likelihood of behaviour change to improve food security for people from refugee backgrounds.

# Co-production of Move Well, Feel Good: a school-based motor competence and mental health intervention.

**Ms. Lauren Clifford**<sup>1</sup>, Dr. Richard Tyler<sup>1</sup>, Prof. Zoe Knowles<sup>2</sup>, Dr. Emma Ashworth<sup>2</sup>, Prof. Lynne Boddy<sup>2</sup>, Dr. Lawrence Fowweather<sup>2</sup>, Prof. Stuart Fairclough<sup>1</sup>

<sup>1</sup>Edge Hill University, Liverpool, United Kingdom, <sup>2</sup>Liverpool John Moores, Liverpool, United Kingdom

**SO.3.23 - Working with participatory research designs in mental health, UKK - Hall D (Level 2 - main floor), June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose:** Children from low-income families are disproportionately affected by poor mental health. Mental health problems such as anxiety and depression are associated with low motor competence (MC) and inhibited psychosocial development. These relationships may be mediated by social support and personal resources such as perceived competence. Improving children's MC through school-based physical activity interventions emphasising psychosocial development may therefore be a mechanism for promoting positive mental health. Shared stakeholder ownership in intervention development provides a context-sensitive basis for acceptable interventions with increased likelihood of them being effectively implemented. This study describes the co-production of 'Move Well Feel Good', a primary school physical activity intervention to improve children's MC and mental health.

**Methods:** Five primary schools from a low-income community of northwest England were recruited. Stakeholder groups consisting of class teachers, school leaders, physical activity specialists, and children (aged 8-9 years) participated in a series of co-production workshops. During these, participants worked in single and multiple stakeholder groups through a 6-stage process. Stakeholders' knowledge and experiences were integrated with existing research evidence using creative methods (e.g., post-it note tasks, worksheets, and drawings) to facilitate discussion. Audio recordings and field notes were also used to capture the events of the workshops. The co-production process culminated in stakeholder consensus voting for one of three proposed intervention ideas to decide which intervention would be implemented as a subsequent feasibility trial.

**Results:** Children cited physical and mental health benefits, enjoyment with friends, and high perceived competence as motives for being physically active. Opportunities to develop MC across the different segments of the school day were identified by adult stakeholders, who perceived the barriers to intervention implementation as children's lack of resilience, an overloaded curriculum, and poor parental support for physical activity. Stakeholders agreed that a fully resourced programme that could be embedded across the curriculum was essential for intervention feasibility and acceptability. The chosen intervention idea received 6 out of a possible 12 votes.

**Conclusions:** This study reinforces the complex nature of school-based intervention development and highlights the value of engaging with stakeholders in co-production processes.

# Community Capacity Building for Improving Capabilities for Physical Activity in Men 50 plus

**Prof. Susanne Tittlbach**<sup>1</sup>, Mr. Sebastian Kindig<sup>1</sup>, Prof. Anne Herrmann-Johns<sup>2</sup>, Mrs. Christine Bernardi<sup>2</sup>, Dr. Julia von Somogy<sup>2</sup>, Prof. Julika Loss<sup>3</sup>, Dr. Helmut Strobl<sup>1</sup>

<sup>1</sup>University of Bayreuth, Bayreuth, Germany, <sup>2</sup>University of Regensburg, Regensburg, Germany, <sup>3</sup>Robert-Koch-Institute, Berlin, Germany

**SO.3.23 - Working with participatory research designs in mental health, UKK - Hall D (Level 2 - main floor), June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** K. Participatory Research in Health Promotion

**Purpose** Participation of men 50 plus in programs to promote health-enhancing physical activity (HEPA) is low. Due to socially constructed roles and expectations, men 50 plus are more likely to deny engagement in those programs, to prove adherence to the construct of masculine “toughness” or strength. Improving social and environmental conversion factors by working with rather than against sociocultural influences on behaviour is a promising way to increase participation rates of men in HEPA. However, there is a lack of capacity in many communities to conceptualize and implement corresponding programs. For that reason, ACTION for men (A4M) aims to (a) develop capacities for gender-sensitized HEPA promotion addressing men 50 plus by a participatory approach in two rural communities in Germany, and (b) scale up good-practice models.

**Methods** We implemented participatory stakeholder groups in each community. These groups were motivated to develop and implement gender-sensitized measures for HEPA promotion for men 50 plus. For measuring capacity building processes a semi-standardized monitoring protocol was used to document all group meetings (23 protocols) and 13 semi-standardized interviews with group participants and drop-outs were conducted. All documents were analysed using thematic analysis along relevant dimensions of capacity building suggested in literature (e.g., problem solving, resource mobilization, leadership).

**Results** We successfully established stakeholder groups that conceptualized and implemented a range of local measures meant to increase HEPA among men 50 plus (e.g. new gender-sensitized HEPA programs with a low-threshold access). Capacity building was successful to a certain degree (e.g., regarding participation, problem assessment, and resource mobilization). Capacity building processes differed between communities in terms of leadership, sustainability and critical awareness. Two good-practice models turned out: The SportCard, as a trial offer for men-specific courses of different sports club courses, and a standardized men-specific HEPA program. These measures have been scaled up to other municipalities and umbrella sports organisations.

**Conclusions** A successful capacity building approach can result in improved social and environmental conversion factors regarding physical activity for men 50 plus. Success of the approach mainly depends on the composition of stakeholder groups and inherent power relations.

# Movement Matters: A co-produced physical activity and motor competence intervention for children with intellectual disabilities.

**Dr. Sarah Taylor**<sup>1</sup>, Prof. Lynne Boddy<sup>1</sup>, Dr. Samantha Downs<sup>1</sup>, Dr. Arlene McGarty<sup>2</sup>, Dr. Bronagh McGrane<sup>3</sup>, Dr. James Rudd<sup>4</sup>, Dr. Benjamin Buckley<sup>1,5</sup>, Dr. Lawrence Fowweather<sup>1</sup>

<sup>1</sup>Liverpool John Moores University, Liverpool, United Kingdom, <sup>2</sup>University of Glasgow, Glasgow, United Kingdom, <sup>3</sup>Dundalk Institute of Technology, Dundalk, Ireland, <sup>4</sup>Norwegian School of Sport Sciences, Oslo, Norway, <sup>5</sup>University of Liverpool, Liverpool, United Kingdom

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**Purpose** The purpose of this study was to co-produce and trial the feasibility of an intervention aimed at improving physical activity (PA) and motor competence (MC) levels of children with intellectual disabilities (ID) aged 8-10 years. Interventions targeting both these outcomes in children with ID are scarce. Co-production has been suggested as a more appropriate approach to intervention development as it uses stakeholder knowledge, understanding, and lived experiences to produce context-sensitive, effective, and sustainable strategies.

**Methods** Across the Liverpool city region (UK), 49 individuals representing education, sport, charities, health, and parents/families were invited to participate in the co-production. Local Special Educational Needs Schools were invited to participate in a 5-week feasibility trial. Feasibility outcomes included, eligibility and recruitment of schools, training satisfaction, dose delivered, programme satisfaction, completed outcome measures of The Bruininks-Oseretsky Test of Motor Proficiency-2, accelerometry-assessed PA and anthropometrics, and attrition from baseline to follow up.

**Results** Twelve individuals participated in four co-production workshops. Stakeholder groups included, professionals, relatives of an adult/child with ID, parents of an adult/child with ID, adults/children with ID. Additional co-production discussions were held outside of these workshops with parents at charity group meetings and children in schools. Stakeholders co-produced six programme ideas: 1) Teacher/coach training. 2) School-based PA. 3) Family co-participation. 4) Parental education. 5) School multi-skill event. 6) Role models. For the feasibility trial, two schools were recruited (recruitment rate of 13%). Completion rate of the outcome measures with 25 participants was 67.0% at baseline and 40.5% at follow up. One participating school was not able to complete the fulfilments of the MM programme, meaning 12 participants were lost from baseline to follow up. The training course was not completed in full by any school staff, with time cited as a reason for two participating staff. One school reported successfully implementing the remaining strategies as recommended.

**Conclusions** To proceed to pilot, changes to eligibility/recruitment criteria, school commitment enhancement strategies, and adjustments to the training component are required. Learnings from this study, such as workshop tasks and techniques used to engage the public in intervention design can be used and adapted for future research.

# The current and potential role of physical activity within holistic health support for people living with severe mental illness.

**Dr. Ilaria Pina**<sup>1</sup>, Ms. Sue Webster<sup>5</sup>, Dr. Vanessa Pinfold<sup>5</sup>, Dr. Emily Henderson<sup>4</sup>, Prof. Tammi Walker<sup>3</sup>, Prof. Kate Walters<sup>2</sup>, Prof. David Osborn<sup>2</sup>, Prof. Emily Oliver<sup>1,3</sup>

<sup>1</sup>Newcastle University, Newcastle upon Tyne, United Kingdom, <sup>2</sup>University College London, London, United Kingdom, <sup>3</sup>Durham University, Durham, United Kingdom, <sup>4</sup>Northumbria University, Newcastle upon Tyne, United Kingdom, <sup>5</sup>The McPin Foundation, London, United Kingdom

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**Purpose:** People living with severe mental illness (SMI) are over three times more likely to have a physical health condition, and die on average 15-20 years earlier, than others in the general population. One determinant of these premature deaths is modifiable health-related behaviour, with high levels of physical inactivity and sedentary behaviour overlapping with other behavioural and social risk factors. Although effective health promotion services exist, provision is mixed and engagement relatively poor. Here, we explored the perspectives of people with SMI on existing and potential holistic health support services, with a particular focus on the role of physical activity, to better inform implementation and service planning.

**Methods:** Qualitative data were collected using future workshops and semi-structured interviews with adult experts by experience, defined as people living with SMI and/or carers and close family members. These were conducted online and in-person, and analysed using reflexive thematic analysis with a lens provided by the Consolidated Framework for Implementation Research. Analyses were further informed by a lived experience advisory panel and peer researcher engagement.

**Results/findings:** People with SMI advocated for a more holistic health approach in healthcare, and experienced fragmentation and neglect of their physical health needs: *"I'll often say that I feel like I'm just a piece of a part of the body, but nobody looks at it like the whole, like the impact as a whole."* Physical activity was experienced as a context of holistic health- and life-enhancing experiences, with creative, community-based and immersive experiences particularly valued. While disconnection between healthcare and physical activity services was experienced as frustrating and impaired access, participants were keen that community-based physical activity provision did not become 'overmedicalised' and risk losing some of its effective characteristics (e.g., community spirit, joy).

**Conclusions:** Physical activity experiences, especially in community settings, were advocated by people living with SMI as a contributor to their holistic health and 'living well'. For effective integration in, or partnerships with, more formal health support services, enhanced cross-sector communication, information-sharing, and wider referral and entry pathways are required. Without these, implementation settings will remain challenging.

# Exploring the Needs of People with Low Health Literacy for Lifestyle Counselling: A Qualitative Study

**Ms. Eclair Hietbrink<sup>1,2</sup>**, Dr. Anouk Middelweerd<sup>1</sup>, Ms. Marlin Meulman<sup>3</sup>, Ms. Anouk Logtenberg<sup>3</sup>, Ms. Lara Schemkes, Ms. Manou Hijink<sup>3</sup>, Ms. Petra Welmers<sup>3</sup>, Ms. Eline Droppers<sup>3</sup>, Ms. Dorthe Brands<sup>3</sup>, Mr. Arie Koster<sup>3</sup>  
<sup>1</sup>University of Twente, Enschede, Netherlands, <sup>2</sup>Ziekenhuisgroep Twente (ZGT), Almelo, Netherlands, <sup>3</sup>Saxion University of Applied Sciences, Enschede, Netherlands

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**Purpose:** Health literacy forms the basis of a healthy lifestyle. Almost thirty percent of the Dutch population has low health literacy (LHL), which means that they have difficulty obtaining, understanding, and applying health-related information. Therefore, this group has more difficulty maintaining a healthy lifestyle. Many existing lifestyle counselling interventions are not accessible to people with LHL because those are not tailored to their needs. This study explored the needs of people with LHL regarding physical activity and dietary counselling.

**Methods:** From 3 October to 11 November 2022, 13 semi-structured interviews were conducted among 8 people with LHL and 5 healthcare professionals familiar with the target group. Participants were recruited through interest groups for people with LHL. Interview topics included adherence to a healthy lifestyle, comprehensibility of current lifestyle counselling, and needs regarding lifestyle counselling. All interviews were audio-recorded, transcribed non-verbatim, and coded applying inductive thematic analysis.

**Findings:** Five main themes emerged: (1) challenges in adhering to lifestyle advice, (2) problems with comprehensibility of lifestyle counselling, (3) mode of delivery, (4) understandability of the information, (5) applicability of the information. Participants often did not follow lifestyle advice because they did not know how to apply the advice in daily life. Current lifestyle guidance through consultations with healthcare professionals and leaflets were often misunderstood due to the use of long sentences with difficult terminology and numbers. Participants found existing apps for lifestyle guidance too difficult to use. Participants preferred blended lifestyle counseling in which guidance from a healthcare provider is complemented with daily guidance. They would prefer to receive daily guidance via a simple app or paper workbooks. To provide comprehensible lifestyle counselling, it is important to consider the choice of words and style, the structure, the use of numbers, and the use of images. To make lifestyle advice applicable, it is important that the advice encourages concrete actions with an explicit step-by-step plan.

**Conclusions:** The findings provide concrete starting points for developing interventions to support a healthy lifestyle in people with LHL. The insights will be used to develop a physical activity and dietary intervention through co-creation with the target group.



# Availability of Healthy and Unhealthy Foods in Supermarkets in Urban Ireland

**Ms. Sinead O'Mahony**<sup>1,2</sup>, Miss Aideen McCann<sup>1</sup>, Mrs. Nuala Collins<sup>1</sup>, Prof. Gerardine Doyle<sup>2</sup>, Dr. Kevin Burke<sup>3</sup>, Prof. Adrian Moore<sup>4</sup>, Prof. Eileen Gibney<sup>2</sup>

<sup>1</sup>Food Safety Authority of Ireland, Dublin, Ireland, <sup>2</sup>University College Dublin, Dublin, Ireland, <sup>3</sup>University of Limerick, Limerick, Ireland, <sup>4</sup>University of Ulster, Coleraine, United Kingdom

**SO.3.24 - Studies on food and drink consumption, accessibility, and purchasing behavior, UKK - K1 (+K2) (Level 3), June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Sugar and saturated fat in Irish adult diets are in excess of the World Health Organisation (WHO) recommended intakes. Supermarkets account for 91% of food purchased from grocery retailers by consumers in Ireland. Despite the importance of supermarkets in consumer food choice, to date there has been no research on the availability of healthy and unhealthy foods sold in Irish supermarkets. The aim of this study was to measure shelf space allocation to healthy and unhealthy foods in supermarkets in Dublin, Ireland in areas of high and low socio-economic deprivation.

**Methods:** Three of the five large grocery retailers in Ireland participated in the study, accounting for approximately 50% of market share. Supermarkets in Dublin, Ireland were mapped by area level socio-economic deprivation and sampled representatively. The INFORMAS Food Retail Module: Food Availability in Supermarkets Protocol was applied in 36 supermarket stores between October 2021 – February 2022. Shelf space (height (cm) x length (cm)) was measured for seven food categories, representative of healthy and unhealthy food offerings, using a five-metre measuring tape. Available shelf space (cm<sup>2</sup>) for healthy and unhealthy foods was calculated as defined by the protocol.

**Results:** The study found for every 100cm<sup>2</sup> of shelf space, 69cm<sup>2</sup> was allocated to unhealthy foods and 31cm<sup>2</sup> was allocated to healthy foods. There was little difference between area level socio-economic deprivation. In areas of low socio-economic deprivation (affluent and marginally above average) for every 100cm<sup>2</sup> of shelf space, 69cm<sup>2</sup> was allocated to unhealthy foods and 31cm<sup>2</sup> was allocated to healthy foods. In areas of high socio-economic deprivation (disadvantaged and marginally below average) for every 100cm<sup>2</sup> of shelf space, 70cm<sup>2</sup> was allocated to unhealthy foods and 30cm<sup>2</sup> was allocated to healthy foods.

**Conclusion:** This study found more shelf space allocated to unhealthy than healthy foods in supermarkets in Dublin, Ireland. Allocation of shelf space to healthy and unhealthy food does not differ by area level socio-economic deprivation, in this urban context. Findings indicate an opportunity to improve the allocation of shelf space to healthy foods in Irish supermarkets to support healthier food choice by consumers.

# “It seems as though there are healthy options but still the bad options too”: Staff and visitor satisfaction with food and drinks in New Zealand healthcare facilities

**Miss Magda Rosin<sup>1</sup>**, Dr. Sarah Gerritsen<sup>1</sup>, Dr. Yannan Jiang<sup>2</sup>, Mr. Bruce Kidd<sup>2</sup>, Miss Stephanie Shen<sup>2</sup>, Mrs. Elaine Umali<sup>2</sup>, Dr. Sally Mackay<sup>1</sup>, Associate Professor Lisa Te Morenga<sup>3</sup>, Prof. Cliona Ni Mhurchu<sup>2</sup>

<sup>1</sup>School of Population Health, Faculty of Medical and Health Sciences, The University of Auckland, Auckland, New Zealand, <sup>2</sup>National Institute for Health Innovation, The University of Auckland, Auckland, New Zealand, <sup>3</sup>Research Centre for Hauora and Health, Massey University, Mt Cook, Wellington, New Zealand

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**SIG - Primary Choice:** H. Policies and environments

**Purpose:** A voluntary National Healthy Food and Drink Policy was released in New Zealand in 2016 to encourage public sector organizations to provide healthier food/drink options for staff and visitors in line with national dietary guidelines. However, staff and visitor satisfaction with the available food/drink options has not been assessed. This study aimed to collect feedback on the current food environment in healthcare facilities and any perceived changes resulting from the implementation of the Policy.

**Methods:** Electronic and paper-based surveys were undertaken from June 2021 to August 2022 in 18 (out of 20 total) District Health Boards (regional healthcare facilities) and one central government agency. Participants were invited to complete the surveys via in-person recruitment onsite, paper flyers and posters in healthcare facilities, organizational staff email lists, and social media platforms. Quantitative data were analyzed using SAS v.9.4©, with the primary outcome measure being staff and visitors' satisfaction with the food/drink available. Free-text data were analyzed using a qualitative general inductive approach.

**Results/findings:** Surveys were completed by 2,526 hospital staff and 261 visitors. Most staff participants were nurses (27.9%), administration staff (23.2%), allied health workers (21.9%), and doctors (8.7%). Staff were more aware of the healthy food/drink policy (79.3%) than visitors (56.3%). Both groups generally supported having organizational guidelines (62.7% staff and 76.9% visitors). Staff noticed changes in the food/drink healthiness in the period following policy implementation, but indicated healthy options were not more affordable. The mean satisfaction score of the available food/drink on a scale of 1 (very dissatisfied) to 10 (very satisfied) was 4.7 (SD 2.3) for staff and 6.5 (SD 2.5) for visitors. Preliminary qualitative analysis indicates that variety, cost, quality and taste of food/drinks, and perception of freedom of choice, are important to staff and visitors in healthcare facilities.

**Conclusion:** Hospital staff and visitors are reasonably satisfied with the available food/drink options and noticed an improvement in healthy food/drink availability, but not affordability, following the introduction of a voluntary national food policy. Survey respondents provided valuable suggestions for further improving current food environments.

# Exploring socioeconomic patterning of online food outlet accessibility through online food delivery services in seven European countries

**Dr. Jody Hoenink**<sup>1</sup>, Ms. Yuru Huang<sup>1</sup>, Mr. Matthew Keeble<sup>1</sup>, Assistant Professor Joreintje Mackenbach<sup>2</sup>, Dr. Gabriela Matias de Pinho<sup>3</sup>, Dr. Thomas Burgoine<sup>1</sup>, Prof. Jean Adams<sup>1</sup>

<sup>1</sup>University of Cambridge, Cambridge, United Kingdom, <sup>2</sup>Amsterdam UMC, Amsterdam, Netherlands, <sup>3</sup>Utrecht University, Utrecht, Netherlands

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**Purpose:** Use of online food delivery services (OFDS) has increased in recent years. This trend is concerning given that most food sold by OFDS is 'unhealthy'. Furthermore, dietary consumption and diet-related morbidity is socioeconomically patterned. Online food outlet access and its socioeconomic patterning has rarely been studied at a national or international scale. We explored access to food outlets through the most popular OFDS across seven purposively selected European countries to maximise variation in income and OFDS usage. We also investigated how online food outlet access varies by area-level socioeconomic position (SEP) in each country.

**Methods:** In this cross-sectional study, we automated collection of data on all food outlets registered with the leading OFDS (e.g. Just Eat Takeaway.com) in 2022 in England, Italy, Luxembourg, the Netherlands, Portugal, Spain and Switzerland. For each country, we linked area-level online food outlet access to socio-demographic information (i.e. area size, number of residents, income and social assistance rate as available) using a geographic information system. We used negative binomial regression models to investigate associations between area-level SEP quintiles and online food outlet access adjusted for population density.

**Results:** Median number of food outlets accessible online per 1000 residents was highest in England (14 food outlets online (IQR 4-31)) and lowest in Italy, Portugal and Spain (0 food outlets online (IQR 0-1)). In Italy, Luxembourg, Portugal and Spain, more socioeconomically advantaged areas had greater online food outlet access (e.g. Italy Q4 vs Q1 IRR= 5.8, 95%CI= 4.7; 7.1) compared with less socioeconomically advantaged areas. The reverse was seen in Switzerland, where more socioeconomically advantaged areas had less online food outlet access (e.g. Q4 vs Q1 IRR= 0.7, 95%CI= 0.6; 0.8). In the Netherlands and England, socioeconomic patterning was U-shaped; the most socioeconomically advantages areas had the greatest online food outlet access, and those in the second least advantaged areas had the least access.

**Conclusion:** National context appears to contribute to the socioeconomic patterning of online food outlet access. Further work is needed to understand drivers of disparities in online food outlet access by country, as well as possible implications for public health.

# Evaluation of the updated Nutri-Score algorithm in a Norwegian setting

**Dr. Bente Øvrebo<sup>1</sup>**, Dr. Marianne Hope Abel<sup>1</sup>, Dr. Anne Lise Brantsæter<sup>1</sup>, Prof. Lene Frost Andersen<sup>2</sup>

<sup>1</sup>Norwegian Institute of Public Health, Oslo, Norway, <sup>2</sup>University of Oslo, Oslo, Norway

**SO.3.24 - Studies on food and drink consumption, accessibility, and purchasing behavior, UKK - K1 (+K2) (Level 3), June 17, 2023, 9:40 AM - 10:55 AM**

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**Purpose** The Nutri-Score is a candidate for a harmonized mandatory front-of-pack nutrition label enabling consumers in the EU to make healthier food choices. We aim to evaluate the updated Nutri-Score algorithm (2022) in a Norwegian setting by exploring its ability to discriminate the nutritional quality of foods, with emphasis on challenges previously cited by the Nordic countries such as the scoring of fish and oils. Additionally, we assess its agreement with food-based dietary guidelines (FBDG). To our knowledge, we are the first to evaluate the updated Nutri-Score algorithm independent of the Nutri-Score Scientific Committee.

**Methods** The updated Nutri-Score has been calculated for a) general foods and b) fats, oils, nuts and seeds in a Norwegian food database containing 1,631 foods and will be calculated for all foods in a national database for branded foods sold in grocery stores (n~40,000).

The discriminatory ability of the algorithm is considered by exploring the distribution of Nutri-Score in overall food categories and in subcategories using boxplots and frequency tables. Agreement with FBDG is assessed by exploring scores for different foods with specific recommendations, expecting higher scores for foods we should increase intake of, and opposite for foods we should limit.

**Results/findings** In general, preliminary findings indicate that the updated Nutri-Score algorithm discriminates nutritional quality of foods within and between food categories. The updated algorithm also aligns better with Norwegian FBDG, particularly related to fish and fats with different fat quality and content, which are previously cited challenges. Limitations might remain as the algorithm may not capture small, but perhaps important, differences in nutritional composition in some food categories which could be important for health, such as by fat content in cheese.

**Conclusions** Overall, the updated Nutri-Score algorithm shows promising results on its ability to discriminate the nutritional quality of foods, and it appears to have improved previously cited limitations. This is important for Nutri-Score's trustworthiness and potential of use. To fully assess the performance of the updated Nutri-Score algorithm in a Norwegian setting, a more thorough evaluation is currently conducted using a database containing all branded foods sold in Norwegian grocery stores.

# The evolution of online food delivery service: recommended industry actions to support healthier out-of-home food consumption

**Assistant Professor Lana Vanderlee**<sup>1,2</sup>, Prof. Gary Sacks<sup>3</sup>

<sup>1</sup>Université Laval, Quebec, Canada, <sup>2</sup>Centre NUTRISS, Quebec, Canada, <sup>3</sup>Deakin University, Melbourne, Australia

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**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Food ordered using online food delivery (OFD) services represents an increasingly large proportion of out-of-home food purchases. This study aimed to create an evaluation framework for assessing OFD company policies, commitments and actions to create healthier food environments and support efforts to improve population diets.

**Methods:** Drawing upon the Business Impact Assessment—Obesity and Population-Level Nutrition (BIA-Obesity) framework developed as part of INFORMAS, evidence from peer-reviewed and grey literature was synthesized and expert opinion was sought to identify recommended industry actions that OFD aggregators (e.g., UberEats, JustEat) could undertake across six domains: *corporate strategy*; *external relationships*; *nutrition labelling*; *promotions and pricing*; *product and outlet availability*; and *product formulation*.

**Results/findings:** In the domains of *corporate strategy* and *external relationships*, recommended industry actions were consistent with those for other food industry sectors, including targeted corporate commitments to nutrition and health with transparent reporting. In *nutrition labelling*, recommended actions included the labelling of nutrition and/or energy information in ways that are consistent and easy to access and understand, with transparency on mechanisms used to identify 'healthier' products/outlets. In *promotions and pricing*, recommended actions included measures to reduce children's exposure to unhealthy products and brands. These measures included commitments to not sponsor sporting, cultural or other activities popular with children and/or in settings where children gather, and to not use celebrities or animated characters that appeal to children. Recommended actions to restrict promotions for unhealthy products/brands included avoiding premium offers, price promotions or loyalty benefits for unhealthy products/brands. In *product and outlet availability*, recommended actions included mechanisms to ensure greater availability of healthier food items and healthier outlets, including opportunities for consumers to prioritize access to healthier food items. No actions were identified for *product formulation*; however, the recommended actions in other domains are likely to promote reformulation from food service companies.

**Conclusions:** OFD companies have the opportunity to contribute to efforts to improve population diets, particularly through their large reach and function as an aggregator, and their potential influence over food service companies. Monitoring the policies and actions of OFD companies may help improve their accountability for creating health-promoting food environments.

# Household purchases of sugar-sweetened, artificially sweetened, and unsweetened beverages: A five-year time trend analysis using New Zealand NielsenIQ Homescan market research data

**Dr. Helen Eyles<sup>1</sup>**, Ms. Sah Dodd<sup>1</sup>, Dr. Kelly Garton<sup>1</sup>, Dr. Yannan Jiang<sup>1</sup>, Dr. Teresa Castro<sup>1</sup>

<sup>1</sup>University of Auckland, Auckland, New Zealand

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**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Sugar-sweetened beverages (SSBs) are a significant source of dietary free sugars, thus providing a suitable target for nutrition-related policies and interventions. However, in Aotearoa New Zealand (NZ), no such strategy has been implemented, and data on the consumption of SSBs and their less sugary counterparts are lacking. Our aims were to assess (1) recent annual household purchase volumes and percentages of SSBs, artificially sweetened beverages (AFSBs), and unsweetened beverages (USBs), (2) differences in purchase volumes of beverages by household composition and income, and (3) changes in purchase volumes of beverages over time (2015 to 2019).

**Methods:** We used annual household purchasing data from NielsenIQ Homescan, a geographically and demographically representative consumer panel of ~ 1,800 NZ households per year. The sugar content of beverages was acquired from a NZ supermarket food composition database (Nutritrack). Beverages were classified based on sweetener type and amount. The outcome of interest was total annual household purchase volume (in litres) of all eligible non-alcoholic beverages. Analysis of variance (ANOVA) was used to compare household purchase volumes between household characteristics and years.

**Results:** In 2019, mean (SD) annual household purchase volumes for SSBs were 72.3 (93.0) L (33%), AFSBs were 32.5 (79.3) L (15%), and USBs were 112.5 (100.9) L (52%). Households with more adults or children generally purchased more of all beverages, except AFSBs. Households earning < \$NZ 30,000 generally purchased fewer of all beverages, except SSBs. Household purchases of SSBs dropped from 78.2 (91.5) L in 2015 to 72.3 (93.0) L in 2019, and AFSBs increased from 27.2 (72.7) L to 32.5 (79.3) L, respectively (both  $p=0.03$ ). No changes over time were observed for total or USBs.

**Conclusions:** Most beverages purchased by NZ households were AFSBs or USBs, and household SSB purchases dropped from 2015 to 2019. However, the reduction in SSBs was small and thus unlikely to improve health. Further, equal spending on SSBs by household income suggests greater relative spending for those on lower incomes. Findings support the need for policies and interventions to reduce SSB consumption in NZ and highlight that such strategies must focus on reducing inequities.



# Benchmarking the online fast food supply against the NSW Menu Labelling Scheme

**Miss Sophia Cassano**<sup>1</sup>, **Miss Anna Jia**<sup>1</sup>, Dr. Stephanie Partridge<sup>1</sup>, Dr. Alice Gibson<sup>1</sup>, Prof. Margaret Allman-Farinelli<sup>1</sup>, Miss Sisi Jia<sup>1</sup>

<sup>1</sup>University of Sydney, Sydney, Australia

**SO.3.24 - Studies on food and drink consumption, accessibility, and purchasing behavior, UKK - K1 (+K2) (Level 3), June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** In New South Wales (NSW), Australia, it is mandatory for large food outlets (>20 locations) to display kilojoule (kJ) labelling at point-of-sale under the Menu Labelling Scheme. It is unknown how well this scheme is implemented on Meal Delivery Applications (MDAs) which sell food via an online platform. Additionally, mid-sized food outlets that escape the scheme criteria, are potentially providing foods which may also warrant kJ labelling. This study aimed to examine the prevalence of kJ labelling on the menus of large food outlets on franchise-owned (single large food outlet app) and third-party (aggregated food outlets app such as Uber Eats, Menulog, Deliveroo) MDAs in Sydney, Australia. A secondary aim was to evaluate the nutritional quality of menu items from mid-sized food outlets.

**Methods:** Cross-sectional observational study. Ten suburbs across Sydney were randomly selected to represent all deciles of the SEIFA Index of Relative Socioeconomic Disadvantage. Large food outlets were identified as those that had >20 locations in NSW, mid-sized food outlets had between 5-20 locations. From 24<sup>th</sup> August to 14<sup>th</sup> September 2022, publicly available data was extracted. The prevalence of kJ labelling on online menus of large food outlets was assessed. Using the Australian Dietary Guidelines, the proportion of 'discretionary' menu items from mid-sized outlets that are energy-dense, nutrient-poor was calculated.

**Results/findings:** On franchise-owned MDAs, 91% (21/23) of large food outlets had some form of kJ labelling, and 35% (7/23) had complete kJ labelling. In comparison, only 4.8% (2/42), 5.3% (2/38) and 3.6% (1/28) of large outlets on Uber Eats, Menulog and Deliveroo had complete kJ labelling, respectively. Kilojoule labelling was also inconsistent between outlet locations across MDAs. Of the 452 menu items from mid-sized outlets, 76.3% (345/452) were classified as 'discretionary.'

**Conclusions:** Kilojoule labelling was absent or incomplete on a high proportion of online menus, predominately on third-party MDAs. Mid-sized outlets also offered a large proportion of discretionary choices which highlights a need to broaden the criteria for outlets subject to the Menu Labelling Scheme. The findings combined with the increasing popularity of MDAs show nutrition policies must be updated to include online forms of food retail.

# The quality and accuracy of nutrition information on Instagram

**Ms. Emily Denniss<sup>1</sup>**, Dr. Rebecca Lindberg<sup>1</sup>, Prof. Sarah McNaughton<sup>1</sup>

<sup>1</sup>Institute for Physical Activity and Nutrition, School of Exercise and Nutrition Sciences, Deakin University, Melbourne, Australia

**SO.3.24 - Studies on food and drink consumption, accessibility, and purchasing behavior, UKK - K1 (+K2) (Level 3), June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose:** Online health misinformation is a major issue. Social media has become a popular source of nutrition information and can influence eating behaviours. Thus far, no studies have examined the quality and accuracy of nutrition information on Instagram. Therefore, the aim of this study was to evaluate the quality and accuracy of nutrition information posted by popular Australian Instagram accounts.

**Methods:** Australian Instagram accounts with over 100,000 followers, that primarily posted about nutrition were identified, and all posts containing nutrition information from a 12-month period were identified (n = 10,964 posts). A random subsample of these posts was analysed for the present study. The quality of posts was evaluated using the PRinciples for Health Information on Social Media (PHRISM) tool. Posts were assessed with an overall quality score (0-100, where a higher score indicated higher quality). The accuracy of information was evaluated against the Australian Dietary Guidelines, Practice-based Evidence in Nutrition database and the Metafact fact-checking platform. Descriptive statistics and significance of overall difference in quality and accuracy scores between Instagram account categories and Instagram post topics using one-way ANOVA will be calculated in Stata. Post hoc significance tests will be calculated using the Tukey-Kramer method. Pearson's correlation coefficient will be used to determine correlation between quality and accuracy.

**Results/findings:** A total of 715 posts were included in the final sample. Preliminary results of quality evaluations reveal 35% of posts were poor, 61% mediocre, 11% good and 0% excellent quality. The average quality score was 31/100. The majority of posts (57%) contained inaccuracies and 43% of posts were completely accurate.

**Conclusions:** Findings from this study indicate that the quality and accuracy of nutrition information posted by Australian influencer accounts is suboptimal, suggesting that the public are at risk of exposure to unreliable nutrition information. More work is needed to understand the role of social media on food literacy, to understand the role of credible nutrition experts on social media and to improve the public's e-health literacy. Improved policies to regulate harmful health misinformation on social media and greater monitoring of health information are also needed.

# The nutrient composition and Health Star Rating of packaged foods manufactured by major New Zealand food and beverage companies: 2015 to 2019: a trend analysis

**Dr. Leanne Young<sup>1</sup>**, Mr. Bruce Kidd<sup>1</sup>, Ms. Stephanie Shen<sup>1</sup>, Dr. Yannan Jiang<sup>1</sup>, Prof. Cliona Ni Mhurchu<sup>1</sup>

<sup>1</sup>The University of Auckland, Auckland, New Zealand

**SO.3.24 - Studies on food and drink consumption, accessibility, and purchasing behavior, UKK - K1 (+K2) (Level 3), June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** H. Policies and environments

**Purpose** We aimed to evaluate the healthiness and nutrient composition of packaged foods manufactured by major New Zealand food and beverage companies over time (2015-2019). This analysis is part of a larger randomised trial evaluating structured engagement with food companies as a method to improve nutrition-related policies and actions.

**Methods** The largest food and beverage companies operating in New Zealand (n=36) were identified based on sales revenue and market share data sourced from the Euromonitor 2019 database. All relevant brands and products from the companies were selected from the Nutrtrack database, and their composition over five years (2015-2019) was examined. The primary outcome was the product health star rating (HSR) estimated using Nutrition Information Panel and food ingredient information. Healthiness was defined as a minimum of 3.5 stars (out of a maximum of 5). Secondary outcomes included the product sodium (mg per 100g or 100mL), total sugar (g per 100g or 100mL) and saturated fat (g per 100g or 100mL) contents.

All outcomes were summarised overall, by company, by major food category, and over time. Change over time was tested using linear mixed models, adjusting for company and major food categories. Model-adjusted mean differences between years were estimated with 95% confidence intervals.

**Results/findings** The category sales revenue of the 36 identified companies ranged from 15-229 million GBP for beverages and 18-744 million GBP for packaged foods. Category market share for beverages ranged from 28-41% and packaged food from 0.1-12% (2019). The total number of products included in this analysis across the five years was ~18,000 which accounts for approximately one-quarter of products each year in Nutrtrack. Detailed findings on change over time in HSR and nutrient content will be presented.

**Conclusions** Comprehensive, independent monitoring of the composition of packaged foods and beverages is important to understand if government-led reformulation programmes and nutrition labelling policies incentivise the packaged food industry to reformulate and produce healthier foods.

# Can parenting practices predict adolescents' 24-hour movement behaviours? A compositional data approach based on accelerometer data.

**Mrs. Vera Verbestel**<sup>1</sup>, Miss Iris willems<sup>1,2</sup>, Miss Marga Decraene<sup>1</sup>, Prof. Marieke De Craemer<sup>1</sup>

<sup>1</sup>Ghent University, Ghent, Belgium, <sup>2</sup>Research Foundation Flanders, Brussels, Belgium

SO.3.25 - How can parenting support healthy behaviours in children and adolescents?, UKK - K3+4 (Level 3), June 17, 2023, 9:40 AM - 10:55 AM

**SIG - Primary Choice:** G. Children and families

**Purpose:** Optimal compositions of 24-hour movement behaviours (24-HMBs; i.e., sufficient sleep, low levels of sedentary time (ST), high levels of physical activity (PA)) are associated with positive health outcomes in adolescents. Adolescence is typically characterized by an increasing need for independence but parents remain important actors in developing and changing their children's behaviours. However, evidence is lacking on how parenting practices are related to adolescents' 24-HMB compositions. Getting insight in these associations can provide direction for interventions aiming to optimize 24-HMB compositions in adolescents. The aim of this study was therefore to investigate if parenting practices were associated with adolescents' 24-HMB compositions.

**Methods:** Valid 24-HMB data (i.e., sleep, ST, light and moderate-to-vigorous PA) were obtained from the ActiGraph GT3X in 72 Belgian adolescents (mean age: 14.82±1.73 years; 80% girls). An online questionnaire measured adolescents' socio-demographics and perceived parenting practices. Parenting practices were conceptualized within the self-determination theory and reflected the parental support provided to fulfil adolescents' psychologic needs of autonomy, competence, and relatedness (i.e., need-supportive parenting practices). To account for the intrinsic co-dependency of 24-HMBs, a compositional data approach was applied, followed by isometric log-ratio transformations on the compositional data. To investigate the association between parenting practices and 24-HMB compositions, linear regression models were used. Prediction models were applied to assess if 24-HMBs compositions changed with varying levels of parenting practices.

**Results:** Adolescents' daily composition consisted for 35% of sleep (505.34 min/day), 47% of ST (674.31 min/day), 18% of light PA (260.33 min/day) and 0.0014% of moderate-to-vigorous PA (0.02 min/day). Need-supportive parenting practices were not significantly associated with adolescents' 24-HMB compositions (relatedness:  $p=0.123$ , competence:  $p=0.824$ , autonomy:  $p=0.553$ ). When plotting prediction models, ST decreased whereas light PA and sleep increased with increasing need-supportive parenting practices. No substantial changes were observed in moderate-to-vigorous PA.

**Conclusions:** Given the dramatically low levels of moderate-to-vigorous PA and high levels of ST, findings of this study call for action to optimize 24-HMB compositions in adolescents. Increasing parental support to fulfil adolescents' needs for autonomy, competence, and relatedness might be a promising strategy to optimize adolescents' ST, light PA and sleep duration but more research is warranted.

# Weeknight Supper Savers: Family-based intervention to reduce household food waste

**Associate Professor Jess Haines<sup>1</sup>**, Mr. Amar Laila<sup>1</sup>, Dr. Kate Parizeau<sup>1</sup>, Dr. Michael von Massow<sup>1</sup>

<sup>1</sup>University of Guelph, Guelph, Canada

**SO.3.25 - How can parenting support healthy behaviours in children and adolescents?, UKK - K3+4 (Level 3), June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** To assess the feasibility, acceptability, and preliminary impact of Weeknight Supper Savers, a family-based food waste intervention.

**Methods:** Nineteen families with at least one child between 9-12 years of age and with no prior nutrition or food training participated in a pre/post design pilot study. Families completed a 4-week intervention, which was based on Theory of Planned Behaviour, and included: a) a chef-led online cooking class; b) a food waste toolkit that provided families with tips, kitchen tools, and recipes to reduce food waste, and c) tips to reduce food waste delivered via 4 text messages/week. The primary outcome was feasibility and acceptability of the intervention. Secondary outcomes were pre/post intervention changes in quantity of household food waste, and level of food literacy and waste-related knowledge, attitudes, and behaviours of parents and children.

**Results:** Of the 19 families who completed the baseline assessment, 18 families attended their scheduled cooking class. All parents (17 mothers; 12 fathers) and 17 of the 22 children who completed the post-intervention process survey reported being satisfied with the program. Compared to baseline, household avoidable fruit and vegetable waste and unavoidable other food waste significantly decreased by 37% and 53%, respectively. At post-intervention more parents reported being confident in reducing food waste and more children correctly interpreted “best before” dates as compared to baseline.

**Conclusion:** The Weeknight Supper Savers intervention was well-received and may decrease both avoidable and unavoidable household food waste. A full-scale randomized controlled trial with a larger sample is warranted.

# Perceptions and feeding experiences of Australian fathers of young children while living with disadvantage

**Mr. Tsz Hei Jeffrey So (corresponding author)**<sup>1</sup>, Dr. Kimberley A Baxter<sup>1</sup>, Dr. Rebecca Byrne<sup>1,2</sup>, Dr. Smita Nambiar-Mann<sup>1,2</sup>, Prof. Danielle Gallegos<sup>1</sup>

<sup>1</sup>Woolworths Centre for Childhood Nutrition Research, Faculty of Health, Queensland University of Technology, Brisbane, Australia, <sup>2</sup>School of Exercise and Nutrition Sciences, Faculty of Health, Queensland University of Technology, Brisbane, Australia

**SO.3.25 - How can parenting support healthy behaviours in children and adolescents?, UKK - K3+4 (Level 3), June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Fathers influence children's nutrition and development in a unique way. Research examining fathers' role in child feeding is gaining interest, however, paternal feeding practices in the context of disadvantage is limited. Family socioeconomic factors are associated with the physical and psychosocial development of children and can also impact caregivers' ability to feed responsively. The aim of this research was to explore the perceptions and experiences of feeding in fathers experiencing hardship.

**Methods:** This qualitative study employed a constructionist approach and symbolic interactionism lens to interpret meanings for behaviours. Fathers (n=25) of children aged between 6 months and 5 years who experienced financial hardship participated in semi-structured interviews across Australia. Interviews were analysed using reflexive thematic analysis.

**Results:** Five themes were constructed from the data: (i) disrupting normative gendered roles: from tension to acceptance, (ii) responsibilities for food work are based on strengths, opportunities and values, (iii) prioritising feeding children: managing adversities, (iv) contextual factors facilitate or hinder feeding practices, and (v) seeking out help: dads are "brushed to the side". Fathers embraced involved fatherhood norms. Their responsibilities for food work varied depending on family structure and capacity, employment, maternal gatekeeping, and intergenerational, cultural and gender norms around food provision. Economic, emotional and environmental stressors contribute to financial and mental strain, and food insecurity. Fathers described resource management strategies to maintain normality and protect children's food access at the expense of caregivers. Food parenting practices are driven by value, adversity and emotions. Challenging child behaviours coupled with limited resources and mental capacity triggered adjustment of feeding strategies to align with reality, such as tailoring to child food preferences and allowing screentime to avoid power struggles. Fathers reported feeling unsupported by health services and therefore sought information elsewhere, such as internet and social networks

**Conclusions:** Fathers are involved in feeding but faced personal and systemic barriers. It is crucial for health services to review their practices to include fathers and support their unique needs. The values that underpin father-child mealtime interactions and coping mechanisms amidst adversities can be leveraged to inform child feeding interventions to promote child health and development.



# Successfully involving parents in family lifestyle interventions. Where is the fun in that?

**Miss Lisa S.E. Harms<sup>1</sup>**, Assistant Professor Kathelijne M.H.H. Bessems<sup>1</sup>, Associate Professor Jessica S. Gubbels<sup>1</sup>, Associate Professor Patricia van Assema<sup>1</sup>, Assistant Professor Sanne M.P.L. Gerards<sup>1</sup>

<sup>1</sup>Department of Health Promotion, School of Nutrition and Translational Research in Metabolism (NUTRIM), Maastricht University, Maastricht, Netherlands

**SO.3.25 - How can parenting support healthy behaviours in children and adolescents?, UKK - K3+4 (Level 3), June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Families with young children are an important target group for prevention interventions. A relevant evolution has been the development of comprehensive multi-setting intervention approaches. Promising effects on child energy balance-related behaviours encourage the implementation of such interventions. Yet, a common barrier is the generally low reach and involvement of specifically parents. Therefore, we aimed to gain a better understanding of what works in involving parents, and why.

**Methods:** Multiple mixed method studies focused on two interventions targeted at children and families. The first, SuperFIT, is an effective intervention approach targeting families with young children (2-4 year olds) through increased attention for healthy nutrition and physical activity in the preschool and home setting. The second, Up for Cooking, targets families with children attending primary school (4-12 year olds) through an (online) food literacy cooking intervention. Three mixed-method studies with parents (n=38-54, total n=133) and implementers evaluated different elements of the interventions. An inductive approach used qualitative data (i.e., semi-structured interviews, open-ended questionnaires) to gain insight if, how and why parents applied newly acquired knowledge and skills in their daily family life, or why they did not. Quantitative data (i.e., over-time measurements of parenting practices, food literacy) was used to confirm perceived impact of the intervention.

**Findings:** Overall, the studies taught us that parents appreciated on-the-spot coaching for their child's behaviour, such as how to promote physical activity or the use of positive parenting practices. Having fun and receiving tangible materials were a major success factor in all activities. Children served as change agents, and their enthusiasm to take, for example, a mascot home was an important facilitator for parents to be involved in the intervention. In addition, parents liked to receive practical tips (i.e., child appropriate cutting techniques, simple games). At the same time, parents required more guidance and cues to change daily life routines consistently. There was room for improvement in accessibility, scheduling, and the use of narratives, to ensure fit with daily family routines.

**Conclusions:** This research adds to our knowledge on parental involvement in lifestyle interventions, by focusing on mixed-method approaches using qualitative and quantitative measurements.

# Parental and child characteristics are associated with low satiety responsiveness in children

**Ms. Catharina Sarkkola**<sup>1,2</sup>, Dr. Aino-Maija Eloranta<sup>3,4,5</sup>, Dr. Marja H Leppänen<sup>1,2</sup>, Dr. Heli Viljakainen<sup>1,2</sup>, Dr. Satu Männistö<sup>6</sup>

<sup>1</sup>Folkhälsan Research Center, Helsinki, Finland, <sup>2</sup>Faculty of Medicine, University of Helsinki, Helsinki, Finland, <sup>3</sup>Institute of Biomedicine, School of Medicine, University of Eastern Finland, Kuopio, Finland, <sup>4</sup>Institute of Public Health and Clinical Nutrition, University of Eastern Finland, Kuopio, Finland, <sup>5</sup>Department of Medicine, Endocrinology and Clinical Nutrition, Kuopio University Hospital, Kuopio, Finland, <sup>6</sup>Department of Public Health and Welfare, Finnish Institute for Health and Welfare, Helsinki, Finland

**SO.3.25 - How can parenting support healthy behaviours in children and adolescents?, UKK - K3+4 (Level 3), June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** G. Children and families

**Purpose** Low satiety responsiveness (SR) is thought to progress unhealthy weight development. SR evolves in early life, thus identifying children with a high risk of low SR is important. However, parental and child characteristics associated with low SR are not fully known. We therefore studied which family determinants increase the risk of low SR in school-aged children.

**Methods** This study included 5,973 children aged 9–12 years from the Finnish Health in Teens (Fin-HIT) cohort in 2011–2014. The parents filled in a questionnaire on their child's SR and parental feeding practices. Within the three-class variable, low SR was defined as parent agreeing or slightly agreeing with the statement "If I did not guide or regulate her eating she would eat too much". We had data on child characteristics: number of homes and siblings, age when entering daycare, food allergies, meal regularity, height and weight, and parental characteristics: age, socioeconomic status, depression, exhaustion, breastfeeding, height and weight. We used ordinal and stepwise logistic regression as statistical methods.

**Results** The frequency of low SR was 10.1% in the cohort. In the stepwise multivariate model, boys had an increased risk of low SR (OR 1.30, 95% CI 1.07–1.59) compared with girls. Children with overweight (12.1% of the cohort) and obesity (2.4%) had a 9- and 30-fold risk, respectively, for low SR, compared with normal weight children. Children whose parents cheered them up with something to eat if they were sad or upset had higher risk of low SR (OR 1.28, 95% CI 1.04–1.57). Parental depression was associated with higher risk of low SR in the children (OR 1.50, 95% CI 1.09–2.05). Eating breakfast and dinner irregularly and having two homes, a parent with overweight/obesity and with lower socioeconomic status were associated with low SR in the unadjusted model only.

**Conclusions** We identified parental feeding practices, e.g. cheering up the child with food, and parental depression as independent risk factors for low SR in school-aged children. The results contribute with new knowledge of determinants of SR, which could be targeted to manage overeating and prevent overweight in school-aged children.

# The role of supportive coparenting relationship quality in spillover from parental stress to family meals: An ecological momentary assessment study

Dr. Anna Hochgraf<sup>1</sup>, Dr. Allan Tate<sup>2</sup>, Dr. Katie Loth<sup>1</sup>, **Dr. Jerica Berge<sup>1</sup>**

<sup>1</sup>The University of Minnesota, Minneapolis, USA, <sup>2</sup>The University of Georgia, Athens, USA

**SO.3.25 - How can parenting support healthy behaviours in children and adolescents?, UKK - K3+4 (Level 3), June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Family meals are protective against the development of obesity and disordered eating among youth (Berge et al., 2015; Neumark-Sztainer et al., 2008). However, the extent to which family meals are protective may depend on meal atmosphere (Loth et al., 2015). Parents' experiences of daily stressors may hinder their capacity to facilitate family meals (Tate et al., 2020) and have implications for family meal atmosphere. We examined whether 1) family meals are less likely to occur and 2) meal atmosphere is less positive on days when parents experience higher-than-usual stress, and 3) whether coparenting support buffers these associations.

**Methods:** The analytic sample was 497 parents of children ages 5–7 years (racially stratified; Asian, Black, Hmong, Latinx, Somali, and White families) who participated in a mixed-methods study. Parents reported their coparenting relationship quality at baseline (Abidin & Brunner, 1995) and completed up to 8 days of ecological momentary assessments. Each day, parents reported their stress level, whether they ate dinner with their child, and how positive the meal atmosphere was. Multilevel logistic regression was used to address research questions.

**Results:** Findings suggested a trend such that on days when parents experienced higher-than-usual stress, odds of engaging in a family meal were lower (OR=0.92, 95% CI=[0.83, 1.01]). Coparenting support did not moderate this association. Higher-than-usual stress was associated with lower odds of positive meal atmosphere, and there was a trend for coparenting support predicting higher odds of positive atmosphere; however, these effects were qualified by an interaction between stress and coparenting (OR=0.89, 95% CI=[0.81, 0.97]). For each unit of stress above parents' usual level, the probability of positive meal atmosphere was 0.03 units lower for parents with high support and 0.02 units lower for parents with moderate support.

**Conclusions:** When parents experienced higher-than-usual stress, family meal atmosphere was less positive and higher coparenting support did not alleviate this. Although coparenting support is generally beneficial, it may be that when parents feel especially stressed and they have a highly involved coparent, negative emotions transmit more easily through families. Sources of stress and momentary perceptions of support may be key to elucidating these complex associations.

# Parental Controlling Feeding Practices Might Reduce Adolescents' Eating Competence. The STEPS Study.

**Mrs. Saija Tarro**<sup>1,2</sup>, Dr. Hanna Lagström<sup>1,2</sup>, Ms. Sabrina Granberg<sup>4</sup>, Dr. Mirkka Lahdenperä<sup>3</sup>

<sup>1</sup>Department of Public Health, University of Turku, Turku, Finland, <sup>2</sup>Centre for Population Health Research, University of Turku and Turku University Hospital, Turku, Finland, <sup>3</sup>Department of Biology, University of Turku, Turku, Finland, <sup>4</sup>The Faculty of Sport and Health Sciences, University of Jyväskylä, Jyväskylä, Finland

**SO.3.25 - How can parenting support healthy behaviours in children and adolescents?, UKK - K3+4 (Level 3), June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Eating competence concept, based on The Satter Eating Competence Model, includes eating attitudes, food acceptance, internal regulation and contextual skills. Competent eaters have natural and positive attitudes about eating and food. Parental feeding practices have been associated with child BMI status. However, the association of parental practices and eating competence are largely unknown among adolescents. We examined association between parental feeding practices and eating competence among adolescents aged 11-13 years.

**Methods:** We used data from a prospective Steps to Healthy Development follow-up study from South-West Finland, with 348 mother-adolescent dyads and 215 father-adolescent dyads. Eating competence was evaluated by using the Satter Eating Competence Inventory (ecSI 2.0) instrument filled by adolescents. Parental feeding practices were evaluated with Child Feeding Questionnaire filled by parents including following factors: Restriction, Pressure to Eat, Monitoring and Concern for adolescent's weight. Linear regression analyses were performed, with parental feeding practices as predictors and eating competence as dependent variables. Analyses were made separately for mother-adolescent pairs and father-adolescent pairs controlling for parental education and income, parent BMI, child BMI-SDS and child sex.

**Results:** We found that Restriction by mother but not by father, was associated negatively with adolescents' total eating competence score (Beta (95% CL): -1.95 (-3.15 – -0.75); p=0.002), eating attitudes (Beta (95% CL): -0.75 (-1.22 – -0.28); p=0.002) and food acceptance (Beta (95% CL): -0.58 (-0.93 – -0.22); p=0.002). In addition, higher scores in Pressure to Eat by mother and father, significantly reduced adolescent eating attitudes (p=0.03). In addition, mother's greater Concern for adolescent's weight was negatively associated with adolescent's total eating competence score (p=0.006), eating attitudes (p<0.001) and internal regulation (p=0.005).

**Conclusions:** The results indicate that food-related parenting practices may affect adolescents' eating competence. Especially Restriction and Pressure to Eat may be detrimental to adolescents' eating competence and positive eating attitudes. Further, Concern for adolescent's weight might be reflected in adolescent's eating competence. However, more studies are needed to further confirm this finding in more diverse samples and other food cultures.

# Do parents' intentions translate into behaviours?

## Examining parental support behaviours and device-measured physical activity among children and youth with disabilities

**Ms. Katerina Disimino**<sup>1</sup>, Ms. Maeghan E. James<sup>2</sup>, Dr. Christine Voss<sup>3</sup>, Dr. Rebecca L. Bassett-Gunter<sup>1</sup>, Dr. Kelly P. Arbour-Nicitopoulos<sup>2</sup>

<sup>1</sup>York University, Toronto, Canada, <sup>2</sup>University of Toronto, Toronto, Canada, <sup>3</sup>University of British Columbia, Vancouver, Canada

**SO.3.25 - How can parenting support healthy behaviours in children and adolescents?, UKK - K3+4 (Level 3), June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** G. Children and families

**Purpose:** Many children and youth with disabilities (CYD) do not engage in sufficient physical activity (PA), warranting the investigation of strategies to promote enhanced PA engagement. Limited research has explored the relationship between parental support for PA and child PA among families of CYD. Moreover, intentions to engage in parental support for PA often fail to translate into behaviour. The multi-process action control framework (M-PAC) serves as a tool for understanding this intention-behaviour gap and more optimally fostering parental support for PA. Guided by the M-PAC framework, this study examined the relationship between intentions, regulatory behaviours, and support behaviours with respect to parental support for PA and how, in turn, parental support for PA behaviours are related to child PA behaviours.

**Methods:** Data were collected cross-sectionally through the pan-Canadian National PA Measurement study. Parents (N=148; 89% mothers) of CYD aged 5 to 17 (71% boys; 51% developmental disabilities) completed an online questionnaire measuring variables related to parental support for PA on 5-point Likert scales (intentions, 1=strongly disagree to 5=strongly agree; regulatory behaviours, 1=never/rarely to 5=daily; support behaviours, 0=none to 4=daily). Child PA behaviours (i.e., step counts) were measured over a 28-day period via Fitbits. A regression (path) analysis was conducted using the statistical software R. Mean scale scores (intentions, regulatory behaviours, and support behaviours) and median step counts were the observed variables in the model.

**Results:** On average, parents had high intentions to support their children's PA (Med=4, IQR=1), engaged in regulatory behaviours once per month (Med=2, IQR=1.19), and provided support for their children's PA "sometimes" (Med=2, IQR=1.15), and children's step counts were 9654 steps per day (SD=3727). Aligning with the M-PAC framework, intentions ( $\beta=0.18$ ,  $p=0.009$ ) and regulatory behaviours ( $\beta=0.53$ ,  $p<0.001$ ) significantly predicted parental support for PA behaviours. In turn, parental support for PA behaviours significantly predicted child PA behaviours ( $\beta=0.18$ ,  $p=0.031$ ).

**Conclusions:** This is one of few studies to examine parental support for PA in families of CYD. Predictors of parental support for PA and child PA were identified, which will be necessary to effectively inform intervention targets that bridge the intention-behaviour gap and enhance PA behaviours among CYD.

# Community-Based Lifestyle Intervention Improves Behavioural and Health Outcomes for Singaporean Women

**Dr. Elaine Yee-Sing Wong<sup>1</sup>**, Prof. Andy H Lee<sup>1</sup>, Dr. Anthony P James<sup>1</sup>, Prof. Jonine Jancey<sup>1</sup>

<sup>1</sup>Curtin University, Perth, Australia

**SO.3.26 - Lessons learned from implementation in the community setting, Clarion Hotel Gillet - Room Gillesalen, June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** E. Implementation and scalability

**PURPOSE:** Physical inactivity and unhealthy eating habits are behavioural risk factors leading to a rise in non-communicable diseases (NCDs) among Singaporean women. To address the escalating NCDs, the Singapore Physical Activity and Nutrition Study (SPANS) is the first clustered randomised controlled (RCT) to examine the impact of a culturally relevant lifestyle intervention to improve behavioural and health outcomes among women aged  $\geq 50$  years.

**METHODS:** Social Cognitive Theory underpinned the 6-month community-based RCT targeting women from 27 recreational centres in Singapore. 682 participants were randomised to either the intervention ( $n = 351$ ) group to engage in the SPANS program (PA classes, nutrition workshops and dietary counselling sessions), and received health resources, or the control ( $n = 331$ ) group that received only a falls prevention booklet. Outcome measures consisted of PA and dietary behaviours, anthropometric, blood pressure (BP) measurements and health-related quality of life (HR-QOL) indicators. Pre-post measurements were collected and analysed using univariate statistics and generalised estimating equations (GEE) modelling.

**RESULTS:** A final analysed sample of intervention (295) and control (285) participants completed the intervention. After controlling for confounders, the GEE analyses confirmed that the intervention group displayed statistically significant mean increases in PA: moderate-intensity, vigorous-intensity and total ( $p < 0.001$ ); increased mean intake frequency of fruit ( $p = 0.001$ ), vegetables ( $p = 0.049$ ) and wholegrains ( $p = 0.041$ ), mean reduction in salt and salty sauce intake ( $p = 0.042$ ) and sugary beverages ( $p = 0.019$ ) relative to the control group. Moreover, the intervention group had statistically significant mean reductions in systolic BP ( $p = 0.020$ ), diastolic BP ( $p = 0.001$ ), body fat percentage ( $p < 0.001$ ) and self-reported 'no bodily pain' ( $p = 0.039$ ) in the intervention group compared to the control group.

**CONCLUSIONS:** The GEE analyses confirmed that the program was effective in improving PA and dietary behaviours, reducing systolic and diastolic BP and body fat percentage, as well as self-reported 'no bodily pain' in the target group. This study could be replicated and upscaled in other community settings as a promising primary prevention initiative for chronic conditions.



# Selecting Implementation Strategies to Overcome Barriers to Delivering and Scaling Rural Healthy Eating and Active Living Policy, Systems, and Environmental Change Interventions

**Dr. Bailey Houghtaling<sup>1,2,3</sup>**, Dr. Laura Balis<sup>4</sup>

<sup>1</sup>School of Nutrition and Food Sciences, Louisiana State University (LSU) & LSU Agricultural Center, Baton Rouge, USA, <sup>2</sup>Department of Human Nutrition, Foods, and Exercise, Virginia Tech, Blacksburg, USA,

<sup>3</sup>Gretchen Swanson Center for Nutrition, Omaha, USA, <sup>4</sup>Pacific Institute for Research and Evaluation, Louisville, USA

**SO.3.26 - Lessons learned from implementation in the community setting, Clarion Hotel Gillet - Room Gillesalen, June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** The aim of this work was to: 1) select Expert Recommendations for Implementing Change (ERIC) implementation strategies required to overcome Louisiana Cooperative Extension Services (LCES) Family and Consumer Sciences practitioners' barriers to delivering and scaling rural healthy eating and active living policy, systems, and environmental (PSE) interventions; and, 2) to document/disseminate the process to inform dissemination and implementation science methods for community public health contexts.

**Methods:** Formative research about LCES practitioners' multi-level barriers based on the updated 2022 Consolidated Framework for Implementation Research (2022 CFIR) (e.g., communications, knowledge/resources, organizational culture, partnerships, opportunity/capability, innovation complexity) were used as inputs to the CFIR-ERIC Implementation Strategy Matching Tool. The creation of the tool was based on a sample of implementation scientists/practitioners, largely reflecting a U.S. clinic or patientcare perspective, and involved the matching of CFIR constructs to 73 ERIC implementation strategies and ranking by importance. To enhance relevance in community—rather than clinical—contexts, the tool's implementation strategy outputs were replaced with community setting terminology/definitions to align with a recent commentary. Two expert implementation science and community public health researchers reviewed the adapted tool output against formative research findings, selected relevant strategies, and categorized strategies according to Leeman et al.'s classifications using discussion and agreement.

**Results:** The CFIR-ERIC Implementation Strategy Matching Tool recommended 45 high priority implementation strategies to overcome LCES practitioners' barriers to delivering and scaling rural healthy eating and active living PSE interventions. However, 16 of these strategies were excluded, mainly due to researchers' perceptions of poor fit to overcome barriers in the LCES and rural community context. Of 17 recommended lower priority implementation strategies, 8 were removed due to similar reasons. One implementation strategy not recommended by the tool was selected for inclusion to overcome identified barriers. Resulting, 39 ERIC implementation strategies were considered relevant in relation to formative research findings and were classified as: capacity building strategies (n=15); implementation process strategies (n=12); and integration strategies (n=12).

**Conclusions:** There was limited congruence between CFIR-ERIC Implementation Strategy Matching Tool recommendations and final selections. This indicates more work may be needed to improve implementation strategy and tool relevance for community public health contexts.

# Feasibility of a virtual health promoting intervention (Choose to Move) for older adults: A rapid adaptation in response to COVID-19

**Dr. Samantha M. Gray**<sup>1,2,3</sup>, Dr. Thea Franke<sup>2,3</sup>, Dr. Lindsay Nettlefold<sup>2,3</sup>, Associate Professor Dawn Mackey<sup>1,3</sup>, Dr. Joanie Sims Gould<sup>2,3,4</sup>, Prof. Heather McKay<sup>2,3,4</sup>

<sup>1</sup>Aging and Population Health Lab, Department of Biomedical Physiology and Kinesiology, Simon Fraser University, Burnaby, Canada, <sup>2</sup>Active Aging Research Team, University of British Columbia, Vancouver, Canada, <sup>3</sup>Centre for Hip Health and Mobility, Vancouver Coastal Health Research Institute, Vancouver, Canada, <sup>4</sup>Department of Family Practice, University of British Columbia, Vancouver, Canada

**SO.3.26 - Lessons learned from implementation in the community setting, Clarion Hotel Gillet - Room Gillesalen, June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** E. Implementation and scalability

Public health directives to 'stay home' countered transmission of COVID-19 but exacerbated older adults' physical and social health challenges. Programs that supported older adults to remain mobile, independent, and socially connected—outside of high risk COVID-19 transmission spaces—became critical. Thus, we rapidly adapted an effective older adult health promoting intervention (Choose to Move; CTM) for virtual delivery in British Columbia (BC), Canada.

**Purpose:** To: 1) compare implementation outcomes of the CTM virtual program to pre-determined feasibility targets; and 2) describe the impact, facilitators, and barriers of the CTM virtual program on participants' mobility, physical activity (PA), loneliness, social network, and social isolation.

**Methods:** We conducted a 3-month, single-group, pre-post feasibility study. Activity coaches delivered 33 programs to a convenience sample of older adults (n=153; 86% female; 73±6 years) via Zoom during BC's 1<sup>st</sup> wave of COVID-19 (April-October 2020). We set feasibility targets for participant recruitment (50%), retention (80%), dose received (60%), and completion of virtual evaluation (80%). We collected survey data using validated tools to assess mobility, PA, loneliness, social network, and social isolation (0, 3-months). We used descriptive analyses to describe health outcomes. We conducted semi-structured telephone interviews with older adults (0, 3-months, & during 2<sup>nd</sup> COVID-19 wave). Deductive framework analysis was used in NVivo to identify themes.

**Results:** Most feasibility targets were met (dose received, retention, virtual evaluation). We fell short of our recruitment target—44% of those we contacted volunteered to participate. We retained 87% of participants at 3 months, who attended 74% of group meetings. Virtual evaluation completion rates were >85% across time points. Approximately 2/3 of older adults maintained or improved their mobility, PA, loneliness, social network, and social isolation at 3 months. Facilitators of participation were motivation; accountability; social connection. Barriers were lack of inclusive (age and ability) at-home exercise options; accessibility. Follow-up interviews suggested a decline in mobility, PA, and social connection when virtual program support was withdrawn.

**Conclusions:** It was feasible to implement and evaluate CTM virtually. Flexible, virtual interventions are an important mainstay as we navigate public health emergencies in future and seek to reach homebound older adults.

# From start-up to scale-up of a health-promoting intervention for older adults: The Choose to Move story

Dr. Lindsay Nettlefold<sup>1,2</sup>, **Dr. Samantha Gray**<sup>1,2,3</sup>, Dr. Joanie Sims Gould<sup>1,2,4</sup>, Prof. Heather McKay<sup>1,2,4</sup>

<sup>1</sup>Active Aging Research Team, University of British Columbia, Vancouver, Canada, <sup>2</sup>Centre for Hip Health and Mobility, Vancouver Coastal Health Research Institute, Vancouver, Canada, <sup>3</sup>Aging and Population Health Lab, Department of Biomedical Physiology and Kinesiology, Simon Fraser University, Burnaby, Canada,

<sup>4</sup>Department of Family Practice, University of British Columbia, Vancouver, Canada

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## **SIG - Primary Choice:** E. Implementation and scalability

Interventions shown to ‘work’ in efficacy or effectiveness trials can only improve population level health if they are successfully scaled-up outside of the research setting. However, few interventions are ever scaled-up. Factors such as the need to adapt interventions prior to implementing them in diverse settings at scale, retaining fidelity to the intervention, and cultivating the necessary community and funding partnerships can all present a challenge. Thus, we share an example of successful scale-up of an effective health-promoting intervention for older adults, Choose to Move (CTM).

**Purpose:** To: 1) describe the frameworks and processes adopted to implement, adapt, and scale-up CTM across British Columbia (BC), Canada; 2) provide an overview of the phased approach to scale-up; and 3) share lessons learned while implementing and scaling-up CTM with community delivery partners.

**Methods:** CTM delivery is guided by implementation (Framework for Effective Implementation; Interactive Systems Framework) and scale-up (Yamey; Simmons & Shiffman) frameworks and adaptation processes. Phased implementation and scale-up spanned 8 years from formative evaluation (2015) to Phases 1 & 2 (2016-2017; small scale) to Phase 3 (2018-2020; large scale) to Phase 4 (2020-present; optimized). We systematically adapted CTM between phases to respond to stakeholders (2017); to reach rural and remote communities (2018); to reduce costs (2019); and for the COVID-19 context (2020).

**Findings:** Across all phases, delivery partners implemented >450 CTM programs to >4300 older adults in 70 community sites in BC. CTM Phases 1, 2, and 3 increased older adults’ physical activity, mobility, and social connectedness. There was ‘voltage drop’ in some measures as scale-up proceeded but an approximately 2-fold benefit in social isolation after adaptations. Our delivery system deemed CTM implementation acceptable and feasible. Features critical for successful scale-up were: an evidence-based, flexible, and adaptable program; committed government and community partners; alignment with organizational priorities; active participation of stakeholders to design, adapt, and implement; strong leadership and governance by our support team.

**Conclusions:** It is critical to build scalability and adaptability into health promoting interventions by ‘beginning with the end in mind’ and forming trusted partnerships with key stakeholder groups (i.e., in the academic, community, and public sectors).

# Implementation barriers and facilitators for referral from the hospital to community-based lifestyle initiatives: a qualitative study

**Ms. Leonie M. Te Loo**<sup>1,2,3</sup>, Dr. Jasmijn Holla<sup>3,5</sup>, Dr. Joyce Vrijsen<sup>4</sup>, Ms. Anouk Driessen<sup>1,2,3</sup>, Ms. Marlinde L. Van Dijk<sup>1,2</sup>, Dr. Lilian Linders<sup>3</sup>, Dr. Inge Van den Akker-Scheek<sup>4</sup>, Mr. Patrick Rijnbeek<sup>6</sup>, Ms. Jessica Oudesogtoen<sup>7</sup>, Ms. Linda Schouten<sup>8</sup>, Ms. Josine Van 't Klooster<sup>4</sup>, Prof. Rienk Dekker<sup>4</sup>, Prof. Martine De Bruijne<sup>1,2</sup>, Associate Professor Hidde P. Van der Ploeg<sup>1,2</sup>, Prof. Willem Van Mechelen<sup>1,2</sup>, Dr. Judith G.M. Jelsma<sup>1,2</sup>

<sup>1</sup>Amsterdam UMC, location Vrije Universiteit Amsterdam, Department of Public and Occupational Health, Amsterdam, Netherlands, <sup>2</sup>Amsterdam Public Health Research Institute, Health Behaviors & Chronic Diseases, Amsterdam, Netherlands, <sup>3</sup>Inholland University of Applied Sciences, Faculty of Health, Sports and Social Work, Haarlem, Netherlands, <sup>4</sup>University of Groningen, University Medical Center Groningen, Department of Orthopedics, Groningen, Netherlands, <sup>5</sup>Reade, Amsterdam Rehabilitation Research Centre, Amsterdam, Netherlands, <sup>6</sup>NL Actief, Ede, Netherlands, <sup>7</sup>Huis voor de Sport in Groningen, Groningen, Netherlands, <sup>8</sup>Team Sportservice Noord-Holland, Haarlem, Netherlands

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## **SIG - Primary Choice:** E. Implementation and scalability

**Purpose** A dedicated lifestyle front office in the hospital is a new approach to refer patients at increased risk for or with communicable diseases to community-based lifestyle initiatives. Successful implementation and adoption of such a lifestyle front office requires knowledge about implementation barriers and facilitators. Therefore the aim is to identify implementation barriers and facilitators for referral from the lifestyle front office in the hospital to community-based lifestyle initiatives.

**Methods** We conducted semi-structured interviews until data saturation, with 23 healthcare professionals working in the community (i.e. lifestyle coaches (n=11); dietician (n=1); care sport connectors (n=4); social domain health care professionals (n=3); health club managers (n=4)). A semi-structured topic guide was used, inquiring about (1) the professional's lifestyle initiative; (2) their views about referral from the hospital; and (3) their preferences, needs and recommendations for collaboration with the hospital. The online interviews lasted on average 45 minutes, were audio recorded and transcribed verbatim. A thematic content analysis was conducted in software package MAXQDA 2020.

## **Results**

Barriers and facilitators were divided into two main themes: 1) possible referral options in the community; and, 2) collaboration from the community with a lifestyle front office in the hospital. For possible referral options barriers were found regarding the financial, cultural or geographical accessibility of the referral options. Quality of referral options was also mentioned as barrier. For collaboration facilitators were found regarding a personal and equal relationship with regular contact with the lifestyle broker and a secure digital platform for communication. However, it was mentioned that the segregation between primary and secondary/tertiary care is a barrier for collaboration. Furthermore, guidelines on referral information and responsibility were mentioned as facilitators.

**Conclusions** Overall, the idea of collaboration with a lifestyle front office in the hospital was supported by community-based healthcare professionals. In order for a lifestyle front office in the hospital to be successful, some effort should be made to identify all possible referral options and to work closely and on a personal basis with community-based healthcare professionals. Extra attention is needed to facilitate collaboration between the hospital and the community.

# Workplace choice architecture cueing to healthy eating and physical activity: Acceptance among implementers and employees

**Ms. Eeva Rantala**<sup>1,2,3</sup>, Dr. Saara Vanhatalo<sup>2</sup>, Prof. Federico J. A. Perez-Cueto<sup>4</sup>, Prof. Jussi Pihlajamäki<sup>1,5</sup>, Prof. Kaisa Poutanen<sup>2</sup>, Dr. Leila Karhunen<sup>1</sup>, Prof. Pilvikki Absetz<sup>6</sup>

<sup>1</sup>Institute of Public Health and Clinical Nutrition, University of Eastern Finland, Kuopio, Finland, <sup>2</sup>VTT Technical Research Centre of Finland, Espoo, Finland, <sup>3</sup>Finnish Institute for Health and Welfare, Helsinki, Finland, <sup>4</sup>Department of Food, Nutrition and Culinary Science, Umeå University, Umeå, Sweden, <sup>5</sup>Department of Medicine, Endocrinology and Clinical Nutrition, Kuopio University Hospital, Kuopio, Finland, <sup>6</sup>Faculty of Social Sciences, Tampere University, Tampere, Finland

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**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** Redesigning choice architectures—the way available options are provided in decision-making contexts—appears a promising approach to promote healthy behaviours, but the acceptability of this approach keeps sparking discussion. Whilst some evidence suggests that people welcome choice architecture interventions for promoting health, acceptance at the workplace context remains unknown. This study evaluated the acceptability of a quasi-experimental implementation-effectiveness trial that targeted the choice architecture of the worksite environment.

**Methods:** Altogether 53 worksites from 16 organisations participated in the intervention. Over 12 months, the sites implemented in total 23 choice architecture strategies (Mdn 3 per site) for healthy eating and daily physical activity. The strategies applied numerous behaviour change mechanisms, including primes, prompts, and alterations to the availability, visibility, and accessibility of choice options. The acceptability evaluation covered the perspectives of site implementers and influenced employees. The evaluation built on 1) deductive qualitative content analysis of implementer interviews (n=65 informants) conducted at months six and twelve, and 2) quantitative analysis of an employee questionnaire (n=1124) conducted at month twelve. Qualitative analysis focused on implementers' thoughts and observations of the intervention and its implementation, considering six domains of acceptability as defined by the Theoretical Framework of Acceptability: ethicality, affective attitude, burden, intervention coherence, opportunity costs, and perceived effectiveness. Quantitative analysis used descriptive statistics to examine overall acceptance among employees of eight specific choice architecture strategies employed in the intervention (scale: 1=completely disapprove, 7=completely approve).

**Results:** Implementers considered the choice architecture approach ethical for workplace health promotion, expressed mostly positive affective attitudes to implemented strategies, and found the implementation to cause little burden. Understanding the rationale behind the intervention—i.e., intervention coherence—supported acceptance and implementation. Accepting opportunity costs appeared to depend on the perceived importance of the intervention and the intensity of implementation. Perceived effectiveness was mixed. Employees showed overall high acceptance of the evaluated strategies (M 6.5, SD 0.9, range 1–7), with little variation in the acceptability of individual strategies (M 6.3–6.6).

**Conclusions:** A range of choice architecture strategies appear generally acceptable for promoting healthy eating and daily physical activity at the workplace, as evaluated by implementers and employees across heterogeneous worksites.



# Tensions and Paradoxes of Scaling Up: A Critical Reflection on Physical Activity Promotion

Dr. Harriet Koorts<sup>1</sup>, Prof. Adrian Bauman<sup>2,3</sup>, Prof. Nancy Edwards<sup>4</sup>, Prof. William Bellew<sup>5</sup>, Prof. Wendy Brown<sup>6</sup>, Prof. Mitch Duncan<sup>7</sup>, Prof. David Lubans<sup>8,9,10</sup>, Dr. Andrew Milat<sup>2,11</sup>, Prof. Philip Morgan<sup>8,9</sup>, Dr. Nicole Nathan<sup>9,12,13</sup>, Prof. Andrew Searles<sup>9</sup>, Dr. Karen Lee<sup>2,3</sup>, **Prof. Ronald Plotnikoff<sup>8,9</sup>**

<sup>1</sup>School of Exercise and Nutrition Sciences, Institute for Physical Activity and Nutrition (IPAN), Deakin University, Geelong, Australia, <sup>2</sup>Prevention Research Collaboration, Sydney School of Public Health, The University of Sydney, Sydney, Australia, <sup>3</sup>The Australian Prevention Partnership Centre, Sax Institute, Sydney, Australia, <sup>4</sup>School of Nursing, University of Ottawa, Ottawa, Canada, <sup>5</sup>Sydney Medical School & Sydney School of Public Health, The University of Sydney, Sydney, Australia, <sup>6</sup>School of Human Movement and Nutrition Sciences, University of Queensland, St Lucia, Australia, <sup>7</sup>School of Public Health, University of Newcastle, Callaghan, Australia, <sup>8</sup>Centre for Active Living and Learning, College of Human and Social Futures, University of Newcastle, Callaghan, Australia, <sup>9</sup>Hunter Medical Research Institute, New Lambton Heights, Australia, <sup>10</sup>Faculty of Sport and Health Sciences, University of Jyväskylä, Jyväskylä, Finland, <sup>11</sup>Centre for Epidemiology and Evidence, NSW Ministry of Health, St Leonards, Australia, <sup>12</sup>School of Medicine and Public Health, The University of Newcastle, Newcastle, Australia, <sup>13</sup>Hunter New England Population Health, Hunter New England Area Health Service, Newcastle, Australia

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**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** Scaling up evidence-based interventions has been ubiquitously difficult in public health. Accelerating implementation of scalable solutions to address population physical inactivity is needed, although this requires reliable, dedicated resources, and establishment of strategic connections between stakeholders and policy priorities. Currently, we do not know why some interventions are successfully scaled over others, and how we can facilitate the process. This presentation discusses *tensions* (challenges and conflicts) and *paradoxes* (things contrary to expectations) that academics, practitioners and policymakers ('stakeholders') face when scaling up physical activity interventions.

**Methods:** A multidisciplinary two-day workshop involving stakeholders in physical activity scale-up (convened by the University of Newcastle, Australia, and the University of Ottawa, Canada; 2019). Objectives included exploring: (i) funding, evaluation and other challenges during scale-up; (ii) research designs, process and outcome measures, and costing; and (iii) collaboration between government and academic organisations. Workshop facilitators captured session notes, which were grouped into core topic areas. Core topics were organised and framed as '*tensions*' and '*paradoxes*' in the scale-up field.

**Results:** Tensions included: epistemology, methodology, time, and partnerships. Paradoxes included: 'reach without scale', 'planned serendipity' and 'simple complexity'. Tensions can impede scale-up progress. Paradoxes encourage a reframing of scaling mindsets. Implications and recommendations for future scale up research and practice included: (i) broadening theoretical approaches, (ii) re-thinking data sources, (iii) co-creation for planning and design, (iv) shared values and evaluation approaches, (v) improving research-practice roles and partnerships.

**Conclusions:** This presentation showcases new insights that extend what is already known from studies of scaling up. We explore challenging concepts such as whether we can improve scaling up and how the systems we work in (i.e., academic or government) contribute to the circumstances we face in population health. We adopted a unique approach to understanding scaling up, by synthesizing multiple viewpoints and framing these through a reflexive and critical lens of '*tensions*' and '*paradoxes*'. The originality of this work lies in the fact that



we delve deeper into stakeholders' assumptions, processes and expectations of scaling up, and challenge the ways we all contribute to desired or undesired scale up outcomes.

# Developing a Workplace Wide PA Intervention for Mental Health: Mapping of current physical activity and health behaviours

**Dr. Gemma Ryde<sup>1</sup>, Mr. Craig Tumblety<sup>1</sup>**, Dr. Evangelia Demou<sup>1</sup>, Mr. Paul Kelly<sup>2</sup>, Prof. Kate Hunt<sup>3</sup>, Mr. Michael Cusack<sup>4</sup>

<sup>1</sup>University of Glasgow, Glasgow, United Kingdom, <sup>2</sup>University of Edinburgh, Edinburgh, United Kingdom,

<sup>3</sup>University of Stirling, Stirling, United Kingdom, <sup>4</sup>ACS Clothing, Glasgow, United Kingdom

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**SIG - Primary Choice:** E. Implementation and scalability

**Purpose:** Physical activity (PA) can improve both physical and mental health with evidence suggesting that PA can be as effective for mental health as antidepressants. Poor mental health is a key issue for the workplace with a significant proportion of absenteeism and burnout attributed to mental health and stress. This project aims to develop and evaluate a context sensitive, workplace wide PA intervention for mental health. The outcome from the mapping phase of this project will be discussed.

**Methods:** The project consists of four phases: 1) Review workplace PA interventions for improved mental health; 2) Map PA and mental health levels and health practices/policies across a whole workplace; 3) Develop an intervention using co-creation workshops assessing potential intervention strategies and; 4) Test the feasibility and acceptability of the intervention and measure PA and mental health outcomes. The project is based in a clothing rental and renewal company in Central Scotland (120 employees) with an embedded researcher at the organisation for a 4-year period. The workplace consists of both sedentary and hard physical labour occupations. For the mapping phase, all employees were offered an annual wellbeing assessment consisting of a health check (blood pressure, height, weight, hand grip and hair cortisol), online survey (demographics, mental health, stress, productivity), workplace audit (physical and social work environment and job profiles) and 24hr activity monitoring for 7 days (Actigraph accelerometer and heart rate). Activity profiles of the employees will be created and assessed against health outcomes.

**Results/findings:** Wellbeing assessments are due to finish in December 2022. To date 69 employees have participated in the wellbeing assessments. Data will be presented on the activity profiles of employees and health outcomes with a focus on mental health. Lessons learnt during this phase will also be reported.

**Conclusions:** Understanding current physical activity profiles in the workplace is an essential part of intervention development in this context. The findings from this study will help to provide key information on activity profiles in complex workplaces as part of the intervention development process.

# Co-design of a digital health intervention to engage childhood cancer survivors in physical activity

**Dr. Lauren Ha<sup>1,2</sup>**, Prof. Claire Wakefield<sup>1,2</sup>, Ms. Jacqueline Jacovou<sup>1,2</sup>, Dr. Suzanne Nevin<sup>1,2</sup>, Dr. David Mizrahi<sup>3,4</sup>, Dr. Christina Signorelli<sup>1,2</sup>

<sup>1</sup>School of Clinical Medicine, Faculty of Medicine and Health, The University of New South Wales, Sydney, Australia, <sup>2</sup>Behavioural Sciences Unit, Sydney Children's Hospital, Sydney, Australia, <sup>3</sup>The Daffodil Centre, The University of Sydney, a joint venture with Cancer Council NSW, Sydney, Australia, <sup>4</sup>Prince of Wales Clinical School, Faculty of Medicine and Health, The University of New South Wales, Sydney, Australia

**SO.3.27 - Novel interventions and studies on e & mHealth, Clarion Hotel Gillet - Room Akademien, June 17, 2023, 9:40 AM - 10:55 AM**

## **SIG - Primary Choice:** D. e- & mHealth

Many childhood cancer survivors do not meet recommended physical activity guidelines, which exacerbates their already increased risk of developing cardiometabolic conditions. Previous research has highlighted the importance of using co-design methods to develop sustainable and acceptable health interventions. Our study aimed to collaborate with childhood cancer survivors, parents, and health professionals to explore their priorities and to co-design a digital health intervention to support childhood cancer survivors to be physically active. This abstract presents on the health professional data only.

We recruited Australian health professionals and community representatives working within paediatric oncology via social media. Participants completed a study-specific survey to rate the importance of certain features, content, modality, and functionality related to digital health and health behaviours. Guided by the survey responses, we conducted online semi-structured focus groups to discuss participants' perceived importance of different elements or features of digital health interventions. We transcribed the data verbatim and used inductive content analysis to identify common themes.

Participants (N=14) included exercise physiologists (n=7), nurses (n=3), physiotherapists (n=2), and representatives from community organisations (n=2). Participants reported that the most important elements of digital health interventions to engage survivors in physical activity were: 1) providing health behaviour education, 2) encouraging goal setting, 3) involving peers and parents, and 4) providing health professional support. The least endorsed features were: 1) facilitating engagement between cancer survivors, 2) using non-digital mediums, 3) providing wearable activity trackers, and 4) offering quizzes to test survivors' knowledge. Health professionals highlighted that intervention features such as physical activity comparisons or competitions with other survivors, monitoring step counts and quizzes may be distractions or barriers to survivors increasing their physical activity levels.

This project highlights health professionals' and community representatives' perceived importance of digital health elements to support childhood cancer survivors to be physically active. Co-design focus groups and interviews are underway with survivors and parents to explore their priorities of using digital health to support health behaviours. We will compare and integrate the multi-stakeholder perspectives to inform the co-development of a digital health program to facilitate an acceptable and sustainable intervention to support physical activity behaviours among survivors.

# Acceptability, use and usability of the mHealth app 'ecofit' promoting resistance training using outdoor gyms

**Dr. Anna Jansson**<sup>1,2</sup>, Prof. Mitch Duncan<sup>2,3</sup>, Prof. David Lubans<sup>1,2</sup>, Dr. Jordan Smith<sup>1,2</sup>, Prof. Adrian Bauman<sup>4</sup>, Prof. John Attia<sup>3</sup>, Prof. Ronald Plotnikoff<sup>1,2</sup>

<sup>1</sup>Centre for Active Living and Learning, University of Newcastle, Newcastle, Australia, <sup>2</sup>Active Living Research Program, Hunter Medical Research Institute, Newcastle, Australia, <sup>3</sup>School of Medicine and Public Health, University of Newcastle, Newcastle, Australia, <sup>4</sup>School of Public Health, University of Sydney, Sydney, Australia

**SO.3.27 - Novel interventions and studies on e & mHealth, Clarion Hotel Gillet - Room Akademien, June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** This study describes the acceptability, use and usability of the smartphone application (app) developed for the *ecofit* effectiveness trial. The *ecofit* effectiveness trial aimed to determine the effects of an innovative multicomponent physical activity intervention promoting resistance and aerobic-based physical activity using mHealth, outdoor gym equipment, and social support.

**Methods:** We evaluated the 'ecofit' intervention using a two-arm cluster randomised controlled trial from September 2019 to March 2022 in two regional municipalities of New South Wales, Australia. We recruited a sample of 245 participants (72% female, mean age 53.4 years [SD = 13.9]) who were randomised to the *ecofit* intervention ( $n = 122$ ) or waitlist control ( $n = 123$ ) group. The intervention group received access to a smartphone app, which included standardised workouts tailored to 12 outdoor gym locations, self-monitoring functions and cognitive behavioural therapy resources. Participants in the intervention group also received one 90-minute introductory session where they were shown how to use the app, correctly perform some of the exercises, and encouraged to perform at least two *ecofit* workouts/week. Process evaluation data were collected using surveys ( $n=69$ ) and user data through the *ecofit* app. Data were analysed using descriptive statistics and presented as means (standard deviations [SD]), medians (interquartile ranks [IQR]) or counts (percentages) as appropriate.

**Results/findings:** Overall, 1,447 workouts were logged by participants in the app at 3-months (median=5.5, IQR = 19). The sit-to-stand self-assessment was the most frequently used self-assessment, (median completions = 1.0, IQR = 1.0, min = 0, max = 6). Overall, most participants (92.7%) found the information in the app provided them with enough detail to perform muscle-strengthening exercises and that the animated videos helped them perform the exercises correctly (84.0%). Approximately half (50.7%) agreed the goal setting function in the app encouraged them to complete workouts and most (86.9%) believed the app provided the flexibility to work out when it suited them.

**Conclusions:** This study demonstrates promise in using mHealth technology as a platform to promote muscle strengthening exercises using the outdoor environment in the community.

# Perceptions and expectations of an artificially intelligent physical activity chatbot – a focus group study

**Prof. Corneel Vandelanotte**<sup>1</sup>, Dr. Danya Hodgetts<sup>1</sup>, Dr. Quyen To<sup>1</sup>, Dr. Tasadduq Imam<sup>1</sup>, Dr. Mamunur Rashid<sup>1</sup>, Ms. Ashmita Karki<sup>1</sup>, Prof. Stewart Trost<sup>2</sup>, Prof. Carol Maher<sup>3</sup>

<sup>1</sup>Central Queensland University, Rockhampton, Australia, <sup>2</sup>The University of Queensland, Brisbane, Australia,

<sup>3</sup>University of South Australia, Adelaide, Australia

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**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Basic conversational agents or chatbots to support the adoption and maintenance of physical activity have demonstrated initial feasibility and efficacy. However, sophisticated physical activity chatbots that are truly intelligent and use the full spectrum of machine learning capabilities have not yet been developed. This study aimed to explore potential users' perceptions and expectations of using such a chatbot.

**Methods:** Six 90-minute online focus group meetings (n=45 adults) were conducted via Zoom in October 2022. Meetings were recorded and transcribed verbatim and content analysis was conducted to identify themes, categories, and sub-categories.

**Results:** While overall perceptions of current day chatbots were not positive, participants embraced the idea of a 'virtual assistant' providing physical activity support. Generally, participants indicated they would like to receive messages from the chatbot, but did not agree on the daily number, timing, tone and content of messages, which were all perceived needing to be highly individual. Participants agreed they would need to provide information to the chatbot to receive personalised messages from the chatbot, but they varied in the extent of information that they were willing to provide. Some wanted to provide minimal data (i.e., activity tracking data), while others were willing to share extensive information (e.g., GPS data, digital dairy data) to enhance chatbot functionality. Participants were not against the use of artificial intelligence or machine learning to produce a better chatbot, given that these technologies are already being used in many applications (e.g., social media). Participants agreed that the chatbot should have a specific personality, but didn't agree what that personality should be, with answers ranging from an 'exercise drill agent' to 'animal-based avatar'. Participants preferred the chatbot to use standalone software rather than being integrated in existing platforms (e.g., Facebook Messenger), due to data privacy concerns.

**Conclusions:** Participants were excited about the possibilities of using an artificially-intelligent chatbot to help them become more active, though simultaneously indicated the need for a large degree of personalisation. This poses challenges in terms of cost, development and functionality, especially for those participants who aren't willing to share much data with the platform.

# Using Design Thinking Process to develop a Digital Microlearning Responsive Feeding Intervention for Australian Families experiencing Food Insecurity: Eat, Learn, Grow

**Dr. Kimberley Baxter<sup>1</sup>**, Dr. Smita Nambiar<sup>1</sup>, Dr. Jeremy Kerr<sup>2</sup>, Dr. Danielle Gallegos<sup>1</sup>, Dr. Rebecca Byrne<sup>1</sup>

<sup>1</sup>Faculty of Health, School of Exercise and Nutrition Sciences, Queensland University of Technology, Brisbane, Australia, <sup>2</sup>Faculty of Creative Industries, Education and Social Justice, School of Design, Queensland University of Technology, Brisbane, Australia

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**SIG - Primary Choice:** D. e- & mHealth

**Purpose** Families experiencing economic hardship and food insecurity face multiple challenges in feeding their children. Feeding responsiveness may be negatively affected and how best to support families is unclear. Design Thinking and codesign is a consultative process which enables health researchers to respond to complex problems through a person-centric approach.

**Methods** From May2021-November2022, mixed methods were used to inform the development of a child feeding intervention, including parent codesign workshops, semi-structured interviews, home mealtime observations, an online survey and user testing sessions. Researchers drew on Design Thinking and codesign principles as a guiding framework to understand parents' perspectives on the topic. Parents/caregivers were recruited through various avenues and self-identified as experiencing economic hardship. The interviews were thematically analysed using the Framework Method to describe key themes and ideas. Codesign and user testing sessions were conducted, where parents engaged with three examples of intervention content to determine feasibility, acceptability, and accessibility of the content and digital delivery mode.

**Findings** Analysis of the data (workshops n=8; interviews n=29; home mealtime observations n=10) indicated mixed feeding practices, high mental load, lack of time and an overall preference for visual, short, and plain language information accessed via a mobile phone. In response, a child feeding intervention that utilised mobile first design was developed through a digital course creator platform. Researchers drew on cognitive load theory and social learning theory to create a series of short, interactive, and engaging content based on an educational strategy called microlearning. Codesign and user testing sessions (n=12) with parents, including fathers and mothers and those with diverse learning needs, indicated that the content was highly acceptable, and the information was accessible and engaging. The intervention will be evaluated in early 2023 with a pilot randomised controlled trial and follow up at 6 months.

**Conclusions** Collaborative codesign methods enable researchers to design interventions which respond to participant needs. Digital microlearning is a promising and innovative information delivery tool which can be applied to health intervention design. It utilises clear and concise messaging and leverages the high digital skills and the emerging technology at parents' fingertips through their mobile phone device.



# Chat-bot led lifestyle medicine program for Return-to-Work: a proof-of-concept study

**Dr. Jacinta Brinsley<sup>1</sup>**, Dr. Ben Singh<sup>1</sup>, Prof. Carol Maher<sup>1</sup>

<sup>1</sup>University of South Australia, Adelaide, Australia

**SO.3.27 - Novel interventions and studies on e & mHealth, Clarion Hotel Gillet - Room Akademien, June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Work disability is a major public health burden. Being out of work is associated with increased morbidity and mortality. Technology-based interventions may provide an opportunity to address lifestyle risk-factors such as physical activity, diet, sleep and stress-management, offering opportunities to deliver accessible, and cost-efficient interventions. This proof-of-concept study aimed to analyze the engagement and adherence of a 6-week digital lifestyle program led by a virtual health coach “Lucy” for people on an active workers compensation claim and to evaluate preliminary efficacy for improving psychological distress and wellbeing.

**Methods:** Retrospective analyses of a single-arm non-randomized cohort ( $N = 78$ , mean age 46 years, 32% female) were completed. Primary outcomes included engagement, adherence and preliminary efficacy for improving psychological distress and wellbeing. Secondary outcomes were confidence and anxiety about returning to work and participant satisfaction. Analyses were undertaken on an intention-to-treat basis. Efficacy was assessed using Wilcoxon signed rank test for related samples. Wilcoxon effect sizes ( $r$ ) were interpreted as 0.1 - <0.3 small effect, 0.3 - <0.5 medium effect and 0.5+ large effect.

**Results/findings:** The dropout rate was 28% ( $N = 18$ ). Participants completed an average of 73% of the program and 95% of telehealth coaching sessions. Improvements in psychological distress (K10;  $p < .001$ ,  $r = .47$ ), depression (K10;  $p < .001$ ,  $r = .55$ ), anxiety (K10;  $p < .001$ ,  $r = .46$ ) and wellbeing (WHO-5;  $p < .001$ ,  $r = .62$ ) were observed from pre- to post-intervention. Confidence about returning to work increased ( $p < .001$ ,  $r = .51$ ) while anxiety about returning to work was unchanged. A significant improvement in return-to-work status was observed ( $\chi^2(4, N = 78) = 19.267$ ,  $p < .001$ ).

**Conclusions:** Findings from this study provide preliminary evidence indicating high engagement, high adherence and preliminary efficacy of a digital lifestyle medicine and psycho-education intervention for people on an active workers compensation claim. Artificial intelligence technology may be able to provide a practical, supportive and low-cost intervention to improve psychosocial outcomes among individuals on an active workers compensation claim.

# Personalized feedback messaging perspectives in a qualitative study among Black and Hispanic women: Implications for future mHealth behavioral interventions

**Dr. Grace Brannon**<sup>1</sup>, Ms. Hannah Affleck<sup>1</sup>, Ms. Sophia Mitchell<sup>1</sup>, Ms. Riley Wiland<sup>1</sup>, Ms. Victoria Munoz<sup>1</sup>, Dr. Kyras Brown<sup>1</sup>, Dr. Haleh Aghajani<sup>2</sup>, Dr. VP Nguyen<sup>1</sup>, Dr. Yue Liao<sup>1</sup>

<sup>1</sup>The University of Texas at Arlington, Arlington, USA, <sup>2</sup>The University of Texas at Arlington Research Institute, Fort Worth, USA

SO.3.27 - Novel interventions and studies on e & mHealth, Clarion Hotel Gillet - Room Akademien, June 17, 2023, 9:40 AM - 10:55 AM

## SIG - Primary Choice: D. e- & mHealth

**Purpose:** Behavioral interventions via providing personalized feedback messages are effective approaches towards adopting an active lifestyle. Most intervention messaging is generic and tested in primarily White populations. Given potential differences in cultural beliefs, it is critical to recognize specific needs that racial minority women must develop culturally sensitive mHealth interventions with personalized feedback. The objective of this study was to develop and test perceptions among minority women about feedback messages based on wearable activity tracker data that target physical activity, sedentary behavior, and sleep.

**Methods:** Fifty-three insufficiently active, obese women (33 Non-Hispanic Black [aged 20-45], 15 Hispanic [aged 18-43], and 5 Hispanic Black [aged 29-43]) participated in nine focus groups (February-May 2022) examining four sample feedback messages based on information from a wearable tracker (e.g., active minutes, steps, sleep) by a moderator. Participants discussed feelings about and preferences towards these messages. Coders analyzed transcribed data totaling 376 pages using Braun and Clark's thematic analysis method.

**Results:** Participants preferred shorter, data-based messages. Positive message valence and humor were perceived well. Participants reported that messages recommending social engagement (e.g., "chat-walk") or referencing spirituality with physical activity were motivational, for both Black and Hispanic women but especially for Hispanic women; Hispanic women also prioritized sleep in higher numbers than Black women. Hispanic women also indicated that their family, particularly children, and friends were primary motivators for them to engage in physical activity in greater numbers than Black women did.

**Conclusions:** Feedback messaging for mobile health interventions are not representative of Black and Hispanic women's preferences. Testing further personalized health messaging based on data from wearable sensors among Black and Hispanic women with obesity should be prioritized in order to prevent obesity-related chronic diseases. Further personalization can come through references to highly valued things (e.g., family and friends). Future physical activity interventions should integrate the target audience's cultural background and preferences for health communication messaging.

# A web app co-designed with parents improved feeding practices and toddler eating behaviours: results from a randomised controlled pilot.

**Ms. Brittany R Markides<sup>1</sup>**, Prof. Kylie D Hesketh<sup>1</sup>, Associate Professor Rachel Laws<sup>1</sup>, Prof. Ralph Maddison<sup>1</sup>, Prof. Elizabeth Denney-Wilson<sup>2</sup>, Prof. Karen J. Campbell<sup>1</sup>

<sup>1</sup>Institute of Physical Activity and Nutrition, Deakin University, Burwood, Australia, <sup>2</sup>Faculty of Medicine and Health, The University of Sydney, Sydney, Australia

**SO.3.27 - Novel interventions and studies on e & mHealth, Clarion Hotel Gillet - Room Akademien, June 17, 2023, 9:40 AM - 10:55 AM**

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Although fussy eating is a developmentally normal behaviour, it is a source of anxiety and concern for up to half of parents of young children. Concern for fussy eating mediates parents' use of nonresponsive feeding practises, such as persuasive or unstructured feeding, which can lead to mealtime conflict, increase the intensity and/or duration of fussy eating, and may have negative impacts on food preferences and healthy growth and development that persist into adolescence and adulthood. Despite this, few interventions have been developed for this population. To address this gap, Fussy Eating Rescue, an app-based feeding intervention, was co-designed with parents concerned for fussy eating. The purpose of this study was to evaluate the app's impacts on parent feeding practices and children's eating behaviours in a randomised controlled pilot trial.

**Methods:** Fussy Eating Rescue consisted of a food offer tracker, information about fussy eating / feeding strategies, recipes, and SMS notifications. Parents concerned for the fussy eating behaviour of their toddlers (12 to 36 months) were recruited via Facebook and randomised to an intervention group (n=25, received app access for 6 weeks), or control (n=26, wait-listed). T-tests were used to measure differences between pre/post measures of parent feeding practices and child eating behaviours. An engagement index that summarised app usage was calculated and used in linear regression models to evaluate the impact of app engagement impact on intervention outcomes.

**Findings:** In the intervention group, there were significant decreases in child food fussiness ( $p = .04$ , Cohen  $D = .40$ ) and aggressive mealtime behaviours ( $p = .01$ , Cohen  $D = .55$ ). There were no pre/post differences in measures for the control group. Higher app engagement predicted decreased parental concern for fussy eating ( $R^2 = .77$ ,  $F = 24.48$ ,  $p = .03$ ) and increased structured parent feeding practises ( $R^2 = .52$ ,  $F = 6.71$ ,  $p = .0004$ ).

**Conclusion:** Fussy Eating Rescue has potential to help improve the feeding practices of parents concerned for fussy eating. A larger trial is warranted to examine long-term impacts.

# Changes in physical activity and other health-related behaviours among users of the Couch to 5K beginner's running app

**Prof. Stacy Clemes<sup>1</sup>**, Mr. Andrew Hamblen<sup>1</sup>, Dr. Carolyn Plateau<sup>1</sup>, Dr. Clare Stevinson<sup>1</sup>

<sup>1</sup>Loughborough University, Loughborough, United Kingdom

SO.3.27 - Novel interventions and studies on e & mHealth, Clarion Hotel Gillet - Room Akademien, June 17, 2023, 9:40 AM - 10:55 AM

**SIG - Primary Choice:** D. e- & mHealth

**Purpose:** Recreational running is an effective way of developing health-related fitness. The Couch to 5K (C25K) programme delivered via a smartphone app is a freely available, accessible, and popular method of supporting beginner runners (receiving ~1 million downloads/year), yet limited research has assessed programme adherence, or outcomes associated with programme completion. This study investigated the potential effects of completing the C25K app-delivered programme on health-related behaviours (physical activity, sitting, sleep, and diet), and markers of physical and mental wellbeing.

**Methods:** 41 novice runners (73% female, mean±SD age: 37±12 years, BMI: 28.8±5.3 kg/m<sup>2</sup>) completed an online questionnaire containing validated measures of physical activity, sitting, sleep quality, dietary intake, and symptoms of anxiety and depression, prior to commencing the 9-week app-delivered C25K programme. Age, height, weight, and sex were also reported. Participants completed the same measures at the mid-point and after 9-weeks, plus additional questions on adherence and running-related injuries. Friedman's tests compared outcomes assessed across the three time points; significant findings were examined further using Bonferroni-corrected post hoc comparisons, and effect sizes (ES) calculated.

**Results:** 25 participants completed the study (61% retention). Participants reported completing an average of 18 (of 27) sessions (67% adherence). Significant differences across measurement time points were observed for total physical activity MET-minutes/week, vigorous intensity MET-minutes/week and depression symptoms (all p<0.01). Post hoc comparisons revealed total and vigorous intensity activity MET-minutes/week were significantly higher at the mid-point (total [median:IQR]: 1774(1491-2199); vigorous: 720(512-1260) MET-mins/week) and final assessments (total: 1386(968-2514); vigorous: 720(0-1080) MET-mins/week) compared to baseline (total: 876(495-1485); vigorous: 0(0-360) MET-mins/week), symptoms of depression were significantly lower at these time points relative to baseline (all p<0.01, all ES r>0.6). 14 (56%) participants reported experiencing a running-related injury.

**Conclusions:** Completion of the 9-week app-delivered C25K programme led to large increases in vigorous intensity physical activity and improvements in mental wellbeing. No changes in weight or health-related behaviours (sitting, sleep, diet) were observed. Injury rates were relatively high. The longer-term impact of completing the C25K programme on markers of health and health-related behaviours needs assessing; with further work also needed examining injury prevention strategies to supplement beginner running programmes.

# Blended lifestyle coaching for people with diabetes type 2 in secondary care: A feasibility study of the Diamter + Cool

**Dr. Anouk Middelweerd<sup>1</sup>**, Ms. Eclair Hietbrink<sup>1,2</sup>, Ms. Carine Gotink<sup>1</sup>, Dr. Annemieke Konijnendijk<sup>1,3</sup>, Prof. Goos Laverman<sup>1,2</sup>

<sup>1</sup>-Biomedical signals and systems (BSS), University of Twente, Enschede, Netherlands, <sup>2</sup>Nephrology, Internal medicine, Ziekenhuisgroep Twente (ZGT), Almelo, Netherlands, <sup>3</sup>ZGT Academie, Ziekenhuisgroep Twente (ZGT), Almelo, Netherlands

**SO.3.27 - Novel interventions and studies on e & mHealth, Clarion Hotel Gillet - Room Akademien, June 17, 2023, 9:40 AM - 10:55 AM**

## **SIG - Primary Choice:** D. e- & mHealth

**Purpose:** The Cool-intervention, a two-year lifestyle intervention, is considered to be an effective lifestyle intervention for overweight people with type 2 diabetes mellitus (T2DM). Combining face-to-face coaching (Cool) with an app (the Diameter) that supports patients between Cool-sessions can provide additional support in making healthy choices between the in-person meetings. The Diameter enables continuous monitoring of nutrition (diary), physical activity (PA; Fitbit) and glucose values (Freestyle libre) and provides tailored feedback, i.e. guided goal setting, daily informative and motivating coaching messages and weekly exercises aimed at learning to cope with barriers that arise in daily life to maintain a healthy lifestyle. The aim was to evaluate the feasibility of using the Diameter in combination Cool (Cool+Diameter) to change lifestyle behaviors in people with T2DM in secondary care from the perspectives of patients and healthcare professionals.

**Methods:** A mixed-method approach was used to explore the feasibility, e.g., acceptability, intervention usage, limited-efficacy testing, with regard to the Cool+Diameter intervention. Five patients with T2DM used the Diameter for three months and attended monthly group sessions with a lifestyle coach. Measurements on glycemic regulation, body composition, PA and nutritional intake were performed at baseline and at the three-month follow-up. Post-intervention semi-structured interviews were conducted with five patients and eight healthcare professionals.

**Results:** Patients and healthcare professionals saw the Diameter as a valuable addition to the Cool-program, mainly because of the glucose and lifestyle monitoring and discussing these behaviors during the meetings. However, the coaching content of the Diameter is not adapted to the Cool-program and should be more tailored to the user. Limited efficacy testing showed significant differences between baseline and follow-up for glucose levels ( $\Delta_{HbA1c} = 11 \text{ mmol/mol}$ , 95%CI=0.35 – 21.65) and BMI ( $\Delta_{BMI} = 0.78 \text{ kg/m}^2$ , 95%CI=0.28 – 1.28). In addition, promising results for hip ( $\Delta_{hip} = 1 \text{ cm}$ , 95%CI= -0.24 - 2.24) and waist ( $\Delta_{waist} = 2.6 \text{ cm}$ , 95%CI= -1.38 – 6.58) circumference were seen.

**Conclusion:** Cool+Diameter was predominantly perceived as a feasible intervention for T2DM patients in secondary care by both patients and healthcare professionals, but coaching content of the Diameter should be more tailored to the user and adapted to the Cool-program.