ISMPB

International Society *for the* Measurement *of* Physical Behaviour

JUNE 18-21, 2024

9TH INTERNATIONAL CONFERENCE ON AMBULATORY MONITORING OF PHYSICAL ACTIVITY AND MOVEMENT

RENNES, BRITTANY, FRANCE

ICAMPAM

RENNES, BRITTANY, FRANCE 2024

ISMPB.ORG

ICAMPAM PROGRAM AT A GLANCE

Time		Tuesday, June 18
08h00	Registration Desk Open 8h00-17h30	Workshops
08h15		
08h30		
08h45		
09h00		
09h15		
09h30		Workshop 1: Objectively Measuring Arm Activity 09h30-11h00 Amphitheatre A / Workshop 2: Actimetric R Package 09h30-11h00 Amphitheatre B / Workshop 3: Learnings From The UK BioBank Study 09h30-11h00 Amphitheatre C
09h45		
10h00		
10h15		
10h30		
10h45		
11h00		Break 11h00-11h30
11h15		
11h30		Workshop 4: Discussion Forum With The WHO 11h30-13h00 Amphitheatre A / Workshop 5: Reproducible Data Analysis At Scale 11h30-13h00 Amphitheatre B / Workshop 6: The Daily Activity Cycle 11h30-13h00 Amphitheatre C
11h45		
12h00		
12h15		
12h30		
12h45		
13h00		Lunch (pre-ordered box lunches during registration) 13h00-14h00
13h15		
13h30	Exhibitors 13h30-17h30	Symposium 1 14h00-15h30 Amphitheatre A / Symposium 2 14h00-15h30 Amphitheatre B / Symposium 3 14h00-15h30 Amphitheatre C
13h45		
14h00		
14h15		
14h30		
14h45		
15h00		
15h15		Break 15h30-16h00
15h30		
15h45		
16h00		Symposium 4 16h00-17h30 Amphitheatre A / Symposium 5 16h00-17h30 Amphitheatre B / Symposium 6 16h00-17h30 Amphitheatre C
16h15		
16h30		
16h45		
17h00		
17h15		
17h30		
18h00		Opening Reception 18h30-20h00
18h15		
18h30		
18h45		
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21h30		
21h45		
22h00		

Program subject to change

ICAMPAM PROGRAM AT A GLANCE

Time	Wednesday, June 19
08h00	Registration Desk Open 8h00-19h00
08h15	Day 1
08h30	Exhibitors 8h00-18h30
08h45	Welcome 08h30-9h00
09h00	Hans Bussmann Lecture Keynote Speaker - Fiona Bull 09h00-10h00 Amphitheatre A
09h15	
09h30	
09h45	
10h00	Transition Period 10h00-10h15
10h15	Oral Session 1 10h15-11h15 Amphitheatre A / Oral Session 2 10h15-11h15 Amphitheatre B / Oral Session 3 10h15-11h15 Amphitheatre C / Oral Session 4 10h15-11h15 Room 12-13
10h30	
10h45	
11h00	Break 11h15-11h45
11h15	
11h30	
11h45	Oral Session 5 11h45-12h45 Amphitheatre A / Oral Session 6 11h45-12h45 Amphitheatre B / Oral Session 7 11h45-12h45 Amphitheatre C / Oral Session 8 11h45-12h45 Room 12-13
12h00	
12h15	
12h30	
12h45	Lunch & Poster Session 1 12h45-14h00 Foyer
13h00	
13h15	
13h30	
13h45	
14h00	Speaker - Severine Sabia 14h00-15h00 Amphitheatre A / Oral Session 9 14h00-15h00 Amphitheatre B / Speaker - Dot Dumuid 14h00-15h00 Amphitheatre C
14h15	
14h30	
14h45	
15h00	Break 15h00-15h30
15h15	
15h30	Symposium 7 15h30-17h00 Amphitheatre A / Symposium 8 15h30-17h00 Amphitheatre B / Symposium 9 15h30-17h00 Amphitheatre C / Symposium 10 15h30-17h00 Room 12-13
15h45	
16h00	
16h15	
16h30	
16h45	
17h00	Transition Period 17h00-17h15
17h15	Keynote Speaker - Guillaume Chevance 17h15-18h15 Amphitheatre A
17h30	
18h00	
18h15	ISMPB General Meeting 18h20-19h00 Amphitheatre A
18h30	
18h45	
19h00	
19h15	ECR Event 20h00-22h00 (ticket required)
19h30	
19h45	
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21h30	
21h45	
22h00	

Program subject to change

ICAMPAM PROGRAM AT A GLANCE

Time	Thursday, June 20
08h00	Day 2
08h15	
08h30	Keynote Speaker - Kerstin Bach 08h30-09h30 Amphitheatre A
08h45	
09h00	
09h15	
09h30	Transition Period 09h30-09h45
09h45	Symposium 11 09h45-11h15 Amphitheatre A / Symposium 12 09h45-11h15 Amphitheatre B / Symposium 13 09h45-11h15 Amphitheatre C
10h00	
10h15	
10h30	
10h45	
11h00	
11h15	Break 11h15-11h45
11h30	
11h45	Exhibitor Talks 11h45-12h45 Amphitheatre A
12h00	
12h15	
12h30	
12h45	Lunch & Poster Session 2 12h45-14h00 Foyer
13h00	
13h15	
13h30	
13h45	
14h00	Speaker - Jairo Migueles 14h00-15h00 Amphitheatre A / Oral Session 10 14h00-15h00 Amphitheatre B / Oral Session 11 14h00-15h00 Amphitheatre C
14h15	
14h30	
14h45	
15h00	15h00-15h30
15h15	
15h30	Oral Session 12 15h30-16h30 Amphitheatre A / Oral Session 13 15h30-16h30 Amphitheatre B / Oral Session 14 15h30-16h30 Amphitheatre C
15h45	
16h00	
16h15	
16h30	Transition Period 16h30-16h45
16h45	Keynote Speaker - Jasper Schipperijn 16h45-17h45 Amphitheatre A
17h00	
17h15	
17h30	
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18h15	
18h30	
18h45	
19h00	
19h15	
19h30	Evening Social Event 19h30-22h00 (ticket required)
19h45	
20h00	
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21h45	
22h00	

Exhibitors 8h30-18h00

Registration Desk Open 8h00-18h00

Program subject to change

ICAMPAM PROGRAM AT A GLANCE

Time	Friday, June 21
08h00	Day 3
08h15	
08h30	Keynote Speaker - Kim Meredith-Jones 08h30-09h30 Amphitheatre A
08h45	
09h00	
09h15	
09h30	Transition Period 09h30-09h45
09h45	Symposium 14 09h45-11h15 Amphitheatre A / Symposium 15 09h45-11h15 Amphitheatre B / Symposium 16 09h45-11h15 Amphitheatre C
10h00	
10h15	
10h30	
10h45	
11h00	Break 11h15-11h45
11h15	
11h30	
11h45	Speaker - Boris Cheval 11h45-12h45 Amphitheatre A / Oral Session 15 11h45-12h45 Amphitheatre B / Oral Session 16 11h45-12h45 Amphitheatre C
12h00	
12h15	
12h30	
12h45	Transition Period 12h45-12h50
13h00	
13h15	Award Presentations and Closing Remarks 12h50-13h15 Amphitheatre A
13h30	
13h45	
14h00	
14h15	
14h30	
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22h00	

Exhibitors 8h30-13h30

Registration Desk Open 8h00-13h30

Program subject to change

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WELCOME TO ICAMPAM

WELCOME!

After very successful ICAMPAM conferences in Rotterdam, Glasgow, Amherst, Limerick, Bethesda, Maastricht, and Keystone, Colorado, we are very pleased to host you in Rennes, the capital of Brittany, for this 9th ICAMPAM conference. This 9th edition is the first in Europe since the COVID 19 pandemic and regain a full in-person configuration is a great pleasure.

Preparing this ninth edition has been a two-year adventure and we have put a lot of effort into making this conference a rich moment for you. I would like to thank the Podium team, and in particular Sharon and Brian, for their constant support, their kindness and their good spirit.

The leaders of the scientific committee, Tom & Asa, have done a great job in preparing a varied scientific program on exciting scientific subjects. Well done and thank you to them! Undoubtedly, this 9th edition of ICAMPAM will once again be a great opportunity to talk about and share the latest scientific advances in physical behavior monitoring using wearable devices. The diverse format of presentations, mixing keynote and invited speakers, symposia, workshops, oral and poster presentations, provide an excellent platform for young scientists to easily interact with renowned experts.

Let's not forget the social and cultural side of ICAMPAM! For this first ICAMPAM in France, we are very proud to host the conference in our beautiful city of Rennes. Once the doors of the amphitheaters will close at the end of each day, we really encourage you to discover Rennes, where the French and Brittany cultures converge. Stroll through the streets of the old town and let yourself be carried from square to square, you will discover our architectural heritage and the numerous bars and restaurants to taste French and Breton gastronomy. Don't miss the traditional meal "The Galette Saucisse", that you can find at the "Marché des Lices" every Saturday morning, an outdoor market for four centuries! If you have more time, discover the beautiful and wild Brittany coast: its intact nature across the hiking trails that follow the sea, Saint-Malo the majestic city of the corsairs, or the outstanding Mont Saint-Michel (which is located, we must admit, in Normandy), and so much more...

Welcome to ICAMPAM 2024, enjoy this moment, and warm regards on behalf of the organizing committee,

Alexis Le Faucheur
Local Host Chair, ICAMPAM 2024
ENS Rennes, France

WELCOME ON BEHALF OF THE SCIENTIFIC COMMITTEE!

We are delighted to welcome you to ICAMPAM 2024, held in the beautiful city of Rennes, France, from the 18th to the 21st of June, 2024. This year's conference promises to be an enriching and stimulating event, reflecting the ongoing advancements in the field of monitoring physical behavior.

ICAMPAM 2024 features an impressive lineup of keynote speakers and invited speakers who have been chosen based on their important and pioneering contributions in their respective fields. With several well-subscribed workshops, 16 symposia sessions, 16 oral sessions, and an impressive array of poster presentations, the scientific program promises a diverse range of high-quality research. The topics span from method development to end-use implementation, across a range of settings, ensuring comprehensive coverage of the latest advancements and applications in our field.

Our scientific committee has worked tirelessly to curate a rich and diverse program. Their efforts, along with the support of our local organizing committee (special mention to Alexis Le Faucheur), have been instrumental in making this conference a success. We would also like to express our gratitude to Sharon Zwack and Brian Groos from Podium Conferences. Their exceptional organizational skills and ongoing support have been crucial in ensuring the smooth planning and execution of this event.

We extend our heartfelt thanks to all participants for joining us here in Rennes. We recognize that traveling can be challenging, and we appreciate your commitment and enthusiasm. We hope you find ICAMPAM 2024 to be a valuable opportunity for learning, networking, and advancing the science of monitoring physical behaviour.

On behalf of the scientific committee, we wish you a fruitful and enjoyable conference.

Åsa Tornberg
Lund University, Sweden

Tom Stewart
Auckland University of Technology, New Zealand

WELCOME ON BEHALF OF THE SOCIETY

I am very pleased to welcome you on behalf of the International Society for the Measurement of Physical Behavior (ISMPB) to the ICAMPAM2024 conference in Rennes. This conference is the 9th ICAMPAM, the latest in a series started by Hans Bussmann in Rotterdam in 2008. The ICAMPAM conference provides a perfect forum to present new ideas, and a relaxed, supportive environment to network, catch up with old friends and make new ones.

ICAMPAM is the premier forum for the ISMPB, but it is now supported by a range of online symposia for our members in the interval between conferences, and by our society's journal, the Journal for the Measurement of Physical Behaviour. I have always found ICAMPAM to be a superb event for meeting researchers from many disciplines who want to further the science and technology of physical behaviour measurement. On behalf of the society's board members, I wish you all an informative, productive, and fun-filled ICAMPAM.

Alan Donnelly
President, ISMPB

ABOUT ISMPB

MISSION STATEMENT

The Society aims to promote and facilitate the study and applications of objective measurement and quantification of free-living physical behavior(s) and its related constructs (e.g. energy expenditure, context) using wearable devices. The Society is characterised by:

- its multidisciplinary focus; including engineering, signal analysis, physiology, medical sciences, public health, psychology, ergonomics and sports.
- bringing together people from a wide variety of backgrounds and expertise, including researchers, clinicians, therapists, signal analysts, computational scientists and commercial companies.

SCOPE OF THE SOCIETY

The Society focuses on the issues related to ambulatory monitoring, wearable monitors, movement sensors, physical activity, sedentary behaviour, movement behaviour, body postures, sleep and constructs related to physical behaviours. Therefore the Society specifically focuses on the objective measurement and quantification of physical behaviours which include:

- all free-living physical behaviours (including sleep) in its different forms (volumes and patterns which could give an indication of quality)
- measurements that are unrestricted, prolonged and unsupervised
- measurements of physiological responses (e.g. energy expenditure) that are directly related to physical behaviours
- a wide range of applications: clinical, public health, behavior sciences, end users etc.

Because of these criteria, other measurement techniques are NOT of primary interest. Examples being:

- objective measurement of signals other than, or not simultaneously measured with, physical behaviours (such as measurement of ECG, EEG or blood pressure)
- measurement of energy expenditure techniques such as the doubly labeled water
- measurement of physical behaviours using direct observation, questionnaires, diaries or electronic diaries room-restricted camera systems
- time restricted, supervised measurement of physical behaviours (kinematics, kinetics) outside a gait or movement laboratory

If these measurement techniques are combined with, or are related to, free-living monitoring they are potentially of interest.

ABOUT ISMPB

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Elected Representatives

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  Dept. of Rehabilitation Medicine, Erasmus MC – University Medical Center, Rotterdam, the Netherlands
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  School of Health & Society, The University of Salford, UK
- **Professor Jorunn Helbostad**
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  Epidemiology and Genomics Research Program, National Cancer Institute, USA

ABOUT ISMPB

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ABOUT ISMPB

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Julia Baumgart
Norwegian University of Science & Technology, Norway

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Alan Donnelly
University of Limerick, Ireland

Julia Baumgart
Norwegian University of Science & Technology, Norway

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Bronwyn K. Clark
The University of Queensland, Australia

ICAMPAM LOCAL HOST COMMITTEE

Chair: Alexis Le Faucheur
ENS Rennes, France

Adrien Chanteau
ENS Rennes, France

Steven Gastinger
M2S laboratory, France

Léa Gottsmann
ENS Rennes, France

Amélie Rebillard
M2S laboratory, France

Romane Peyrachon-Mouisset
ENS Rennes, France

Alexandre Vu
M2S laboratory, France

ICAMPAM LOCAL VOLUNTEERS FROM ENS RENNES

Manon Ballet
Romain Biratelle
Antoine Boulagnon
Cassandre Buffet
Diane Chambon
Maëlle Champagne
Maloé Faucon
Marie Gleyze
Welian Goasduff
Tybalt Jaillet
Titouan Junqua-Lamarque
Jarod Legrand
Luna Mock--Gaspalou
Mathilde Montel
Lila Patte
Thomas Priqueler
Hugo Renault
Honorine Robin
Henri Tetard
Pierre Vernel

PODIUM CONFERENCE SPECIALISTS

Marischal De Armond
Brian Groos
Sebastien Lavoie
Sharon Zwack

GENERAL INFORMATION

CONFERENCE VENUE

Beaulieu Campus of Rennes University
École doctorale - Université de Rennes 1,
Bâtiments #1 & #2A
Allée Henri Poincaré
F – 35700 Rennes
GPS coordinates: 48.115251, -1.636849

CONFERENCE REGISTRATION

Registration for the conference includes admission to all sessions including keynotes, symposium sessions, oral presentations and poster sessions. Also included, is the Opening Reception, lunch on Wednesday and Thursday of the conference, plus tea/coffee breaks during the conference. ICAMPAM will once again be using Whova as the platform for program content, networking, and other engagement opportunities. Access will be available for 90 days.

GUESTS

Guests of in-person attendees are welcome to attend the ICAMPAM 2024 Opening Reception at the Piccadilly Brasserie, Terasse and Bar on Tuesday, June 18 (6:30-8:00pm) as well as the Evening Social Event on Thursday, June 20 (7:30-10:00pm). Tickets must be purchased in advance. Opening Reception is $40. Evening Event is $80.

NAME BADGES

Your name badge is your admission ticket to the conference sessions, coffee breaks, meals, and reception. Please wear it at all times. At the end of the conference we ask that you return your badge to the registration desk. ICAMPAM Board Members, Sponsors, Exhibitors and Staff will be identified by appropriate ribbons.

DRESS CODE

Dress is casual for all ICAMPAM meetings and social events.

REGISTRATION AND INFORMATION DESK HOURS

The Registration and Information Desk, located in the foyer of Bâtiments #2A, will be open during the following dates and times:

Tuesday, June 18	8:30 – 18:00
Wednesday, June 19	7:30 – 19:00
Thursday, June 20	8:00 – 18:00
Friday, June 21	8:00 – 14:00

CODE OF CONDUCT

By participating in the ICAMPAM conference you are agreeing to a code of conduct. As a scientific community, ISMPB aims to provide a supportive space for scientific dialogue. We believe that scientific progress depends on the free exchange of ideas in an environment in which all participants are treated equitably and with respect. To this end, we are committed to fostering a safe and supportive community in which all scientists are able to contribute fully regardless of age, gender, race, ethnicity, national origin, religion, gender identity or expression, sexual orientation, disability or any other applicable basis proscribed by law. Harassment of any form has no place in a healthy scientific enterprise. We expect all of our members as well as other attendees at ISMPB organized events to behave in ways that promote the supportive and productive exchange of ideas.

SPEAKER INFORMATION

Each individual oral talk is 8 minutes in length plus three (3) minutes time for Questions and Answers. There will be a moderator who will advise you of the time remaining during your presentation, kindly observe the time restrictions out of respect for other presenters.

The classrooms will be equipped with:

- Projector and screen (please use 16:9 slide ratio)
- PC Laptop computer
  - **Due to time constraints and IT security on campus, personal laptops are not permitted – You must provide your presentation to the speaker ready room**
- Lectern microphone

A Speaker Ready Room will be used at ICAMPAM 2024 and will be located on campus near the registration desk. Please see the registration desk for directions to the Speaker Ready Room.

All speakers in Oral Sessions must upload their presentations in person on campus as per the following schedule:

- Wednesday morning presentations are due Tuesday, June 18 by 5:30pm
- Wednesday afternoon presentations are due Wednesday, June 19 by 12 noon
- Thursday morning presentations are due Wednesday, June 19 by 5:00pm
- Thursday afternoon presentations are due Thursday, June 20 by 12 noon
- Friday presentations are due Thursday, June 20 by 4:30pm

Note the following for your oral talk:

- Power point presenter view may not be available. It is recommended that you bring your speaking notes in another form to be prepared.
- Advise whether your slides include any audio or video files so these may be tested in advance. Please ensure any linked files are embedded within power point.
- Ensure your presentation is Windows compatible.
- **Ensure you check your presentation in the speaker preview/ready room well in advance of your presentation time to ensure all is working and loading correctly.**

POSTER VIEWING INFORMATION

To make the most of the ICAMPAM poster sessions – please review the following information carefully:
All poster abstracts are available for viewing in the ICAMPAM 2024 Whova App; these may be accessed for 90 days from Tuesday, June 18.

Posters will be available for attendees to review starting on Wednesday, June 19 at 10:15 and on Thursday, June 20 after 10:15 in the foyer. Poster presenters will be available at their poster during the scheduled Poster Time.

If you are unable to connect with a poster presenter during the Poster Session, open the poster menu in Whova (found under the agenda drop down menu) and refer to the Chat Box to leave a note in the Chat Box for the presenter to connect with you either during ICAMPAM 2024 or afterwards. You may continue to use the Whova App to connect and converse for up to 90 days.

POSTER PRESENTER INFORMATION

- Posters must be in portrait orientation only
- Poster size: A0 (84.1cm wide x 118.9cm high) (33in w x 46in high)
- ***Velcro will be provided for you to adhere the poster to the board.***

POSTER INSTALLATION AND DISMANTLE

Poster presenters must set-up and remove their posters during the following times:

Poster Session 1
Wednesday, June 19

Set Up: Between 08:00–10:15
Session Time: 12:45-14:00
Tear Down: 15:30

Poster Session 2
Thursday, June 20

Set Up: Between 08:00–10:15am
Session Time: 12:45-14:00
Tear Down: 15:30

Information on Poster Authors (Lead), Poster Numbers and Poster Titles begins on page 84.

CONFERENCE EXHIBITORS

Technical exhibits at ICAMPAM 2024 will be available for viewing in the foyer.

Tuesday, June 18	1300-1730
Wednesday, June 19	0800-1830
Thursday, June 20	0800-1800
Friday, June 21	0800-1330

Attendees will have easy access to exhibitor representatives as these exhibits are located in the coffee area in proximity to the posters.

SOCIETY GENERAL MEMBERSHIP MEETING

The International Society for the Measurement of Physical Behaviours (ISMPB) general membership meeting is scheduled from 18:20- 19:00 on Wednesday, June 19 in Amphitheatre A. All members of the society and prospective members are encouraged to attend and contribute to the meeting.

ISMPB MEMBERSHIP

Membership in ISMPB is open to everyone from around the world involved in the measurement of free-living physical behaviour.

Membership fees support the mission of ISMPB in creating a vibrant community bringing together people from a wide variety of backgrounds and expertise, including researchers, clinicians, therapists, signal analysts, computational scientists and commercial companies.

MEMBER BENEFITS

- Register for Society Meetings at reduced registration rates
- Support a vibrant and independent Society
- Become connected with leading experts in the field
- Opportunity to get involved as an ISMPB Committee member
- Vote in annual elections for the Board of Directors
- Stand for election to the Board of Directors
- Eligible for student awards at the Society Meetings (best oral and best poster)
- Access to online resources and conference proceedings
- Opportunity to post news and information on related events

MEMBER CATEGORIES

Regular / Post Doc Members ($175)
Open to any person who is engaged in research related to areas of interest of the Society.

Student Members ($95)
Open to any student enrolled in degree granting programs at institutions of higher education

The next membership term will run from October 1, 2024 to September 30, 2026.

INTERNET ACCESS

Wireless internet access is available on campus and each attendee has been assigned a username and password. This is located on the back of your name badge.

If you encounter any technical issues while using the app, please contact Whova directly by emailing support@whova.com.

AWARDS

ISMPB will offer four student awards at ICAMPAM 2024. Two awards for best poster presentation by a student and two awards for best oral presentation by a student at ICAMPAM 2024.

Recipients will be chosen from a panel of researchers based on several criteria including:

- creativity and originality of research
- clarity of presentation
- level of understanding

SPECIAL EVENTS

OPENING RECEPTION

AT PICCADILLY BRASSERIE, TERASSE, AND BAR

TUESDAY, JUNE 18 18:30-20:00

Join us at the Piccadilly to meet up with old friends and be introduced to new ones! Delegate admission to this Opening Reception is included in your conference fees. You are welcome to bring a guest with advance ticket purchase. Tickets are $40.

EARLY CAREER RESEARCH EVENT

AT THE ROOF

WEDNESDAY, JUNE 19 19:30-21:00

The Early Career Event is a unique opportunity to expand your research network by bringing together, around a relaxed activity, young researchers and invited experienced researchers participating in ICAMPAM. During this event, you will be introduced to a famous Breton game in an alternative and ephemeral place in Rennes! Wait and see!

Please note that the number of places is limited to 40. The fee is $40 each and only open to conference attendees in their early career.

EXHIBITOR TALKS IN AMPHITHEATRE A

THURSDAY, JUNE 20 11:45-12:45

11:50 ActiGraph: LEAPing Ahead with Multisensor Technology
Presented by: Liz Ball, Sales Development Representative, ActiGraph

12:00 Movisens

12:05 Activinsights

12:15 SAMMed

12:20 SENS: SENS motion, discretely monitoring physical activity
Presented by: Kasper Lykkegaard, CEO and Co-Founder, SENS

12:45 Empatica-McRoberts

12:35 ActivPal

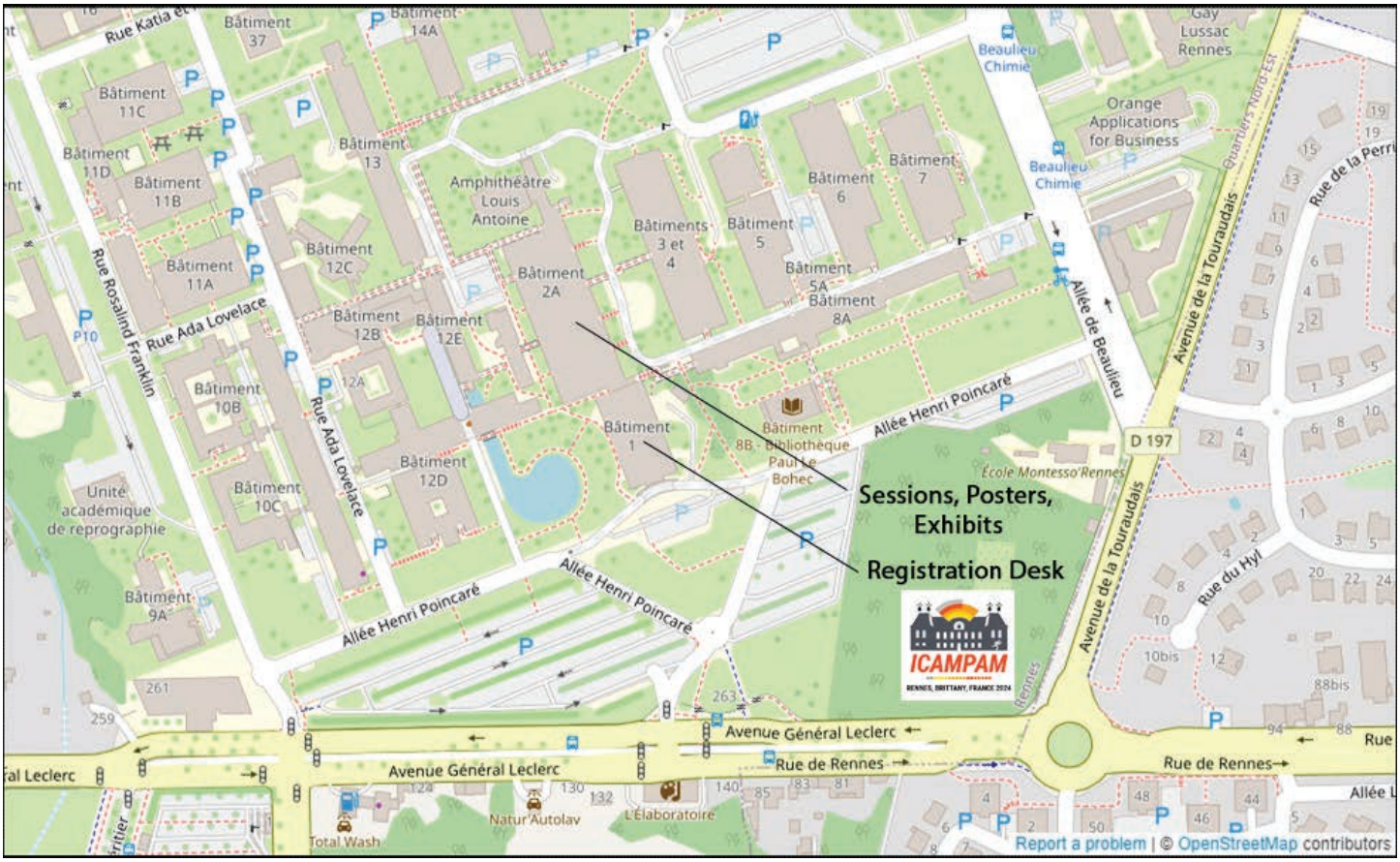
EVENING SOCIAL EVENT

AT PRISON ST. MICHELLE

THURSDAY, JUNE 20 19:30-22:00

Are you ready to travel back in time? For the festive evening of ICAMPAM 2024, you will discover the famous Saint-Michel prison (PSM) located in the historic heart of Rennes! The PSM opened in the 15th century but rest assured, it closed at the end of the 19th century. The atmosphere is now much more relaxed, as the PSM is now an essential place for Rennes' festive nights! Join us for a festive time around a cocktail dinner. Tickets $80.

VENUE LOCATION



PRE-CONFERENCE WORKSHOPS

Tuesday, June 18, 2024

9:30 – 11:00am

Workshop 1

Amphitheatre A

OBJECTIVELY MEASURING ARM ACTIVITY USING WEARBLE SENSORS

Sahel Akbari[1,2], Danny Lemmers[1.2.3]
[1]Erasmus Medical Centre, [2]Technical University of Delft, [3]Erasmus University Rotterdam

In this workshop, we will discuss the process of tailored measurement of Upper Extremity (UE) activity monitoring and assessment at home, utilizing wearable sensors. The primary focus will be on movement patterns of stroke patients and how to extract clinically relevant measures from these patterns. By the end of the workshop, participants will:

- Gain insight into the principles of rehabilitation after a stroke, as well as the clinical requirements and challenges associated with monitoring UE activity in stroke patients at home.
- Understand the possibilities and challenges involved in utilizing IMU sensor data to assess UE activity.
- Apply acquired knowledge to process IMU data and extract clinically relevant measures from wearable sensors.

Workshop 2

Location: Amphitheatre B

ACTIMETRIC R PACKAGE: APPLYING ML-BASED ALGORITHMS TO ACCELEROMETER RAW DATA

Jairo H. Migueles[1], Matthew Ahmadi[2]
[1]University of Granada, [2]University of Sydney

In this workshop, we will discuss the use of ML-based algorithms in accelerometer-based physical activity measurement and how did we get here – the path from some R scripts to a complete R package. By the end of the workshop, participants will:

- Gain insight into the purpose and functionalities of the package.
- Understand the opportunities and challenges of an R package to share methods and how to contribute to the development of actimetric.
- Apply acquired knowledge: learn basic R skills required; use cases/exercises; and looking at the output via datasets and visualizations.

Workshop 3

Location: Amphitheatre C

LEARNINGS FROM THE UK BIOBANK STUDY

Aiden Doherty[1], Adam Lewandowski[2], Alaina Shrives[3]
[1]University of Oxford, [2]UK Biobank, [3]National Cancer Institute

The collection of wrist-worn accelerometer data in 100,000 UK Biobank participants 10 years ago has transformed how we conduct research. In this workshop we will discuss the study design of UK Biobank, share example uses of the resource, and welcome input around ideas to further enhance this global research resource in future. By the end of this workshop participants will learn:

- The background to UK Biobank (Adam Lewandowski, Deputy Chief Scientist, UK Biobank)
- How to use UK Biobank accelerometer data to learn new features for human activity recognition tasks (Aiden Doherty, University of Oxford)
- How to use UK Biobank for physical activity epidemiological analysis (Alaina Shreves, National Cancer Institute)

11:30am – 1:00pm

Workshop 4

Location: Amphitheatre A

AT THE CROSSROADS OF POPULATION MEASUREMENT OF PHYSICAL ACTIVITY: A DISCUSSION FORUM WITH THE WORLD HEALTH ORGANIZATION

Fiona Bull[1], Rick Troiano[1], Juana Willumsen[1]
[1]*World Health Organization (WHO)*

This workshop will introduce participants to the global work of WHO on promoting physical activity (including global policy guidance, guidelines, policy implementation tools and metrics and instruments for population monitoring). The workshop will focus in detail on the current programme of work on updating global guidance on the measurement and surveillance of population prevalence of physical inactivity and related behaviours.

The session will include an overview presentation from WHO followed by a panel discussion including Q&A. Participants will be invited to contribute and inform the development of a consensus on an open-source algorithm suitable to produce the metrics necessary to report on current and anticipated future WHO guidelines. Discussion will scope the requirements for validation of an algorithm for use with raw acceleration data collected from a generic wearable device suitable for surveillance in low-income countries.

Panel:

Charles Matthews *National Cancer Institute, National Institutes of Health*
Sarah Keadle *California Polytechnic Institute San Luis Obispo*
Jairo Migueles *University of Granada*
Alex Rowlands *University of Leicester*
Aiden Doherty *University of Oxford*

Workshop 5

Location: Amphitheatre B

REPRODUCIBLE DATA ANALYSIS AT SCALE USING CONTAINERS ON CENTREPOINT

Ali Neishabouri[1]
[1]*Head of Data Science, ActiGraph*

This workshop focuses on the importance of creating robust pipelines for reproducible analysis of the large amounts of data collected using wearables. We will discuss primarily use of docker containers to encapsulate algorithms that can run on ActiGraph's CentrePoint platform.

- Understand challenges faced when trying to reproduce analysis with various library/OS versions.
- Gain insight on how ActiGraph's CentrePoint platform allows to integrate third-party containers.
- Learn how to encapsulate algorithms into containers that can run on any machine, including on CentrePoint.

Workshop 6

Location: Amphitheatre C

THE DAILY ACTIVITY CYCLE: ARE WE MORE THAN THE SUM OF OUR STEPS?

David Loudon[1], Douglas Maxwell[1], Craig Speirs[1], Thomas Poirier[2]
[1]*PAL Technologies Ltd.*, [2]*SAMMed*

In this workshop we will explore the daily patterns of sleeping, sitting, standing, and stepping and how these can be quantified as measures of participation and participant ability. By the end of this workshop, participants will have considered:

- What defines the daily activity cycle?
- What are the differences between behavioural and biometric outcomes?
- What are upright behaviours, how might we characterise them, and why are they important?

2024 ICAMPAM DETAILED PROGRAM

Please note that the program is subject to change. See the program online at ismpb.org/program

TUESDAY, JUNE 18, 2024

0830-1800 Registration Desk Open
Location: Foyer

0830-1730 Speaker Ready Room Open
Location: Foyer

Pre-Conference Workshops

0930-1100 **Workshop 1**
Location: Amphitheatre A
OBJECTIVELY MEASURING ARM ACTIVITY USING WEARABLE SENSORS
Sahel Akbari *Erasmus Medical Centre and Technical University of Delft*
Danny Lemmers *Erasmus Medical Centre, Technical University of Delft, and Erasmus University Rotterdam*

0930-1100 **Workshop 2**
Location: Amphitheatre B
ACTIMETRIC R PACKAGE
Jairo H. Migueles *University of Granada*
Matthew Ahmadi *University of Sydney*

0930-1100 **Workshop 3**
Location: Amphitheatre C
LEARNINGS FROM THE UK BIOBANK STUDY
Aiden Doherty *University of Oxford*
Adam Lewandowski *UK Biobank*
Alaina Shreves *National Cancer Institute*

1100-1130 Refreshment Break & Networking
Location: Foyer

1130-1300 **Workshop 4**
Location: Amphitheatre A
AT THE CROSSROADS OF POPULATION MEASUREMENT OF PHYSICAL ACTIVITY: A DISCUSSION FORUM WITH THE WORLD HEALTH ORGANIZATION
Fiona Bull *World Health Organization*
Rick Troiano *World Health Organization*
Juana Willumsen *World Health Organization*

1130-1300 **Workshop 5**
Location: Amphitheatre B
REPRODUCIBLE DATA ANALYSIS AT SCALE USING CONTAINERS ON CENTREPOINT
Ali Neishabouri *ActiGraph*

1130-1300 **Workshop 6**
Location: Amphitheatre C
THE DAILY ACTIVITY CYCLE: ARE WE MORE THAN THE SUM OF OUR STEPS?
David Loudon *ActivPal*
Douglas Maxwell *ActivPal*
Craig Speirs *ActivPal*
Thomas Poirier *SAMMed*

1300-1400 Pre ordered box lunch pick up
Location: Foyer

1300-1730 Exhibits Open
Location: Foyer

1400-1530 ## Symposium 1
Location: Amphitheatre A
METHODOLOGICAL CONSIDERATIONS WHEN EXAMINGING PHYSICAL ACTIVITY AND SEDENTARY BEHAVIORS IN OLDER ADULT POPULATIONS
Discussant: **Annemarie Koster** *Maastricht University*

S.1.1 COMPARING PHYSICAL ACTIVITY AND INACTIVITY INTENSITY CUT POINT APPROACHES FOR OLDER ADULTS: THE STUDY OF MUSCLE, MOBILITY AND AGING (SOMMA)
Reagan Garcia *University of Pittsburgh*

S.1.2 EXPANDED METRICS FOR UNDERSTANDING PHYSICAL ACTIVITY IN OLDER ADULTS
Jennifer Schrack *Johns Hopkins Bloomberg School of Public Health*

S.1.3 HOW DO ACCELEROMETER STUDY SPECIFICATIONS AFFECT ESTIMATED AGE-RELATED DIFFERENCES IN MOVEMENT
Lacey Etzkorn *Johns Hopkins Bloomberg School of Public Health*

1400-1530 ## Symposium 2
Location: Amphitheatre B
ACTIGRAPH OPEN-SOURCE ACTIVITY COUNTS: (HOW MUCH) DOES IT MATTER TO THE PHYSICAL BEHAVIOUR MEASUREMENT FIELD?
Discussant: **Phillipa Dall** *Glasgow Caledonian University*

S.2.1 THE MOTIVATION FOR A SPECIAL ISSUE IN JOURNAL FOR THE MEASUREMENT OF PHYSICAL BEHAVIOR DISCUSSING OPEN-SOURCE ACTIGRAPH COUNTS
Alexander Montoye *Alma College*

S.2.2 COMPARABILITY OF 24-HOUR ACTIVITY CYCLE OUTPUTS FROM ACTIGRAPH COUNTS GENERATED IN ACTILIFE AND RSTUDIO
Kimberly Clevenger *Utah State University*

S.2.3 COEXISTING WITH COUNTS: WHERE DO COUNTS STAND IN THE AGE OF RAW DATA?
Samuel Lamunion *National Institutes of Health*

S.2.4 RESCALING ACTIGRAPH COUNTS INTO SI UNITS AND EVALUATING THE INTRINSIC PROPERTIES WITH ALTERNATIVES MEASURES
Jan Brønd *University of Southern Denmark*

1400-1530 **Symposium 3**

Location: Amphitheatre C

RECENT APPLICATIONS OF COMPOSITIONAL DATA ANALYSIS (CODA) FOR ANALYZING THE HEALTH ASSOCIATIONS OF 24-HOUR MOVEMENT BEHAVIORS

S.3.1 ASSOCIATIONS OF 24-H MOVEMENT BEHAVIORS WITH INCIDENCE OF CARDIOVASCULAR RISK FACTORS: THE FINNISH RETIREMENT AND AGING STUDY
Kristin Suorsa *University of Turku*

S.3.2 COMPOSITIONAL ASSOCIATIONS OF 24-HOUR PHYSICAL ACTIVITIES, SEDENTARY TIME, AND SLEEP WITH DEPRESSIVE SYMPTOMS IN URBAN AND RURAL ENVIRONMENTS
Marjo Seppänen *University of Oulu*

S.3.3 DO 24-HOUR MOVEMENT BEHAVIORS PREDICT CHANGES IN QUALITY OF LIFE IN OLD AGE?
Antti Löppönen *University of Jyväskylä*

1530-1600 Refreshment Break & Networking

Location: Foyer

1600-1730 **Symposium 4**

Location: Amphitheatre A

PREDICTING FALL RISK USING DIGITAL TECHNOLOGIES: CURRENT STATE OF THE ART AND FUTURE RESEARCH DIRECTIONS

S.4.1 DIGITAL MEASURES OF GAIT AND TURNING RELATED TO FALLS IN PARKINSON'S DISEASE: EFFECTS OF COGNITION AND FREEZING OF GAIT
Martina Mancini *Oregon Health & Science University*

S.4.2 DIGITAL TECHNOLOGIES FOR FALL RISK ASSESSMENT IN COMMUNITY-DWELLING OLDER SUBJECTS
Luca Palmerini *University of Bologna*

S.4.3 MEASURING SPONTANEOUS ACTIVITY, SLEEP, AND HEART RATE WITH WEARABLE SENSORS TO IMPROVE PREDICTION OF INCIDENT FALLS IN OLDER SUBJECTS: THE DARE FALLSPREDICT PROJECTS
Alessandro Silvani *University of Bologna*

1600-1730 **Symposium 5**

Location: Amphitheatre B

ADVANCING PHYSICAL ACTIVITY RESEARCH: NOVEL ACCELEROMETER METRICS, COMPARATIVE ANALYSIS, AND FUTURE DIRECTIONS IN COHORT STUDIES
Discussant: **Joanne McVeigh** *Curtin University*

S.5.1 ACCELEROMETER-DERIVED METRICS IN MIDDLE-AGED AUSTRALIAN ADULTS AND THEIR ASSOCIATIONS WITH HEALTH OUTCOMES: THE RAINE STUDY
Bingyan Pang *Curtin University*

S.5.2 PHYSICAL ACTIVITY MONITORING IN THE CARDIOVASCULAR RISK IN YOUNG FINNS STUDY – RESULTS AND NEXT STEPS
Janne Kulmala *Jamk University of Applied Sciences*

S.5.3 PHYSICAL ACTIVITY BEHAVIOURS AND THEIR ASSOCIATIONS WITH ADIPOSITY AND TYPE 2 DIABETES RISK: DATA FROM THE MIDDLE-AGED SOWETO COHORT (MASC)
Lisa Micklesfield *University of Witwatersrand*

1600-1730

Symposium 6

Location: Amphitheatre C

BEYOND THE AVERAGE: THE POWER OF TEMPORAL PATTERNS OF PHYSICAL ACTIVITY ACCUMULATION

S.6.1 **BEYOND STEP COUNTS: EXPLORING THE COMPOSITION AND TEMPORAL DISTRIBUTION OF UPRIGHT AND STEPPING EVENTS**
Joshua Culverhouse *University of Exeter*

S.6.2 **ONE STEP BEYOND 'TOTAL STEPS': HOW PEOPLE ACCUMULATE THEIR TOTAL DAILY STEPS IS JUST AS IMPORTANT AS HOW MANY STEPS THEY TAKE FOR IDENTIFYING EARLY DECLINES IN PHYSICAL FUNCTION: A LONGITUDINAL STUDY OF OLDER ADULTS**
Brad Metcalf *University of Exeter*

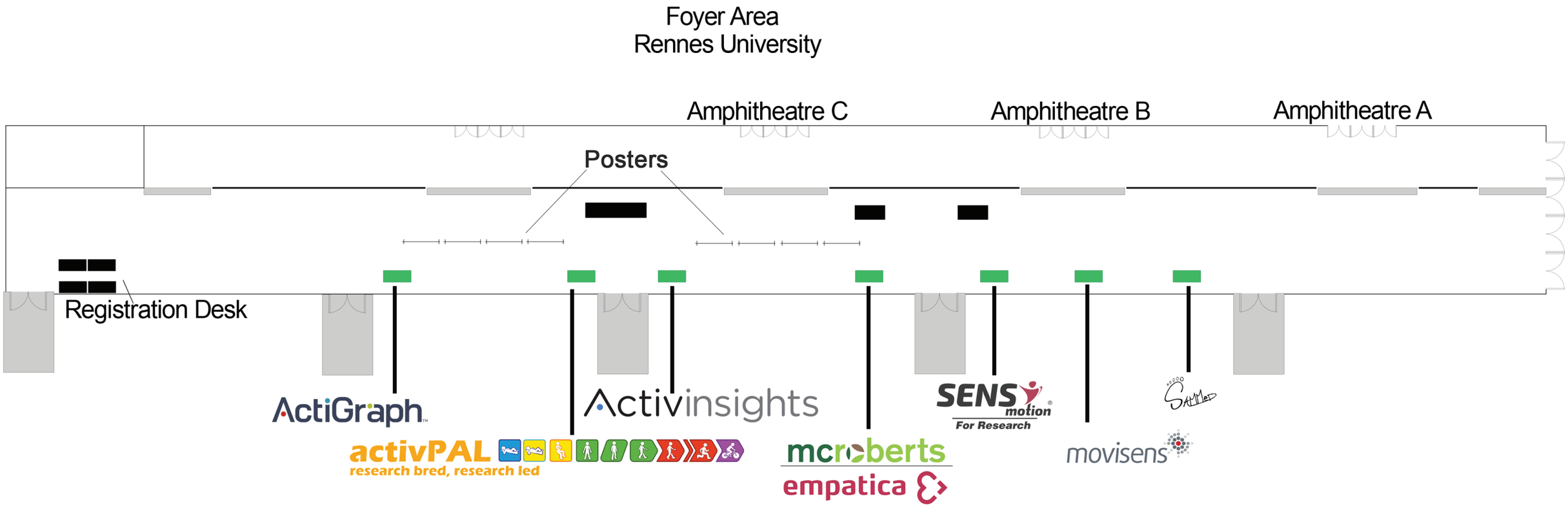
S.6.3 **DAILY PATTERNS OF PHYSICAL ACTIVITY ACCULUMATION OVER 6 MONTHS**
Joss Langford *Activinsights Ltd*

1830-2000

Opening Reception

Location: Picadilly Restaurant

VENUE FLOOR PLAN



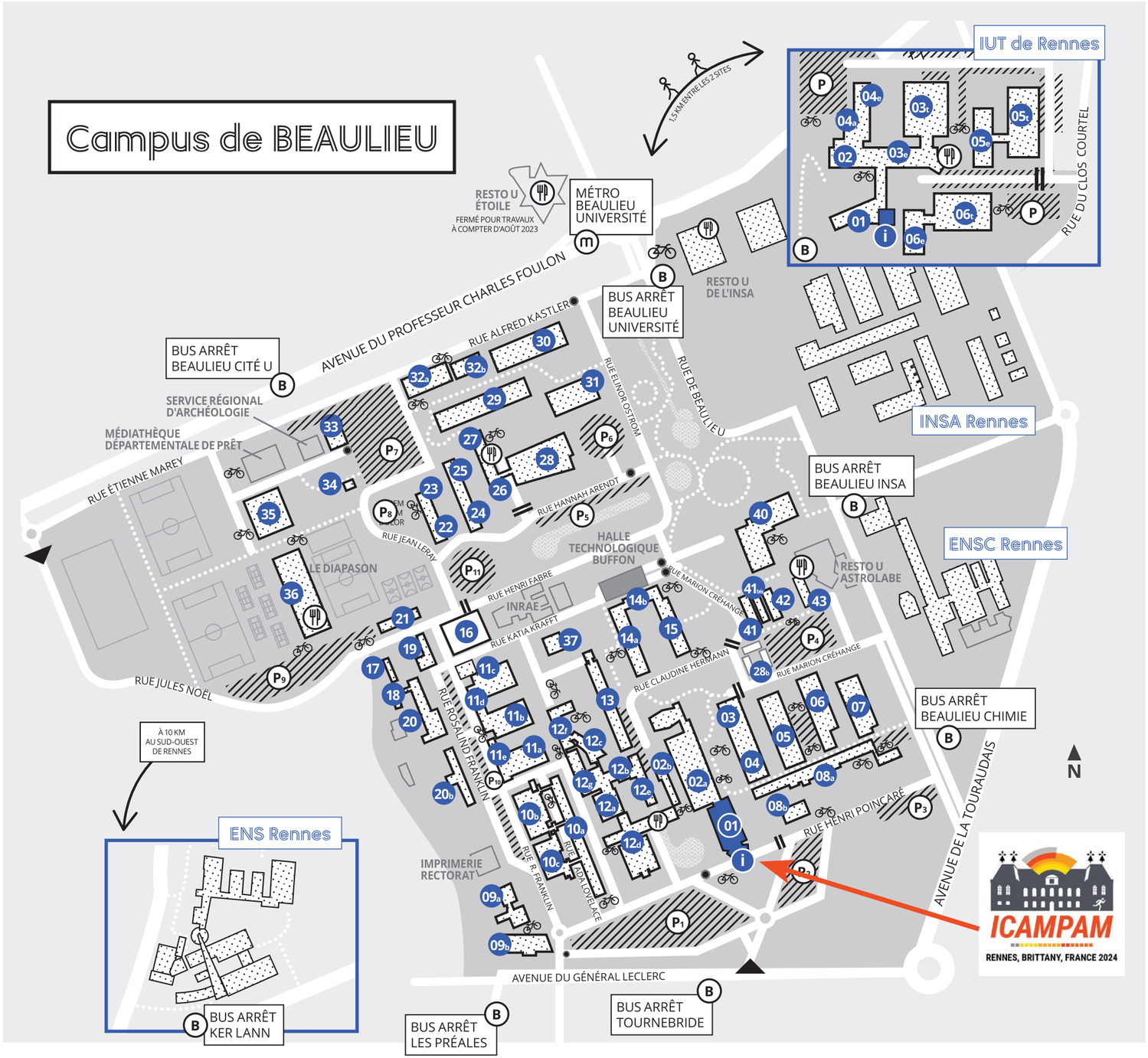
VENUE CAMPUS MAP

Campus de BEAULIEU

263 av. du Général Leclerc, 35042 Rennes

- 01 ACCUEIL, Présidence, Scolarité sciences et Philosophie, Services centraux
- 02a Amphithéâtres A, B, C, D, E, Louis-Antoine Hall des amphithéâtres, hall des examens
- 02b TP informatique
- 03 TP zoologie
- 04 TP botanique Collections et musée de zoologie
- 05 TP géologie, électronique Collections et musée de géologie
- 06 TP physique, électronique
- 07 TP chimie
- 08a IUT Carrières sociales, IUT GEA Salles d'examen, SMUT, DIL
- 08b Bibliothèque Paul Le Bohec Salle Condorcet
- 09a Pôle doctoral, salle immersive Inria Salle visioconférence, Pepite Bretagne
- 09b PNRB - Pôle numérique Rennes Beaulieu, Suptice Service Formation continue et alternance
- 10 abc ISCR - Institut des sciences chimiques de Rennes, organisations syndicales La Rustine de Beaulieu
- 10b Amphithéâtre Daniel Grandjean IPR - mécanique
- 11 abce IPR - Institut de physique de Rennes UFR Sciences et propriétés de la matière
- 11f CRMPO - Centre régional de mesures physiques de l'Ouest
- 11 bcd IETR - Institut d'électronique et des technologies du numérique
- 12f Accueil IRISA, Centre Inria
- 12 abc efg IRISA - Institut de recherche en informatique et systèmes aléatoires Centre Inria de l'Université de Rennes Amphithéâtre G
- 12d ISTIC - UFR Informatique et électronique Amphithéâtre P DSI - Direction du système d'information
- 13 UFR Sciences de la vie et de l'environnement, IGDR - Institut génétique et développement de Rennes
- 14 ab OSUR, ECOBIO, Géosciences Rennes
- 15 Géosciences Rennes, OSUR
- 16 Pôle mécanique
- 19 Local courrier - colis
- 20 DIL - Direction de l'Immobilier et de la Logistique
- 20b DPR - Direction de la prévention des risques
- 21 DEVE - Pôle vie étudiante SSE - Service santé des étudiant·es
- 22 UFR Mathématiques, LTSI - Laboratoire du traitement et du signal
- 23 IRMAR - Institut de recherche mathématique de Rennes
- 24 CReAAH - Centre de recherche en archéologie, archéosciences, histoire Agence comptable, DRH
- 25 Recherche biologie environnement
- 26 SCELVA - Service commun d'étude des langues vivantes appliquées
- 27 Pôle pédagogique licences, salles d'examen
- 28 Amphithéâtres F, G, H, I, J, K, L'Aparté
- 28b Salles de cours modulaires
- 29 TP biologie
- 30 TP physique
- 31 TP chimie
- 32a TP biochimie, salles d'enseignement
- 32b UFR Philosophie, Amphithéâtre 12 DEVE - Direction des études et vie étudiante
- 33 Maison du projet
- 34 Permanence week-end sport (SIUAPS - Service interuniversitaire des activités physiques et sportives)
- 35 SIUAPS - Gymnase Beaulieu Salle de sport
- 36 Le Diapason, Service culturel Gymnase BLB, Dojo, Salle de Boxe
- 37 Serres botaniques
- 40 BU Beaulieu, salles informatiques TP informatique
- 41 41 bis 42 ESIR - École supérieure d'ingénieurs de Rennes, amphithéâtres M, N, L
- 43 Hall des associations étudiantes

- P stationnements
- B bus
- m métro
- parking vélo
- restauration
- i accueil
- entrée principale
- plot anti-circulation
- projet en cours
- salles modulaires
- ACCÈS RÉSERVÉ AUX VÉHICULES AUTORISÉS



septembre 2023

9TH INTERNATIONAL CONFERENCE ON AMBULATORY MONITORING OF PHYSICAL ACTIVITY AND MOVEMENT
ICAMPAM 2024 - JUNE 18-21, 2024

WEDNESDAY, JUNE 19, 2024

0730-1900 Registration Desk Open
Location: Foyer

0730-1730 Speaker Ready Room Open
Location: Foyer

0800-1830 Exhibits Open
Location: Foyer

0830-0900 ## Welcome to ICAMPAM 2024
Location: Amphitheatre A

0900-1000 ## Hans Bussmann Lecture
Location: Amphitheatre A

LET'S GET MOVING: TRANSITIONING FROM SELF-REPORT TO DEVICE-BASED MEASUREMENT AND MONITORING OF GLOBAL PHYSICAL ACTIVITY LEVELS
Fiona Bull *World Health Organization*

This lecture is in recognition of the contribution of Professor Hans Bussmann, who in 2008 organised and ran the first ICAMPAM. This meeting was so successful that it inspired others to organise subsequent highly successful ICAMPAMs. Hans' visionary and brave initiative led directly to the formation of our Society and our international journal.

1000-1015 Transition Period

1015-1115 ## Oral Session 1: CLINICAL POPULATIONS 1
Location: Amphitheatre A

O.1.1 THE RELATIONSHIP BETWEEN GAIT CAPACITY AND GAIT PERFORMANCE IN NEUROLOGICAL PATIENTS
Michelle Van Mierlo *Sint Maartenskliniek*

O.1.2 WEARABLE SENSORS CAN CAPTURE CHANGES IN TURNING MOBILITY IN DAILY LIFE AFTER MTBI REHABILITATION
Laurie King *Oregon Health Science University*

O.1.3 ALTERATIONS IN THE DAILY LIVING GAIT AND MOBILITY DURING THE DAY AND NIGHT AMONG INDIVIDUALS WITH CEREBELLAR ATAXIA, SCA3: AN EXPLORATORY STUDY
Jeffery Hausdorff *Tel Aviv Sourasky Medical Center and Tel Aviv University*

O.1.4 ASSOCIATIONS BETWEEN REAL WORLD GAIT AND PAIN IN INDIVIDUALS SCHEDULED FOR KNEE ARTHROPLASTY: FEASIBILITY STUDY
Frank Bruning *Sint Maartenskliniek*

O.1.5 EXPLORING THE RELATIONSHIP BETWEEN FRAGMENTATION AND CIRCADIAN RHYTHM OF DAILY-LIVING PHYSICAL ACTIVITY, FUNCTIONAL SYSTEM DISABILITY SCORES, AND PHYSICAL FATIGUE IN PEOPLE WITH MULTIPLE SCLEROSIS
Irina Galperin *Tel Aviv University and Tel-Aviv Sourasky Medical Center*

1015-1115 ## Oral Session 2: MEASUREMENT INNOVATIONS
Location: Amphitheatre B

O.2.1 BUILDING AN INTERACTIVE ONLINE NETWORK APPLICATION FOR HARMONISING PHYSICAL ACTIVITY DATA FROM WEARABLES
Matthew Pearce *University of Cambridge*

O.2.2 LET'S DO IT AGAIN: A NEW TOOL FOR ADDING SPATIOTEMPORAL CONTEXT TO HUMAN MOVEMENT BEHAVIOUR DATA
Josef Heidler *University of Southern Denmark*

O.2.3 ANNOTATING VALIDATION STUDIES USING VISION-LANGUAGE MODELS
Abram Schonfeldt *University of Oxford*

O.2.4 PILOT EVALUATION OF THE ROBUSTNESS OF ECOLOGICAL MOMENTARY ASSESSMENT LABELING FOR FREE-LIVING PHYSICAL ACTIVITY DATA
Luis Sigcha *University of Limerick*

O.2.5 A NOVEL APPROACH TO TRUE FREE-LIVING VALIDATION OF ACCELEROMETER-MEASURED MOVEMENT BEHAVIORS
Kimberly Clevenger *Utah State University*

1015-1115 **Oral Session 3: PREDICTING HEALTH OUTCOMES**
Location: Amphitheatre C

O.3.1 ACCELEROMETER-MEASURED DAILY PHYSICAL ACTIVITY AND RISK OF INCIDENT CANCER IN THE UK BIOBANK PROSPECTIVE COHORT
Alaina Shreves *University of Oxford & US National Cancer Institute*

O.3.2 TEMPORAL ANALYSES OF PHYSICAL BEHAVIOR AND THE ASSOCIATION WITH HEALTH INDICATORS
Xin Zheng *Amsterdam UMC*

O.3.3 CAN MEASURES OF HABITUAL ACTIVITY INTENSITY STRATIFY PRIMARY SJOGREN'S SYNDROME PARTICIPANTS WITH PERSISTENT FATIGUE? INSIGHTS FROM THE BRC TOOLS STUDY
Chloe Hinchliffe *Newcastle University*

O.3.4 CAN WEARABLE ACCELEROMETERS IMPROVE THE PREDICTION OF CARDIOVASCULAR DISEASE?
Adam Sturge *University of Oxford*

O.3.5 ESTIMATING BMI FROM THE COMPLEXITY OF GAIT DYNAMICS IN FREE LIVING DATA
James Williamson *MIT Lincoln Laboratory*

1015-1115 **Oral Session 4: ALGORITHMS 1**
Location: Room 12-13

O.4.1 PROOF OF CONCEPT: EXTRACTING PHYSICAL BEHAVIOURS FROM 24-HOUR NARRATIVE DATA USING INTEGRATED LARGE LANGUAGE MODELS AND A PHILOSOPHY OF EVENT APPROACH
Usman Sani Dankoly *Glasgow Caledonian University*

O.4.2 VARIATION IN STEP COUNTS BY DIFFERENT PREDICTION METHODS IN RELATION TO EPIDEMIOLOGIC STUDIES AND PUBLIC HEALTH TRANSLATION
Charles Matthews *National Cancer Institute, National Institutes of Health*

O.4.3 IDENTIFYING PHYSICAL ACTIVITY TYPES USING THIGH-WORN ACCELEROMETRY: COMPARISON OF TWO NO-CODE CLASSIFICATION METHODS
Claas Lendt *German Sport University Cologne, Auckland University of Technology*

O.4.4 DO WE NEED AGE-SPECIFIC HUMAN ACTIVITY RECOGNITION MODELS FOR CLASSIFICATION OF ACTIVTY TYPES IN CHILDREN AND ADOLECENTS? EFFECT OF AGE AND LENGTH OF ACTIVITY BOUTS
Ellen Marie Bardal *Norwegian University of Science and Technology*

O.4.5 HEART RATE MONITORING FROM MOTION-CORRUPTED PHOTOPLETHYSMOGRAPHY: A BENCHMARK STUDY OF OPEN-SOURCE ALGORITHMS
Marcello Sicbaldi *Università di Bologna*

1115-1145 Refreshment Break & Networking
Location: Foyer

1145-1245

Oral Session 5: PARKINSON'S

Location: Amphitheatre A

O.5.1 EXPLORING THE IMPACT OF DOPAMINERGIC MEDICATION ON REAL WORLD DIGITAL MOBILITY OUTCOMES IN PEOPLE WITH PARKINSON'S
Emma Packer *Newcastle University*

O.5.2 WALKING RECOGNITION IN PARKINSON'S DISEASE POPULATIONS USING WRIST-WORN ACCELEROMETERS
Aidan Acquah *University of Oxford*

O.5.3 CAN LOCALISATION INFORMATION IMPROVE OUR UNDERSTANDING OF REAL-WORLD WALKING IN PEOPLE WITH PARKINSON'S AND OLDER ADULTS?
Cameron Kirk *Newcastle University*

O.5.4 HARNESSING WEARABLE CAMERAS AND COMPUTER VISION TO CONTEXTUALISE FREE-LIVING MOBILITY IN PARKINSON'S DISEASE
Jason Moore *Northumbria University*

O.5.5 DAILY-LIFE MEASURES OF GAIT AND TURNING ACROSS THE SPECTRUM OF NORMAL, PRODROMAL, EARLY AND MODERATE PARKINSON'S DISEASE
Martina Mancini *Oregon Health & Science University*

1145-1245

Oral Session 6: DIGITAL MOBILITY

Location: Amphitheatre B

O.6.1 REQUIREMENTS FOR RELIABLE ESTIMATES OF DIGITAL MOBILITY OUTCOMES OF WALKING ACTIVITY AND GAIT FROM A LOWER BACK INERTIAL MEASUREMENT UNIT IN A LARGE MULTI-COHORT STUDY
Joren Buekers *ISGlobal*

O.6.2 THE NUMBER OF DAYS REQUIRED FOR A RELIABLE ESTIMATE OF DIVERSE DIGITAL MOBILITY OUTCOMES FROM VARIOUS GAIT DOMAINS, DERIVED FROM A 1-WEEK WORN LOWER BACK SENSOR. ANALYSIS ACROSS DIFFERENT SUBJECT COHORTS
Eran Gazit *Tel Aviv Sourasky Medical Center*

O.6.3 WALKING SLOWLY – THE ACCURACY OF REAL-WORLD DIGITAL MOBILITY ESTIMATES AFTER A HIP FRACTURE
Martin Berge *NTNU*

O.6.4 DIGITAL MOBILITY OUTCOMES IN HIP FRACTURE PATIENTS THE FIRST YEAR AFTER HIP FRACTURE SURGERY
Jorunn Helbostad *Norwegian University of Science and Technology*

O.6.5 PREDICTING FUTURE FALLS THROUGH DIGITAL MOBILITY BIOMARKERS IN REAL-WORLD MONITORING OF COMMUNITY-DWELLING OLDER ADULTS
Jose Albites-Sanabria *University of Bologna*

1145-1245

Oral Session 7: POST JOINT REPLACEMENT

Location: Amphitheatre C

O.7.1 BRISK CADENCE IS POSSIBLE AND ENHANCED FOLLOWING A PHYSICAL ACTIVITY BEHAVIOR INTERVENTION AFTER TOTAL KNEE ARTHROPLASTY
Rashelle Hoffman *Creighton University*

O.7.2 IMPROVEMENTS IN PHYSICAL CAPACITY MAY NOT INDICATE REDUCTIONS IN REAL-WORLD SEDENTARY ACTIVITY: A LONGITUDINAL POST-TOTAL HIP ARTHROPLASTY STUDY
Rashelle Hoffman *Creighton University*

O.7.3 FEASIBILITY OF INSTRUMENTED INSOLES FOR LONG-TERM MONITORING OF GAIT AFTER TIBIAL FRACTURES
Elke Warmerdam *Saarland University*

O.7.4 **MONITORING REAL-WORLD GAIT TO EVALUATE CHANGES IN MOBILITY AFTER TOTAL KNEE ARTHROPLASTY**
Frank Bruning *Sint Maartenskliniek*

O.7.5 **EVALUATION OF REAL-WORLD MOBILITY RECOVERY AFTER HIP FRACTURE USING DIGITAL MOBILITY OUTCOMES**
Monika Engdal *NTNU*

1145-1245

Oral Session 8: SEDENTARY BEHAVIOUR

Location: Room 12-13

O.8.1 **VALIDATION OF AN ALGORITHM FOR SIT-TO-STAND AND STAND-TO-SIT IDENTIFICATION DURING ACTIVITIES OF DAILY LIVING**
Jose Albites-Sanabria *University of Bologna*

O.8.2 **PATTERNS OF SEDENTARY TIME ACCUMULATION ACCORDING TO AGE IN THE UNITED STATES: A 2003-2006 NHANES ANALYSIS**
Pierre-Yves De Müllenheim *IFEPSA-UCO*

O.8.3 **TESTING THE CONSENSUS METHOD FOR SEDENTARY TIME FROM A HIP-WORN ACCELEROMETER**
Elyse Letts *McMaster University*

O.8.4 **EFFECT OF BRIEF PEDALING BOUTS DURING ONE HOUR OF VIDEO GAME PLAY ON POPLITEAL ARTERY DIAMETER AND VELOCITY**
Macey Dunn *Grand Valley State University*

O.8.5 **IMPACT OF CUT POINT SELECTION ON LEVELS OF PHYSICAL ACTIVITY AND SEDENTARY TIME OF TODDLERS**
Jill Marie Ferry *Ludwig Maximilian University*

1245-1400

Poster Session 1 with lunch

Location: Foyer

1400-1500

Invited Speaker

Location: Amphitheatre

A PHYSICAL ACTIVITY AND SEDENTARY BEHAVIOR PATTERNS IN OLD AGE: THEIR DETERMINANTS AND IMPACT ON CARDIOVASCULAR DISEASE AND MORTALITY
Séverine Sabia *National Institute of Health and Medical Science (Inserm U1153), and University College London*

1400-1500

Oral Session 9: INTERVENTIONS

Location: Amphitheatre B

O.9.1 **ASSESSING PHYSICAL BEHAVIOUR IN A COMMUNITY LED LIFESTYLE INTERVENTION IN A REMOTE AUSTRALIAN ABORIGINAL COMMUNITY: ELCHO ISLAND TEACHINGS**
Bronwyn Clark *The University of Queensland*

O.9.2 **HOME VS COMMUNITY STEPPING PATTERNS: A MEASURE OF PARTICIPATION**
Lauren Gracey-Mcminn *University of Salford*

O.9.3 **ENHANCING DIGITAL HEALTH EVALUATION: INTEGRATING INTENSIVE LONGITUDINAL MONITORING OF PHYSICAL ACTIVITY IN A RANDOMIZED CONTROLLED TRIAL – A CASE STUDY FROM THE DIPPAO RCT.**
Alexandre Mazeas *University Grenoble Alpes*

O.9.4 **INFLUENCE OF A TABLET-BASED, GAMIFIED EXERCISE APPLICATION ON PHYSICAL FUNCTION AND PHYSICAL ACTIVITY FOR OLDER ADULTS: A FEASIBILITY STUDY**
Nina Skjæret-Maroni *Norwegian University of Science and Technology*

O.9.5 WEARABLE FITNESS TRACKERS FOR CONTINUOUS ACTIVITY MONITORING IN PATIENTS WITH HAEMOTOLOGICAL MALIGNANCIES UNDERGOING STEM-CELL TRANSPLANT: A 16-WEEK INTERVENTION STUDY
Christian Brakenridge *Swinburne University of Technology*

1400-1500 ## Invited Speaker

Location: Amphitheatre C

COMPOSITIONAL OPTIMISATION OF MOVEMENT BEHAVIOURS: CAN IT INFORM REAL-WORLD INTERVENTIONS?
Dot Dumuid *University of South Australia*

1500-1530 Refreshment Break & Networking

Location: Foyer

1530-1700 ## Symposium 7

Location: Amphitheatre A

SEDENTARY BEHAVIOR – FROM METHODOLOGICAL ANALYSIS TO POPULATION SAMPLE AND EFFECTIVE INTERVENTIONS

S.7.1 MEASUREMENT OF SEDENTARY BEHAVIOR - THE OUTCOMES OF THE ANGLE FOR POSTURE ESTIMATION (APE) METHOD
Henri Vaha-Ypya *The UKK Institute for Health Promotion Research*

S.7.2 SEDENTARY BEHAVIOR AND ITS ASSOCIATIONS WITH INDICATORS OF METABOLIC HEALTH AMONG WORKING-AGED ADULTS
Pauliina Husu *The UKK Institute for Health Promotion Research*

S.7.3 MEDICAL AND PHYSIOLOGICAL EFFECTS OF REDUCED SITTING – A 6-MONTH RCT
Ilkka Heinonen *Turku University and Turku University Hospital*

S.7.4 A PERSONALIZED 3-MO E-HEALTH INTERVENTION INCREASED NUMBER OF DAILY STEPS AMONG PATIENTS OF ELECTIVE CARDIAC PROCEDURES
Sini Vasankari *Turku University Hospital*

1530-1700 ## Symposium 8

Location: Amphitheatre B

PHYSICAL BEHAVIOUR DETECTION FROM TRI-AXIAL ACCELEROMETRY USING WEARABLES AND SMARTWATCHES: DEVELOPMENT OF CLASSIFIERS AND EXTERNAL VALIDATION BASED ON ECOLOGICAL MOMENTARY ASSESSMENT IN THE WEALTH STUDY
Discussant: **Alan Donnelly** *University of Limerick*

S.8.1 THE WEALTH STUDY DESIGN FOR LABELED DATA ASSESSMENT
Christoph Buck *Leibniz Institute for Prevention Research and Epidemiology - BIPS*

S.8.2 CLASSIFICATION OF PHYSICAL BEHAVIOURS FROM THIGH-WORN ACCELEROMETRY
Luis Sigcha *University of Limerick*

S.8.3 ACCELEROMETRY AND AI: DEVELOPING BEHAVIOURAL (BIO) MARKERS
Alan Godfrey *Northumbria University*

S.8.4 CLASSIFICATION OF PHYSICAL BEHAVIOURS USING HIP- AND WRIST-WORN ACCELEROMETRY
Annika Swenne *Leibniz Institute for Prevention Research and Epidemiology*

1530-1700 **Symposium 9**

Location: Amphitheatre C

BIDIRECTIONAL ASSOCIATIONS OF 24-HOUR MOVEMENT BEHAVIOURS AND COGNITIVE FUNCTION AMONG OLDER ADULTS: IS IT REVERSE CAUSATION?

Discussant: **Paul Gardiner** *University of Queensland*

S.9.1 ASSOCIATIONS BETWEEN TRAJECTORIES OF COGNITIVE FUNCTION AND PHYSICAL ACTIVITY, SEDENTARY TIME, AND SLEEP INI OLDER ADULTS
Dori Rosenberg *Kaiser Permanente Washington Health Research Institute*

S.9.2 DETERMINANTS OF DEVICE-MEASURED MOVEMENT BEHAVIOURS IN A NATIONALLY REPRESENTATIVE COHORT OF OLDER ENGLISH ADULTS
Laura Brocklebank *University College London*

S.9.3 ASSOCIATIONS BETWEEN 20-YEAR MEMORY TRAJECTORIES AND DEVICE-MEASURED MOVEMENT BEHAVIOURS
Mikaela Bloomberg *University College London*

1530-1700 **Symposium 10**

Location: Room 12-13

HOW ARE CHILDREN REALLY USING THEIR DIGITAL MEDIA? HARNESSING THE POWER OF TECHNOLOGY TO OBJECTIVELY MEASURE TRUE SCREEN USE AND DETERMINE RELATIONSHIPS WITH SLEEP HEALTH

Discussant: **Tom Stewart** *Auckland University of Technology*

S.10.1 CAN WE HARNESS THE POWER OF TECHNOLOGY TO MEASURE TRUE SCREEN TIME?
Shay-Ruby Wickham *University of Otago*

S.10.2 FROM DUSK TO DAWN: DOES USING SCREENS BEFORE BED REALLY IMPAIR SLEEP IN ADOLESCENTS?
Rachael Taylor *University of Otago*

S.10.3 DOES GETTING LESS SLEEP INCREASE SCREEN TIME IN CHILDREN? ANALYSIS FROM THE DREAM CROSSOVER TRIAL
Rosie Jackson *University of Otago*

1700-1715 Transition Period

1715-1815 **Keynote Speaker**

Location: Amphitheatre A

INTENSIVE LONGITUDINAL MONITORING OF HUMAN BEHAVIORS APPLIED TO ENVIRONMENTAL HEALTH ISSUES

Guillaume Chevance *Barcelona Institute for Global Health, ISGlobal*

1820-1900 **ISMPB General Meeting**

Location: Amphitheatre A

1930-2100 **ECR Event**

Location: The Roof

THURSDAY, JUNE 20, 2024

0800-1800 Registration Desk Open
Location: Foyer

0800-1730 Speaker Ready Room Open
Location: Foyer

0800-1800 Exhibits Open
Location: Foyer

0830-0930 ## Keynote Speaker
Location: Amphitheatre A

BEYOND BIG DATA: BALANCING KNOWLEDGE AND DATA FOR EFFECTIVE HUMAN ACTIVITY RECOGNITION
Kerstin Bach *Norwegian University of Science and Technology (NTNU)*

0930-0945 Transition Period

0945-1115 ## Symposium 11
Location: Amphitheatre A

PHYSIOLOGY-DRIVEN BEHAVIOUR ASSESSMENT

S.11.1 PHYSICAL DETERMINANTS OF DAILY PHYSICAL ACTIVITY IN OLDER ADULTS
Laura Karavirta *University of Jyväskylä*

S.11.2 OPERATIONALISING MECHANOBIOLOGY IN SKELETAL LOAD ASSESSMENT BASED ON FREE-LIVING ACCELEROMETRY
Timo Rantalainen *University of Jyväskylä*

S.11.3 FREE-LIVING SIT-TO-STAND KINEMATICS AS AN INDICATOR OF LOWER EXTREMITY PHYSICAL FUNCTION
Antti Löppönen *University of Jyväskylä*

S.11.4 PHYSIOLOGY-DRIVEN BEHAVIOUR ASSESSMENT
Henri Vähä-Ypyä *The UKK Institute for Health Promotion Research*

0945-1115 ## Symposium 12
Location: Amphitheatre B

NOVEL INSIGHTS INTO DAILY PHYSICAL ACTIVITY AND FUNCTION IN FITTEST-TO-FRAILEST OLDER ADULTS: FROM VALIDATION TO REAL WORLD PERFORMANCE

S.12.1 PHYSICAL PERFORMANCE IN THE HUNT4 70+ STUDY BY AGE AND EDUCATIONAL LEVEL
Kjerstin Melsæter *Trondheim Municipality, and Norwegian University of Science and Technology*

S.12.2 DEVICE-MEASURED PHYSICAL AVTIVITY IN 9,235 OLDER ADULTS ACCORDING TO AGE, SEX AND EDUCATION. THE HUNT STUDY.
Karen Sverdrup *Norwegian National Centre for Ageing and Health*

S.12.3 HOW OLDER ADULTS WALK IN DAILY LIFE IN RELATION TO AGE, SEX, AND LEVEL OF PHYSICAL FUNCTION - THE HUNT4 TRONDHEIM 70+ STUDY
Karoline Blix Grønvik *Norwegian University of Science and Technology*

S.12.4 DAILY PHYSICAL ACTIVITY AND TRAJECTORIES OF CARE SERVICES USE AMONG OLDER ADULTS: THE HUNT4 TRONDHEIM 70+ STUDY
Astrid Ustad *Norwegian University of Science and Technology*

0945-1115

Symposium 13

Location: Amphitheatre C

ADVANCES AND FUTURES OF 24 HOUR ANALYTICS

S.13.1 USING AI TO OPTIMISE 24H TIME USE
Dot Dumuid *University of South Australia*

S.13.2 BAYESIAN MULTILEVEL COMPOSITIONAL DATA ANALYSIS: A GENTLE INTRODUCTION
Flora Le *Monash University*

S.13.3 DATA-DRIVEN ANALYSIS OF COMPOSITION OF TIME SPENT IN PHYSICAL ACTIVITY INTENSITIES AND SEDENTARY BEHAVIORS
Vahid Farrahi *TU Dortmund Univeristy*

S.13.4 FUNCTIONAL REGRESSION AND ISOTEMPORAL SUBSTITUTION ANALYSIS IN THE CONTEXT OF TIME-USE DATA
Paulína Jašková *Palacký University Olomouc*

1115-1145 Refreshment Break & Networking
Location: Foyer

1145-1245

Exhibitor Talks

Location: Amphitheatre A

1150 ActiGraph:
LEAPing Ahead with Multisensor Technology
Liz Ball

1200 movisens

1205 Activinsights:
How to complement vital research with Insights on Activity, Sleep and Lifestyle
Joss Langford

1215 SAMMed

1220 SENS:
SENS motion, discretely monitoring physical activity
Kasper Lykkegaard

1225 McRoberts-Empatica

1235 ActivPal

1245-1400 **Poster Session 2 with lunch**

Location: Foyer

1400-1500 **Early Career Invited Speaker**

Location: Amphitheatre A

DEVELOPING TOOLS TO DECIPHER WEARABLE SENSOR DATA: LESSONS LEARNT BY A PHYSICAL ACTIVITY RESEARCHER

Jairo Migueles *University of Granada*

1400-1500 **Oral Session 10: CLINICAL POPULATIONS 2**

Location: Amphitheatre B

O.10.1 WRIST ACCELEROMETER MEASURES CORRELATE WITH DISEASE ACTIVITY IN RHEUMATOID ARTHRITIS AND ARE ROBUST TO FREQUENCY DOWNSAMPLING
Cameron Kirk *Newcastle University*

O.10.2 THE BENEFITS OF PASSIVE MONITORING: A COMPARATIVE ANALYSIS OF WALKING IN REAL WORLD USING PATIENT REPORTED MEASURES
Brett Meyer *Medidata Solutions*

O.10.3 CAN FEEDBACK FROM INERTIAL MEASUREMENT UNITS ENHANCE FOOT STRIKE ANGLE AND FORWARD PROPULSION IN INDIVIDUALS RECOVERING FROM STROKE?
Noel Keijsers *Sint Maartenskliniek*

O.10.4 A MACHINE LEARNING CONTEST ENHANCES AUTOMATED FREEZING OF GAIT DETECTION AND REVEALS TIME-OF-DAY EFFECTS
Amit Salomon *Tel Aviv Sourasky Medical Center*

O.10.5 MEASURING AND PREDICTING DAILY PHYSICAL ACTIVITY IN PEOPLE WITH CHRONIC DISEASES: THE ROLE OF EXERCISE-RELATED AFFECTIVE RESPONSES AND PERCEIVED EXERTION
Layan Fessler *University Grenoble Alpes*

1400-1500 **Oral Session 11: SLEEP**

Location: Amphitheatre C

O.11.1 CONCURRENT VALIDITY OF THE ACTIVPAL CREA ALGORITHM AND SELF-REPORT DIARY TO MEASURE TIME IN BED AND SLEEP IN OLDER ADULTS
Philippa Dall *Glasgow Caledonian University*

O.11.2 WEARABLES AND NEARABLES MEASURING SLEEP AND PHYSICAL ACTIVITY AMONG AUTISTIC ADULTS
Phoebe Wan *Curtin University*

O.11.3 SUBJECTIVE REPORTS OF SLEEP TIME: VALIDATION AGAINST ACCELEROMETRY-BASED ESTIMATES
Carolina Murd *National Institute for Health Development*

O.11.4 USING SMARTPHONE SCREEN TIMES TO ESTIMATE SLEEP TIMES IN UNIVERSITY STUDENTS
Michael Schmidt *University of Georgia*

O.11.5 SLEEP TIMING AND VARIABILITY: ASSOCIATIONS WITH OTHER COMPONENTS OF THE 24-HOUR ACTIVITY CYCLE
Michael Schmidt *University of Georgia*

1500-1530 Refreshment Break & Networking

Location: Foyer

1530-1630

Oral Session 12: CHILDREN AND YOUNG PEOPLE

Location: Amphitheatre A

O.12.1 COMPARISON OF MACHINE LEARNING TECHNIQUES FOR ESTIMATING ENERGY EXPENDITURE IN PRESCHOOL CHILDREN FROM GERMANY AND CANADA THROUGH ACCELEROMETRY ASSESSMENT
Hannah Coyle-Asbil *University of Guelph*

O.12.2 ASSESSING 24-HOUR MOVEMENT BEHAVIORS IN 0-4-YEAR-OLD CHILDREN: A COMPARATIVE ANALYSIS OF ACCELEROMETERS AND PROXY-RERPORT USING THE MY LITTLE MOVES APP
Anne Lettink *Amsterdam UMC*

O.12.3 RESPONSIVENESS OF ACCELEROMETER-BASED PHYSICAL ACTIVITY ESTIMATES IN YOUTH
Nicholas Remillard *University of Tennessee Knoxville*

O.12.4 ASSESSING THE ACCURACY OF ACTIVITY CLASSIFICATION USING THIGH-WORN ACCELEROMETRY: A VALIDATION STUDY OF ACTIPASS IN CHILDREN
Claas Lendt *German Sport University Cologne, Auckland University of Technology*

O.12.5 MACHINE LEARNING MODELS TO DETECT PHYSICAL ACTIVITY AND SEDENTARY TIME FROM A HIP-WORN ACCELEROMETER IN TODDLERS
Elyse Letts *McMaster University*

1530-1630

Oral Session 13: ALGORITHMS 2

Location: Amphitheatre B

O.13.1 OPTIMIZED MACHINE LEARNING MODELS FOR THE ESTIMATION OF ENERGY EXPENDITURE BASED ON PHYSIOLOGICAL SIGNALS MEASURED WITH WEARABLES
Wouter Bijnens *Maastricht University*

O.13.2 VALIDATION OF TWO NOVEL HUMAN ACTIVITY RECOGNITION MODELS FOR TYPICALLY DEVELOPING CHILDREN AND CHILDREN WITH CEREBRAL PALSY
Marte Tørring Norwegian University of Science and Technology

O.13.3 INNOVATIVE REAL-WORLD GAIT DETECTION IN HUNTINGTON'S DISEASE: UNRAVELING THE CHALLENGES OF CHOREA THROUGH DEEP LEARNING
Dafna Schwartz *Tel-Aviv Sourasky Medical Center*

O.13.4 ACTIVITY RECOGNITION USING DATA FROM WEARABLE SENSORS AND SMART SHOE DEVICES: CLASSIFYING KICK-BOARD AND SKATEBOARD COMMUTING BEHAVIORS
Julien Tripette *Ochanomizu University*

O.13.5 QUANTIFYING DAILY HEAD TURNS AND HEAD-TRUNK COUPLING IN HEALTHY ADULTS
Selena Cho *University of Utah*

1530-1630

Oral Session 14: 24 HOUR BEHAVIOURS

Location: Amphitheatre C

O.14.1 IDENTIFICATION OF NUMBER OF DAYS NEEDED TO MEASURE RELIABLY FRAGMENTATION OF REST ACTIVITY PATTERNS: A PSEUDO-SIMULATION STUDY BASED ON WHITEHALL ACCELEROMETER SUB-STUDY
Ian Danilevicz *INSERM*

O.14.2 FEASIBILITY OF CONTINUOUS 24-HOUR ACCELEROMETRY ACROSS PREGNANCY
Sylvia Badon *Kaiser Permanente Northern California*

O.14.3 COMBINED ASSOCIATIONS OF TYPE 2 DIABETES AND VIBRATION SENSATION LOSS WITH DEVICE-MEASURED PHYSICAL ACTIVITY AND SEDENTARY BEHAVIOUR. – THE MAASTRICHT STUDY
Touria Ahaouari Lemrabet *Maastricht University*

O.14.4 THE ASSESSMENT OF THE 24-HOUR PHYSICAL BEHAVIOR CONSTRUCT VIA WEARABLES: A SYSTEMATIC REVIEW OF VALIDATION STUDIES.
Marco Giurgiu *Karlsruhe Institute of Technology*

O.14.5 DAILY PHYSICAL ACTIVITY AND VIDEO GAME AND TV TIME ON BODY MASS INDEX IN YOUTH: NATIONAL YOUTH FITNESS SURVEY
Meghan Imhoff *Grand Valley State University*

1630-1645 Transition Period

1645-1745 **Keynote Speaker**
Location: Amphitheatre A

ASSESSING THE CONTEXT OF PHYSICAL ACTIVITY BEHAVIOR
Jasper Schipperijn *University of Southern Denmark*

1930-2200 **Evening Social Event**
Location: Prison St. Michelle

FRIDAY, JUNE 20, 2024

0800-1400 Registration Desk Open Foyer

0800-1100 Speaker Ready Room Open
Location: Room name TBA

0800-1330 Exhibits Open
Location: Foyer

0830-0930 ## Keynote Speaker
Location: Amphitheatre A
THE PAST, PRESENT, AND FUTURE OF SLEEP ASSESSMENT AND MONITORING
Kim Meredith-Jones *University of Otago*

0930-0945 Transition Period

0945-1115 ## Symposium 14
Location: Amphitheatre A
INTEGRATING INTERSECTIONALITY IN BEHAVIORAL DATA ANALYSIS: LABDA ADVANCING HEALTH INSIGHTS THROUGH 24-HOUR ACTIVITY DATA
Discussant: **Jasper Schipperijn** *University of Southern Denmark*

S.14.1 INTEGRATING INTERSECTIONALITY IN BEHAVIORAL DATA ANALYSIS: LABDA ADVANCING HEALTH INSIGHTS THROUGH 24-HOUR ACTIVITY DATA
Mai Chin A Paw *Child and Adolescent Public Health Research and Innovation*

S.14.2 DEVELOPING A UNIVERSAL TAXONOMY OF 24-HOURS HUMAN ACTIVITY: AN INTERSECTIONAL HUMAN CENTERED APPROACH
Sebastien Chastin *Glasgow Caledonian University, Ghent University*

S.14.3 OPEN-SOURCE LABDA TOOLBOX OF ADVANCED ANALYSES METHODS FOR WEARABLE DATA
Marian Paiva Marchiori *Southern Denmark University*

0945-1115 ## Symposium 15
Location: Amphitheatre B
EXPLORING THE IMPACT OF USING WEARABLE MOVEMENT SENSORS IN COLLEGIATE SPORT: FROM RESEARCH TO PRACTICE AND REHABILITATION TO COMPETITION
Discussant: **Dinesh John** *Northeastern University*

S.15.1 SETTING THE STAGE: CREATING ACADEMIC-ATHLETIC PARTNERSHIPS THAT ADDRESS PRACTICAL NEEDS AND RESEARCH QUESTIONS IN SPORT SCIENCE
Karin Pfeiffer *Michigan State University*

S.15.2 THE APPLICATION OF WEARABLE DEVICES AND BIO-MECHANICAL DATA TO INFORM PROGRAMS AND DECISION-MAKING IN ELITE SPORTS
William Burghardt *Michigan State University*

S.15.3 USING DATA TO UNDERSTAND COLLEGIATE ATHLETE TRAINING VOLUMES AND PREDICTORS OF PERFORMANCE
Alexander Montoye *Alma College*

S.15.4 BEYOND THE CLINIC: INTEGRATING WIRELESS ULTRASOUND AND SENSOR TECHNOLOGIES FOR KNEE HEALTH ASSESSMENT
Matt Harkey *Michigan State University*

0945-1115 **Symposium 16**

Location: Amphitheatre C

ACCURACY: THE HOLY GRAIL OF PHYSICAL BEHAVIOR ASSESSMENT—HOW BIG IS THE PROBLEM, ARE THERE SOLUTIONS, AND HOW HAVE OTHER DISCIPLINES SOLVED THIS ISSUE?

Discussant: **Aiden Doherty** *University of Oxford*

S.16.1 MEASUREMENT OF PHYSICAL ACTIVITY AND SEDENTARY BEHAVIOR IN EPIDEMIOLOGIC STUDIES: DOES ACCURACY MATTER?
Charles Matthews *National Cancer Institute, National Institutes of Health*

S.16.2 A FRAMEWORK FOR RIGOROUS, CONSISTENT AND SYSTEMATIC DEVELOPMENT AND EVALUATION OF WEARABLE SENSORS
Sarah Keadle *California Polytechnic State University San Luis Obispo*

S.16.3 HOW DO OTHER MEDICAL AND RESEARCH DEVICES DEVELOP ACCURACY STANDARDS?
Kong Chen *NIDDK, NIH*

1115-1145 Refreshment Break & Networking

Location: Foyer

1145-1245 **Invited Speaker**

Location: Amphitheatre A

UNCOVERING THE NEUROPSYCHOLOGICAL BARRIERS TO PHYSICAL ACTIVITY BEHAVIOR
Boris Cheval *École normale supérieure de Rennes*

1145-1245 **Oral Session 15: WORKPLACE**

Location: Amphitheatre B

O.15.1 ACCURACY AND ACCEPTABILITY OF THE DESK POSITIONING SYSTEM (DPS): A NEW SIT-STAND DESK MEASUREMENT DEVICE
George Thomas *The University of Queensland*

O.15.2 DEVICE-BASED MEASUREMENT OF OFFICE-BASED PHYSICAL BEHAVIOUR: A SYSTEMATIC REVIEW
Bronwyn Clark *The University of Queensland*

O.15.3 ASSOCIATION BETWEEN DEVICE MEASURED PHYSICAL ACTIVITY AT WORK AND SELF-PERCEIVED PHYSICAL WORK DEMANDS AMONG HOSPITAL WORKERS IN NORWAY - THE STUNTH STUDY
Roar Fenne *Norwegian University of Science and Technology*

O.15.4 SITTING, STANDING AND ACTIVE BEHAVIORS OF OFFICE WORKERS PARTICIPATING IN AN ERGONOMIC INTERVENTION: HOW CLOSE DO THEY GET TO A 'JUST RIGHT' ERGONOMIC BALANCE?
Luiz A. Brusaca *Federal University of São Carlos - UFSCar*

O.15.5 THE EFFECT OF A CO-DESIGNED EIGHT-WEEK WORKPLACE HEALTH PROMOTION INITIATIVE ON OCCUPATIONAL SEDENTATY TIME, PHYSICAL ACTIVITY AND GLUCOSE CONTROL WITH ADULTS WHO HOLD DESK-BASED OCCUPATIONS: PRELIMINARY BASELINE RESULTS
Aidan Buffey *University of Limerick*

1145-1245 **Oral Session 16: MEASUREMENT INNOVATIONS 2**

Location: Amphitheatre C

O.16.1 QUANTIFYING THE INTENSITY OF FREE-LIVING PHYSICAL ACTIVITY IN ABSOLUTE AND RELATIVE TERMS: IMPROVING UNDERSTANDING OF DIFFERENCES IN ACTIVITY BY AGE AND ASSOCIATIONS WITH MORTALITY
Alex Rowlands *University of Leicester*

O.16.2 DEVELOPMENT OF A SCREENING TOOL TO IDENTIFY SELF-REPORT AND DEVICE-BASED MEASURES OF HABITUAL PHYSICAL ACTIVITY FOR USE IN A SYSTEMATIC REVIEW: THE OPTIMA STUDY
Philippa Dall *Glasgow Caledonian University*

O.16.3 AN INTERSECTIONAL APPROACH TOWARDS ACCELEROMETER-BASED PHYSICAL BEHAVIOUR PATTERN ANALYSIS: SEQUENCE MAPPING
Mari Sone *Amsterdam UMC*

O.16.4 IDENTIFICATION OF CIRCADIAN RHYTHM PROFILES IN OLDER ADULTS: A COMPREHENSIVE APPROACH USING DATA FROM THE WHITEHALL II ACCELEROMETER SUB-STUDY
Sam Vidil *EpiAging, CRESS, INSERM*

O.16.5 COMPARATIVE EVALUATION OF ECOLOGICAL MOMENTARY ASSESSMENT (EMA), GLOBAL PHYSICAL ACTIVITY QUESTIONNAIRE (GPAQ), AND BOUCHARD'S PHYSICAL ACTIVITY RECORD (BAR) FOR MEASURING PHYSICAL ACTIVITY: A MULTILEVEL MODELING APPROACH
Jung Min Noh *Seoul National University*

1245-1250 Transition Period

1250-1315 ## Awards Presentation & Closing Remarks
Location: Amphitheatre A

KEYNOTE SPEAKERS

Fiona Bull *World Health Organization (WHO)*

Professor Fiona Bull MBE, Phd, is the Head of the Physical Activity Unit in the Department of Health Promotion at the World Health Organization (WHO) Headquarters in Geneva, Switzerland. At WHO, Professor Bull leads a team working on the cross-cutting agenda of promoting more participation in physical activity via active transport, sports and everyday activities through advancing science, policy, and practice. Dr Bull led the development of the Global Action Plan on Physical Activity 2018-2030: More Active People for a Healthier World, the Global Guidelines on Physical Activity and Sedentary Behaviours and the recent Global Status Report on Physical Activity 2022.

Hans Bussmann Lecture: LET'S GET MOVING: TRANSITIONING FROM SELF-REPORT TO DEVICE-BASED MEASUREMENT AND MONITORING OF GLOBAL PHYSICAL ACTIVITY LEVELS

In 2018, a global target was set to reduce physical inactivity levels by 15% (relative to 2010 levels). Tracking progress is essential for robust public health action and for holding governments and stakeholders accountable for promoting physical activity. This presentation will highlight the World Health Organization's (WHO) efforts to support countries in developing and implementing policies that encourage physical activity.

The presentation will focus on WHO's current agenda, which aims to strengthen the measurement and surveillance of physical activity, sedentary behavior, and sleep patterns in populations. It will explore the origins of the global target and discuss ongoing efforts to develop a consensus on using wearable devices in population health monitoring systems. Through these initiatives, WHO seeks to enhance the accuracy and reliability of data, ultimately driving more effective public health strategies to combat physical inactivity worldwide.

This lecture is in recognition of the contribution of Professor Hans Bussmann, who in 2008 organised and ran the first ICAMPAM. This meeting was so successful that it inspired others to organise subsequent highly successful ICAMPAMs. Hans' visionary and brave initiative led directly to the formation of our Society and our international journal.

Guillaume Chevance *Barcelona Institute for Global Health, ISGlobal*

Guillaume Chevance is an interdisciplinary researcher with a first MSc in Sport Sciences, a second in Health Psychology, and a Ph.D. in Human Movement Sciences from the University of Montpellier (France). At the beginning of his research journey, he studied motivation towards health-related behaviours. He then completed a postdoc at the University of California San Diego (US) with a team interested in the design of digital behaviour change interventions.

Guillaume is mainly interested in the dynamics of health behaviour change, such as physical activity, eating behaviors, and sleep, in a context of climate change mitigation and adaptation. For that purpose, he uses digital technologies and related methods to better understand what is going on in our daily lives. He is currently Assistant Professor at the Barcelona Institute for Global Health, ISGlobal, where he leads the eHealth group.

INTENSIVE LONGITUDINAL MONITORING OF HUMAN BEHAVIORS APPLIED TO ENVIRONMENTAL HEALTH ISSUES

This presentation will focus on the benefits of intensive longitudinal monitoring of human behaviors. In the introduction, I will explore topics such as sampling frequency, time series analysis, and complexity-related concepts like early warning signals and dynamical indicators of resilience. In the second part of the talk, I will present concrete applications of intensive longitudinal techniques to environmental health issues, including active transportation, sustainable diets, and the connection between heat and sleep.

Kerstin Bach *Norwegian University of Science and Technology (NTNU)*

Kerstin is a professor in artificial intelligence at the Department of Computer Science at NTNU. Her research interests are Machine Learning and Artificial Intelligence and is currently deputy head of the Data and Artificial Intelligence group, program manager of the Norwegian Research Center for AI Innovation (NorwAI), and associated with the Norwegian Open AI Lab. She was awarded a Dr. rer. nat. (summa cum laude) in Computer Science from the University of Hildesheim, Germany in 2012. Kerstin's main research interests are data-driven decision support systems as well as knowledge-intensive Case-Based Reasoning. She is the chair of the German Society for Computer Science's Special Interest Group on Knowledge Management, co-chair of the AI4EU gender board, and a board member of the Norwegian AI society.

BEYOND BIG DATA: BALANCING KNOWLEDGE AND DATA FOR EFFECTIVE HUMAN ACTIVITY RECOGNITION

Over the past years Machine Learning and Deep Learning models have become more and more popular to process sensor data to automatically recognize human activity. In her keynote, Bach will give an overview of the latest development of Human Activity Recognition (HAR) using Machine Learning methods. She will discuss the data requirements for creating models that can identify physical activities and sleep. Bach and her group have been working on the Norwegian HUNT4 accelerometer dataset and she will share their experience on using labeled and unlabeled data to build models used in public health research. Moreover, she will discuss how providing benchmark datasets can attract researchers from other fields and facilitate interdisciplinary collaborations.

Jasper Schipperijn *University of Southern Denmark*

ASSESSING THE CONTEXT OF PHYSICAL ACTIVITY BEHAVIOR

Jasper Schipperijn is a Professor in Active Living Environments at the Department of Sports Science and Clinical Biomechanics, University of Southern Denmark. He has been leading the World Playground Research Institute since 2022. He has an MSc degree in Forest and Nature Management from Wageningen University, The Netherlands, and a PhD degree in Greenspace Management from the University of Copenhagen, Denmark.

His research interests revolve around three main topics: playgrounds, conducting multi-disciplinary intervention studies to create active living environments, and developing tools and methods that make it possible to measure active living and the environment it takes place in. Jasper has contributed to over 150 peer-reviewed articles and was President of the International Society for Physical Activity and Health (ISPAH) from 2020-2022. Providing guidance and support for PhD students working with device-based data on physical activity behaviour is an important part of his job.

Kim Meredith-Jones *University of Otago*

Kim Meredith-Jones, an Associate Professor at the University of Otago, (New Zealand), specializes in evaluating 24-hour movement patterns, particularly focusing on objective sleep assessment. Leading major research projects involving over 2000 participants, she has played a pivotal role in assessing physical activity and sleep.

As an invited member of academic panels, Kim contributed to both the 2018 and 2022 NZ Physical Activity Report Cards for Children and Youth, including contributions to assessing sleep patterns in NZ children. Her expertise also extends to consulting on optimal measurement methods for sleep across a wide range of randomized controlled trials, including studies on movement behaviours in infants and toddlers and the effects of probiotics on sleep and gut health in adults. Kim is recognized as an authority in her field, having been an invited speaker at prestigious events like ISBNPA 2019, INTUE 2019, and Sleep in Aotearoa 2021 and 2023.

THE PAST, PRESENT, AND FUTURE OF SLEEP ASSESSMENT AND MONITORING

Sleep's impact on health underscores the need for reliable measurement tools to accurately assess duration and efficiency. Inaccurate data can distort associations between sleep and conditions like obesity, diabetes, cardiovascular diseases, and mental health disorders. In her keynote, Associate Professor Meredith-Jones explores existing methods and emerging technologies for subjective and objective sleep evaluation. Accurate measurement is crucial for understanding the relationship between insufficient sleep and various health outcomes. The presentation will discuss contemporary implementations of sleep tech and future possibilities, emphasizing the importance of having the right tools for measuring sleep duration and quality in a study-specific context.

INVITED SPEAKERS

Séverine Sabia *National Institute of Health and Medical Science (Inserm U1153), and University College London*

Séverine Sabia is a research professor in epidemiology at the National Institute of Health and Medical Science (Inserm) in France. Her main research domain is on health behaviours, including physical activity and sleep, with a particular interest in methodology. She set up the Whitehall II accelerometer study in 2012 and has led the methodological and substantive research to study the role of objectively measured physical activity and sleep for ageing outcomes. She is a contributor of the GGIR R package for analyses of raw accelerometer. She now leads a project on circadian rhythm and dementia using data from a general population and memory centre patients, funded by the European Commission.

PHYSICAL ACTIVITY AND SEDENTARY BEHAVIOR PATTERNS IN OLD AGE: THEIR DETERMINANTS AND IMPACT ON CARDIOVASCULAR DISEASE AND MORTALITY

This presentation will discuss how research on physical activity and sedentary behavior in old age has moved from a sole focus on time in moderate-to-vigorous physical activity to a broad range on movement behavior features over the last decade. This will be illustrated by examples from the Whitehall II accelerometer study on findings for cardiovascular and mortality outcomes

Dot Dumuid *University of South Australia*

Dot Dumuid's research seeks to identify the healthiest way to spend our time across daily activities such as sleeping, screen time and exercise. Because there are only 24 hours in any day, this involves a balancing act between activities. Dot Dumuid's work develops novel analytical models that explore how to get the balance right, not only for one aspect of health (e.g., obesity), but for overall health and wellbeing.

COMPOSITIONAL OPTIMISATION OF MOVEMENT BEHAVIOURS: CAN IT INFORM REAL-WORLD INTERVENTIONS?

Optimisation can identify the "best" movement behaviour compositions for one or more outcomes. Yet, these optimal behaviour targets can be impossible for some (perhaps most) people to achieve. Personalisation of the optimisation solution can provide more feasible targets. In this presentation we will explore some of the existing and emerging methods for compositional optimisation, and how optimised time-allocation solutions could be shared with populations. As an example, we will consider the Australian Small Steps towards Dementia Prevention study, which is currently trialling a co-designed interactive personalised time-use optimisation tool among older adults.

EARLY CAREER INVITED SPEAKERS

Jairo Migueles *University of Granada*

DEVELOPING TOOLS TO DECIPHER WEARABLE SENSOR DATA: LESSONS LEARNT BY A PHYSICAL ACTIVITY RESEARCHER

Jairo H. Migueles is a physical activity researcher with expertise in the measurement of physical activity using accelerometers and the comprehensive analysis of data from wearable sensor technologies. Currently, he holds a postdoctoral position at the University of Granada (Spain), while also engaging in freelance consultancy at https://www.jhmigueles.com/.

In 2020, Jairo successfully defended his PhD thesis, focusing on the measurement of physical activity using accelerometers and its implications for health. Jairo has authored over 90 peer-reviewed publications, including two "highly cited papers" recognized by Thomson Reuters Essential Science Indicators. Notably, Jairo contributed to the systematic reviews underpinning the 2020 World Health Organization's Guidelines on Physical Activity and Sedentary Behavior.

At present, Jairo is heavily involved in development of methods for quantifying physical activity and sleep. He is co-developer of the R package 'GGIR' and the main developer of the R package 'actilifecounts', among other tools. His passion lies in the development of methodologies providing consultancy aimed at enhancing research in physical activity, sleep, and associated outcomes utilizing wearable sensor technologies.

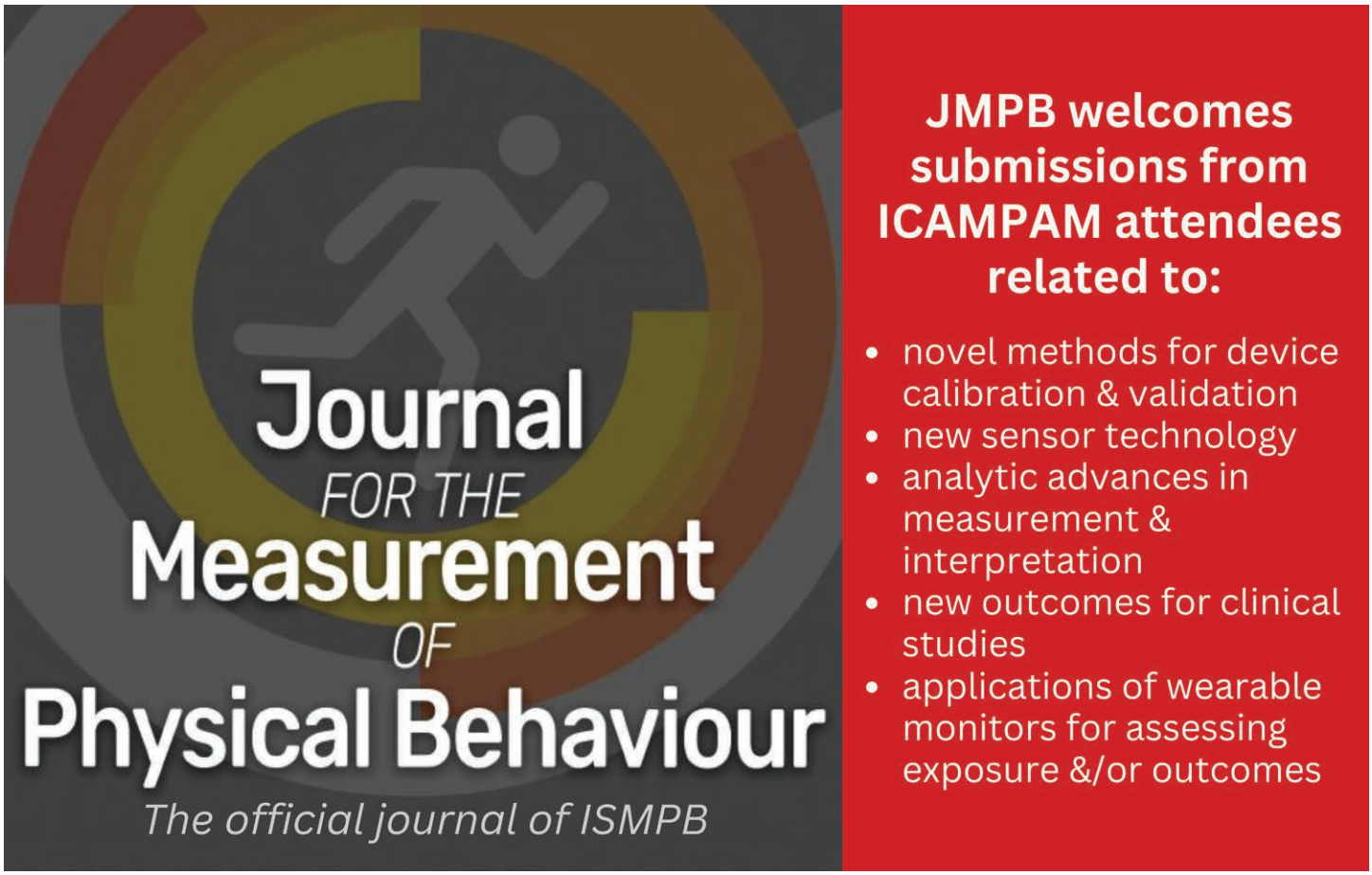
Boris Cheval *École normale supérieure de Rennes*

UNCOVERING THE NEUROPSYCHOLOGICAL BARRIERS TO PHYSICAL ACTIVITY BEHAVIOR

Professor Boris Cheval's research focuses on understanding the socio-economic and neuro-behavioral mechanisms that drive physical activity behaviors to improve health. He is the author of more than 100 articles and one book, all of which have made significant contributions to these areas of study.

After completing his initial academic training in France in the field of exercise and sport sciences, he embarked on a postdoctoral research position in the Methodology and Data Analysis Group (University of Geneva) to further develop his statistical expertise. During subsequent postdoctoral positions at the University Hospitals of Geneva and the Swiss National Center of Competence in Research LIVES, he deepened his investigations on physical activity, with a particular focus on health and socioeconomic inequalities.

In 2019, Dr. Cheval received a competitive grant from the Swiss National Science Foundation (SNSF) to advance his research at the Swiss Center for Affective Sciences (University of Geneva). In 2023, he joined the École normale supérieure de Rennes as an associate professor. Here, he continue his research on the neuropsychological factors influencing physical activity, while training students in research methods in the humanities and social sciences. He has received a Chaire de Recherche Rennes Métropole to study the neurobiological mechanisms that underlie affective response during physical effort.



SYMPOSIA ABSTRACTS

Symposium I

Tuesday, June 18

2:00-3:30pm, Amphitheatre A

METHODOLOGICAL CONSIDERATIONS WHEN EXAMINGING PHYSICAL ACTIVITY AND SEDENTARY BEHAVIORS IN OLDER ADULT POPULATIONS

Chairs: **Nancy Glynn** *University of Pittsburgh*
Jennifer Schrack *Johns Hopkins Bloomberg School of Public Health*

Discussant: **Annemarie Koster** *Maastricht University*

S.1.1 - COMPARING PHYSICAL ACTIVITY AND INACTIVITY INTENSITY CUT POINT APPROACHES FOR OLDER ADULTS: THE STUDY OF MUSCLE, MOBILITY AND AGING (SOMMA)

Reagan Garcia University of Pittsburgh

Reagan Garcia [1], Benjamin Schumacher [1], Terri Blackwell [2], Megan Hetherington-Rauth [2], Peggy Cawthon [2], Anne Newman [1], Nancy Glynn [1]

[1] *University of Pittsburgh,* [2] *San Francisco Coordinating Center*

OBJECTIVE: Raw accelerations may better discriminate physical activity (PA) intensities than proprietary activity counts in older adults. We compared two cut point methodologies applied to SOMMA participants. METHODS: Free-living accelerometry data was collected in SOMMA (N=879; n=830 with valid accelerometry data) over 7 consecutive 24-hour periods (valid wear ≥17 hours on ≥3 days) at baseline using an ActiGraph GT9X Link worn on the non-dominant wrist. Raw accelerations were aggregated into 60-second epochs and classified using two METHODS: 1) activity counts (counts/min) applying Montoye et al., 2020 PA cut points (sedentary activity[inactivity] <2860 counts/min, light PA (LPA) 2680-3940 counts/min, moderate-to-vigorous PA (MVPA) >3940 counts/min) and 2) Euclidean Norm Minus One, milli-gravitational units (mg), applying Migueles et al., 2021 PA cut points (inactivity <18mg, LPA 18 <60 mg, MVPA ≥60 mg). Total time in inactivity, LPA and MVPA were averaged over all valid days. Differences between methods were compared overall and stratified by sex using paired t-tests and Lin's concordance correlation coefficient. RESULTS: Count-based PA cut points credited SOMMA participants with 22% more time in inactivity (676.7 vs 550.4 min/day, p<0.01), 73% less time in LPA (97.8 vs 339.9 min/day, p<0.01), and 77% more time in MVPA (186.8 vs 105.3 min/day, <0.01) than acceleration-based PA cut points. Concordance between cut-point methods were moderate for inactivity (r=0.48, 95% CI: 0.45, 0.52) and MVPA (r=0.49, 95% CI: 0.45, 0.52), and weak for LPA (r=0.05, 95% CI: 0.05, 0.06). Results were similar when stratified by sex. CONCLUSIONS: Cut point methodologies led to significantly different estimates of inactivity, LPA, and MVPA in a cohort of 830 older adults. Given the unique pattern of PA in older adults, the use of acceleration derived cut-points may be more appropriate for estimating PA intensity levels in this population.

S.1.2 - EXPANDED METRICS FOR UNDERSTANDING PHYSICAL ACTIVITY IN OLDER ADULTS

Jennifer Schrack Johns Hopkins Bloomberg School of Public Health

Jennifer Schrack [1], Anis Davoudi [1], Amal Wanigatunga [1]

[1] *Johns Hopkins Bloomberg School of Public Health*

Physical activity is a well-established predictor of health and longevity with aging. Accelerometers produce high-frequency data that capture multiple aspects of physical activity throughout the day. Yet historically the majority of accelerometry-based research has employed summary, threshold-based metrics to understand the associations of amount and intensity of daily physical activity with health outcomes. Although these metrics are important for understanding conformity with physical activity recommendations, they underutilize the complex dimensions of accelerometry data. Further, traditional summary metrics may not be appropriate for use in older study populations, as they were developed and validated in younger populations.This presentation will discuss the development and

implementation of alternative measures of physical activity and their associations with health outcomes in several large cohort studies of older adults. These measures include activity fragmentation, diurnal patterns of activity, and measures of activity stability and variability, which capture unique aspects of daily physical activity above and beyond traditional metrics. Specifically, results from the Study to Understand Vitamin D and Falls Reduction in You (STURDY) trial (N=688) will demonstrate how accelerometry-derived assessments of daily activity and gait cadence can be used to assess the risk of frailty and falls. Results from the Baltimore Longitudinal Study of Aging (BLSA (N=1,300)) will show how time-of-day and fragmentation metrics differ by cognitive status and mortality risk. Finally, data from the National Health and Aging Trends Study (NHATS (N=747)) will show novel approaches to illuminating differences in volume and patterns of daily movement by dementia status. Collectively, these results will demonstrate how novel accelerometry-derived metrics can be used to assess critical associations between daily movement and health outcomes, and highlight the need for continued development of new methodology in older populations.

S.1.3 - HOW DO ACCELEROMETER STUDY SPECIFICATIONS AFFECT ESTIMATED AGE-RELATED DIFFERENCES IN MOVEMENT

Lacey Etzkorn Johns Hopkins Bloomberg School of Public Health

Lacey Etzkorn [1], Amal Wanigatunga [1], Nicolas Knuth [2], Jennifer Schrack [1]

[1] *Johns Hopkins Bloomberg School of Public Health,* [2] *Towson University*

OBJECTIVES: To describe age-related differences in movement measured by accelerometers and to describe how choice of accelerometer placement, raw data specifications (e.g., sampling rate), and movement intensity metric affect estimated age-related differences.METHODS: Twenty-two university students (18-30yrs) and twenty-two older adults (>60yrs) performed a sequence of eight tasks (e.g., usual pace walking, paced walking, sitting) for five minutes each while wearing GT9X Link accelerometers (Actigraph LLC, Pensicola, FL) on each wrist and an elastic waist belt. Raw accelerometer data (frequency = 80hz, range = 16g, resolution = 3.91mg) were coarsened to emulate data from a low-granularity device (1hz, 4g, 15.63mg). Movement intensity metrics (i.e., monitor-independent movement summary, activity counts, activity index, mean amplitude deviation, and Euclidean norm minus one) were derived for each minute of each task from both high and low-granularity data. Minute-level output was compared by age group using concordance and multi-level models.RESULTS: Using high-granularity accelerometer data, age-related differences in movement varied substantially by wear location. Measured at the dominant wrist, older adults moved with greater intensity during paced walking or while pushing a cart, but not while walking at usual or fast pace. When measured with the hip-worn accelerometer, older adults moved with less intensity during fast-paced walking. When using low-granularity data, information about movement intensity was best preserved when operationalized as mean amplitude deviation (MAD).CONCLUSIONS: Studies using hip-mounted and wrist-worn accelerometers may yield qualitatively different results about age-related differences in movement. However, results are likely to be robust to choices of movement intensity metric and accelerometer sampling frequency, resolution, and range..

Symposium II

Tuesday, June 18

2:00-3:30pm, Amphitheatre B

ACTIGRAPH OPEN-SOURCE ACTIVITY COUNTS: (HOW MUCH) DOES IT MATTER TO THE PHYSICAL BEHAVIOUR MEASUREMENT FIELD?

Chair: **Kimberly Clevenger** *Utah State University*
Discussant: **Phillipa Dall** *Glasgow Caledonian University*

S.2.1 - THE MOTIVATION FOR A SPECIAL ISSUE IN JOURNAL FOR THE MEASUREMENT OF PHYSICAL BEHAVIOR DISCUSSING OPEN-SOURCE ACTIGRAPH COUNTS

Alexander Montoye *Alma College*

Alexander Montoye [1]

[1] *Alma College*

INTRODUCTION: Early in 2022, the ActiGraph company (ActiGraph LLC, Pensacola, FL, USA) unexpectedly published a paper releasing the previously-proprietary details on how to generate their “activity count” from raw, triaxial

accelerometer data collected from body-worn accelerometers. In an effort to solicit and collect research which could help the field quickly and comprehensively understand the implications of the ActiGraph open-source count release, a special issue in the Journal for the Measurement of Physical Behaviour (JMPB) called “Understanding Open-Source ActiGraph Counts” was developed. This presentation details motivations for the special issue and the numbers and types of papers included.METHODS: Four experts in physical behaviour assessment conceived of and ultimately were assigned as guest editors for the JMPB special issue. The guest editors, in partnership with the JMPBjournal, solicited submissions through targeted social media posts and by reaching out to researchers with known experience using ActiGraph counts and to authors of recent JMPB publications. In these solicitations, example study ideas were given for potential projects that could fit within the issue’s scope. Submissions were due by September 2023. RESULTS: A total of 12 papers have been or will likely be accepted for publication in the JMPB special issue. These papers include technical notes on count properties, tutorials on calculating counts from raw accelerometer data, original research using open-source counts, and commentaries on the conception of activity counts and what role they play in physical behaviour measurement. This special issue will be fully published in the middle of 2024.CONCLUSION: Studies in this special issue cover a variety of important topics and make important revelations about how counts compare to other metrics and if and how they may be used moving forward. Later presentations in this symposium will present specific findings from several studies included in the special issue and try to place counts in a broader context of available methods and a need to continue to work toward harmonizing approaches to accelerometer data collection, interpretation, and analysis.

S.2.2 - COMPARABILITY OF 24-HOUR ACTIVITY CYCLE OUTPUTS FROM ACTIGRAPH COUNTS GENERATED IN ACTILIFE AND RSTUDIO

Kimberly Clevenger *Utah State University*

Kimberly Clevenger [1], Jan Brønd [2], Samuel Lamunion [3], Alexander Montoye [4]

[1] *Utah State University,* [2] *University of Southern Denmark,* [3] *National Institutes of Health,* [4] *Alma College*

INTRODUCTION: Data from ActiGraph accelerometers have long been downloaded into ActiLife software, where the company’s proprietary “activity counts” were generated in order to understand physical behaviour metrics such as physical activity, sedentary behaviour, and sleep. Alternatively, there are now RStudio packages to generate activity counts from any raw, triaxial accelerometer data and to implement additional data analysis steps available in ActiLife, like non-wear time identification. Use of RStudio can streamline data processing and enhance study replicability, but it is unclear if outcomes are comparable when generated in ActiLife and RStudio. We systematically compared activity counts and related physical behaviour metrics generated from ActiGraph accelerometer data using ActiLife or available packages in RStudio.METHODS: Participants were 129 undergraduate students, 18-24 years of age, who wore an ActiGraph GT9X at the non-dominant wrist and right hip. Triaxial activity counts and physical behaviour outputs (sleep, sedentary behaviour, physical activity) were calculated using multiple non-wear algorithms (Choi, Troiano, continuous zeroes), epochs (1-, 60-s), cut-points (hip, wrist), and sleep scoring algorithms (Sadeh, Cole-Kripke) in both ActiLife and RStudio.RESULTS: Counts were identical between ActiLife and the agcounts package for ~90% of days, with differences in daily counts occurring in the first or last days of a file and caused by a single epoch being different. In most cases (≥95% of days), non-wear times derived from ActiLife and the accelerometry/PhysicalActivity packages were identical. Mean differences in sedentary behavior were <0.3 min, although differences were as large as 68.1 min (corresponding to files in which differences in wear-time were correspondingly large). Differences for light, moderate, and vigorous intensities never exceeded 2 min, and <1% of differences in any of the activity intensities were greater than 1 min. Sleep outcomes were identical between ActiLife and the actigraph.sleepr package except for 11 participants who wore their accelerometers over daylight savings time, which was not accounted for in ActiLife but was accounted for in RStudio.CONCLUSION: While outcomes were largely the same between ActiLife and the tested packages in RStudio, peculiarities in the application of non-wear algorithms to the first and last portions of a data file, differences in rounding, and handling of counts values on the borderline of activity intensities resulted in small but inconsequential differences in some files. However, it is notable that we made several iterative adjustments to the RStudio code to more closely replicate the ActiLife output. Transparent reporting of data analysis is needed and comparability of analytic approaches should be confirmed, as seemingly small decisions like selecting an option or entering a cut-point affects outcomes, not always in expected ways.

S.2.3 - COEXISTING WITH COUNTS: WHERE DO COUNTS STAND IN THE AGE OF RAW DATA?

Samuel Lamunion, *National Institutes of Health*

Samuel Lamunion [1], Alexander Montoye [2], Kimberly Clevenger [3], Jan Brønd [4]

[1] *National Institutes of Health,* [2] *Alma College,* [3] *Utah State University,* [4] *University of Southern Denmark*

The physical behaviour research community has long benefitted from ActiGraph counts and their role in compiling a body of evidence to better characterize and understand physical behaviours and health. Despite frustrations and criticisms with counts over the years, the debut of counts in an open-source format sparked surprise and curiosity among researchers, raising questions about the implications of this format in an era prioritizing raw data. This portion of the symposium explores the advantages and drawbacks of open-source counts and their relevance in the raw data age.The physical behaviour assessment literature is saturated with methods for processing and analyzing counts data, which made open-source counts a welcome evolution for many users. One reason for this enthusiasm may be methodological adoptability which relates to accessibility, usability, and interpretability. For some users, these factors favor counts-based methods because of the ease of implementation. Conversely, the abundance of available counts-based methods makes data comparison challenging, even with the same outcome metric. However, there is also skepticism about the relevance of counts in the current physical behavior research landscape which emphasizes raw data methods. Additionally, current data collection protocols have largely shifted towards favoring wrist-worn devices for 24-hour behaviour analysis, where there are limited counts-based options available, especially in comparison to raw data methods with open-source and well-documented processes to facilitate their useability. Nevertheless, feasibility remains a pivotal factor for widespread adoption, regardless of the metric or outcome. The transition to open-source counts presents an opportunity for comparison with existing data, as evidenced by several manuscripts in the special issue. This comparison allows the physical behaviour research community to select the most suitable data format for their specific use case or research question. Furthermore, it facilitates the simultaneous evaluation of data using various open-source metrics, which could potentially culminate with or promote the development of consensus guidance or recommendations. While this may not directly advance data standardization or harmonization efforts, the availability of open-source counts for integration into existing data processing pipelines is a promising step forward for the field.The growing availability of and support for open-source methods for processing, analyzing, and interpreting physical behaviour data promotes transparency and furthers opportunities for data harmonization and standardization, even if only incremental. As the field continues to evolve, addressing useability concerns will be essential in maximizing the potential of open-source methods in advancing physical behaviour research.

S.2.4 - RESCALING ACTIGRAPH COUNTS INTO SI UNITS AND EVALUATING THE INTRINSIC PROPERTIES WITH ALTERNATIVES MEASURES

Jan Brønd *University of Southern Denmark*

Jan Brønd [1], Niels Christian Møller [1], Anders Grøntved [1]

[1] *University of Southern Denmark*

INTRODUCTION: There are currently several methods available to generate summary measures from raw acceleration and ActiGraph (AG) counts was the first method to be used at large scale. The original proprietary nature of the AG counts method is not the only aspect of the summary measure which has been criticized. An intensity leveling off with running above 12 km×h-1 using hip worn devices, changes to firmware, sampling frequency issues and the arbitrary count units are all debated elements which has been identified by the research community. It is uncertain what impact the recent disclosure of the AG counts method will have on the research field, but it does provide a unique option to compare the internal processing strategy with alternatives. Therefore, the aim of this study is to identify and compare the intrinsic properties of AG counts and five alternatives (ENMO, MAD, AI, ROCAM, and MIMS) and how rescaling of AG counts into SI units can be used to facilitate direct interpretation with other summary measures. METHOD: Rescaling AG counts into SI units is evaluated using acceleration measured at the wrist and hip with 37 children performing a structured protocol in their natural environment. The structured protocol included three sedentary activities and moving activities like walking, running, biking, playground play, and basketball. Oxygen consumption was also measured using indirect calorimetry. RESULTS: A total of twelve intrinsic properties is identified which includes filtering, axes, temporal alignment, rectification, scaling, dead-band elimination, sampling frequency, gravity, peak saturation, aggregation, units and overlapping. From the intrinsic property overview and comparison there is clearly a large diversity in what properties is included in the summary measures. As an example, MAD and ENMO do not include basic elements like dead-band removal or filtering to eliminate digital noise, AG counts to use a resolution, dynamic range and dead-band removal which is not optimized with modern accelerometers, and MIMS as the only summary

measure to consider all intrinsic property elements. The epoch level activity protocol data for all summary measures is graphically combined and the Pearson correlation across the six summary measures is >0.92 and >0.85 for hip and wrist, respectively. Conclusion: Rescaling the AG counts into gravitational SI units facilitates the direct interpretation with alternatives. However, providing robust summary measures with accelerometry recordings of subjects in a natural environment does require the inclusion of some basic intrinsic properties like dead-band removal and filtering which is not included with all summary measures. The research field seems to lack consensus on what elements should be required to obtain robust estimates.

Symposium III

Tuesday, June 18

2:00-3:30pm, Amphitheatre C

RECENT APPLICATIONS OF COMPOSITIONAL DATA ANALYSIS (CODA) FOR ANALYZING THE HEALTH ASSOCIATIONS OF 24-HOUR MOVEMENT BEHAVIORS

Chair: **Christian Brakenridge** *Swinburne University of Technology*

S.3.1 - ASSOCIATIONS OF 24-H MOVEMENT BEHAVIORS WITH INCIDENCE OF CARDIOVASCULAR RISK FACTORS: THE FINNISH RETIREMENT AND AGING STUDY

Kristin Suorsa *University of Turku*

Kristin Suorsa [1], Tuija Leskinen [1], Jesse Pasanen [1], Jaana Pentti [1], Jussi Vahtera [1], Sari Stenholm [1]

[1] *University of Turku*

BACKGROUND: Regular physical activity reduces, whereas high sedentary time (SED) and inadequate sleep increase risk of cardiovascular diseases. These 24-h movement behaviors, including sleep, SED, light physical activity (LPA) and moderate-to-vigorous physical activity (MVPA) have usually been examined in isolation, despite their co-dependency. Moreover, their context has often been neglected, although worktime movement behaviors may not bring same health benefits as leisure-time movement behaviors. We aimed to examine associations between the composition of 24-h movement behaviors and 3-year incidence of cardiovascular risk factors. Our secondary aim was to examine whether associations differ between workday and day off 24-h movement behaviors. METHODS: In total 866 adults (mean age 62.4 years, SD 1.1) from the Finnish Retirement and Aging (FIREA) study, free of cardiovascular risk factors, participated in 24-h wrist-accelerometry measurements combined with a diary between 2014-2018. Incident cardiovascular risk factors including hypertension, dyslipidemia and type 2 diabetes were obtained from national registers, and obesity from annual surveys. The follow-up time was 3 years. Compositional Cox proportional hazards model was used to estimate hazard ratios (HR) of incident cardiovascular risk factors, adjusting for age, sex, occupation, smoking and heavy alcohol consumption.RESULTS: During the follow-up, 84 (17%) developed hypertension, 66 (9%) dyslipidemia, 28 (3%) type 2 diabetes, 43 (6%) obesity and 94 (26%) any of these cardiovascular risk factors. The mean movement behavior composition included 7.8 h sleep, 11.0 h SED, 4.2 h LPA and 60 min MVPA. Compared to the mean composition, having 10 min more MVPA and 10 min less sleep, SED or LPA was associated with 5–7% risk reduction in hypertension, 9–12% in obesity and 6–9% in any cardiovascular risk factor. Among the least active study participants (sleep 7.9 h, SED 12.1 h, LPA 3.6 h, MVPA 24 min), the risk reduction associated with having 10 min more MVPA was nearly twofold. For type 2 diabetes risk among the whole study population, the balance between other movement behaviors, that is, sleep, SED and LPA seemed to matter more than the amount of MVPA. Longer sleep and lower SED and LPA tended to associate with lower risk of type 2 diabetes. However, these associations attenuated when short-sleepers (<7h) were excluded from the analysis. No significant associations were observed for dyslipidemia. No notable differences in the associations were observed between workdays and days off. CONCLUSIONS: Our findings suggest that daily MVPA maybe important in preventing hypertension and obesity. Even small increase in daily MVPA may help in reducing development of cardiovascular risk factors, especially among the least active older adults.

S.3.2 - COMPOSITIONAL ASSOCIATIONS OF 24-HOUR PHYSICAL ACTIVITIES, SEDENTARY TIME, AND SLEEP WITH DEPRESSIVE SYMPTOMS IN URBAN AND RURAL ENVIRONMENTS

Marjo Seppänen *University of Oulu*

Marjo Seppänen [1], Tiina Lankila [2], Maisa Niemelä [1], Nina Rautio [3], Maija Korpisaari [2], Markku Timonen [3], Raija Korpelainen [1], Vahid Farrahi [4]

[1] *University of Oulu,* [2] *Oulu Deaconess Institute Foundation,* [3] *Research Unit of Population Health, University of Oulu, Finland,* [4] *TU Dortmund Univeristy*

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) with a cut-off value of ≥14 points indicating depressive symptoms. 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 for participants with no depressive symptoms (BDI <14) (N=3906) and for those who had depressive symptoms (BDI≥14) (N= 399) and 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 the associations were different in urban and rural environments and for participants with or without depressive symptoms. For example, replacing 30 min/day of sedentary time with sleep was associated with -3.64 (95% CI = -6.03 – -1.24) and -3.84 (95% CI = -7.36 – -0.32) percent lower BDI-II scores among those with no depressive symptoms living in urban and rural environments accordingly, but no association was found for those with depressive symptoms. More daily time in MVPA at the expense of sedentary time was associated with decreased BDI-II score for all of those living in rural environment, but not for those living in urban environment. CONCLUSIONS: These preliminary findings suggest that more sleep and physical activity from moderate to vigorous intensity at the expense of sedentary time could help to prevent depressive symptoms, and the beneficial effects seem be more pronounced for rural residents.

S.3.3 - DO 24-HOUR MOVEMENT BEHAVIORS PREDICT CHANGES IN QUALITY OF LIFE IN OLD AGE?

Antti Löppönen *University of Jyväskylä*

Lotta Palmberg [1], Antti Löppönen [1], Kristin Suorsa [2], Laura Karavirta [1], Taina Rantanen [1], Timo Rantalainen [1]

[1] *University of Jyväskylä,* [2] *University of Turku*

BACKGROUND AND AIM: The maintenance of good quality of life (QoL) in old age is important as aging is often accompanied with the increase of chronic conditions and physical impairment, that can decrease QoL. Favorable movement behavior patterns, comprising more physical activity, less sedentary behavior, and sufficient sleep, may promote the maintenance of good QoL with advancing age. Earlier research targeting the associations of movement behaviors with QoL among older people has traditionally treated physical activity, sedentary behavior, and sleep as individual behaviors without considering that their combined time is fixed to a 24-hour day. The aim of the present findings is to demonstrate whether baseline time-use composition is associated with longitudinal changes in QoL among community-dwelling older adults. METHODS: Participants were community-dwelling older adults who were 75, 80 and 85 years old at baseline (n=207) and followed up 4 years later. Participants wore thigh- and trunk-mounted triaxial accelerometers for 3-7 days at baseline. Proportion of time-use in physical activity, standing and sedentary behavior were assessed based on body posture and movement intensity. Time in bed was determined using an automated algorithm. QoL was assessed during a home interview using the shortOlder People's Quality of Life Questionnaire at baseline and follow-up (range 13-65, higher scores indicate higher QoL). Compositional linear regression models were used to study whether baseline time-use composition predicts changes in QoL. Models were adjusted for age, sex, education, chronic conditions, depressive symptoms, and baseline QoL. RESULTS: Over the 4-year follow-up, QoL scores decreased by 5 % on average. At baseline, participants spent 94 min per day in physical activity, 225 min standing, 567 min in sedentary behaviors and 554 min in bed on average. Of the baseline movement behaviors, higher physical activity in relation to the remaining movement behaviors was associated with increase in QoL over time ($\beta = 0.81$, $p = 0.036$). Sedentary behavior, standing, and time in bed were not associated with changes in QoL. Theoretical reallocation of 60 min of physical activity into sedentary behavior, standing and time in bed was estimated to decrease

QoL by 1.6 (CI -2.3 to -0.9), 1.8 (-2.6 to -0.9) and 1.3 (-2.0 to -0.6) points, respectively. Reallocating time into physical activity from the remaining movement behaviors was associated with smaller estimated changes in QoL. DISCUSSION: The findings indicate that physical activity relative to other 24-hour movement behaviors is associated with longitudinal changes in QoL among older adults. Engaging more in physical activity and less in stationary activities can promote better QoL with advancing age, although the estimated changes in QoL were modest. Especially preventing reduction in physical activity and simultaneously decreasing time-use in more passive waking behaviors can be encouraged for older adults.

Symposium IV

Tuesday, June 18

4:00-5:30pm, Amphitheatre A

PREDICTING FALL RISK USING DIGITAL TECHNOLOGIES: CURRENT STATE OF THE ART AND FUTURE RESEARCH DIRECTIONS

Chair: **Lorenzo Chiar** *University of Bologna*

S.4.1 - DIGITAL MEASURES OF GAIT AND TURNING RELATED TO FALLS IN PARKINSON'S DISEASE: EFFECTS OF COGNITION AND FREEZING OF GAIT

Martina Mancini *Oregon Health & Science University*

Martina Mancini [1], Vrutangkumar Shah [2], Robin Baudier [1], Masoud Abdollahi [1], Carla Batista [1], Anjanibhargavi Ragothaman [1], Patricia Carlson-Kuhta [1], John Nutt [1], Jodi Lapidus [1], Fay Horak [1]

[1] *Oregon Health & Science University,* [2] *Clario*

Parkinson's disease (PD) is responsible for more mobility disability and falls than any other chronic disease. Some of the factors that increase fall rates in people living with PD are the same as for community-dwelling older people, such as advanced age and a prior history of falls. The motor and non-motor impairments, specific to PD, further increase the risk. For example, cognitive impairments are of particular importance as they are closely associated with higher fall risk (possibly related to defective movement automaticity). The motor impairment, freezing of gait (FOG) is also a critical risk factor for falls. Here, we are use digital outcomes from wearable sensors, collected both in the laboratory and in daily life to characterize mobility in people with PD and identify an optimal set of digital measures of gait and balance to discriminate between fallers and non-fallers and to predict future falls, controlling for cognition and FOG.
We collected data on 108 participants with moderate PD, 48 of them reporting one, or more, falls in the previous 6 months. In the laboratory, participants underwent a battery of clinical tests, as well as gait and balance tests, while wearing 6 synchronized, inertial sensors (feet, wrists, lumbar, and sternum). In addition, all participants wore 2 instrumented socks and a lumbar sensor for 7 days, for at least 5 hours a day. Falls were collected prospectively with biweekly surveys for the 12 months following baseline testing. We are using various approaches, including t-tests, and logistic regression to find the best subset of digital measures to discriminate retrospective and prospective fallers from non-fallers. In the laboratory, toe-off angle and gait variability (stride length and swing time) as well as turning (velocity and number of steps) best differentiated retrospective fallers from non-fallers. A similar set of digital measures collected during walking in daily life was important in differentiating fallers and non-fallers, even when controlling for overall cognition (characterized by the MOCA). However, when controlling for FOG, only turning characteristics differentiated between retrospective fallers and non-fallers. In predicting future falls, the most consistently selected measures during daily life were variability of the toe-out angle of the foot, pitch angle of the foot during mid-swing, and peak turn velocity. Interestingly, the AUC of the models using digital measures was better in discriminating future fallers from non-fallers than fall history alone highlighting the importance of considering precise digital measures for fall prediction. In addition, cognition and FOG should be carefully considered in fall prediction models.

S.4.2 - DIGITAL TECHNOLOGIES FOR FALL RISK ASSESSMENT IN COMMUNITY-DWELLING OLDER SUBJECTS

Luca Palmerini *University of Bologna*

Luca Palmerini [1], Jose Albites-Sanabria [1], Pierpaolo Palumbo [1], Jorunn Helbostad [2], Stefania Bandinelli [3], Sabato Mellone [1], Lorenzo Chiari [1]

[1] *University of Bologna,* [2] *Norwegian University of Science and Technology,* [3] *Azienda Sanitaria Toscana Centro*

We will start with a literature review about recent work on fall risk assessment in community-dwelling older subjects using digital technologies such as wearable sensors and machine learning, highlighting current state of the art, limitations and promising research directions. From that, we will show how we are exploiting a longitudinal dataset on ageing (InCHIANTI cohort, Italy), empowered with smartphones, to extract real-world digital outcomes related to balance, turns, gait, and transitions (sit-to-stand and stand-to-sit). These activities were automatically extracted from one week monitoring of 168 community-dwelling older people, using a finite state machine, validated in an independent dataset. From each of these activities specific digital mobility outcomes were extracted and combined through machine learning models to identify people with a higher prospective fall risk. Differences between laboratory-based outcomes and real-world ones were also analyzed, highlighting the need to move beyond traditional laboratory-based measures. Finally, we will show recent efforts towards the collection and meta-analyses of open-access datasets in the literature, to exploit available data from different sources and build more robust and generalizable models for fall risk prediction.

S.4.3 - MEASURING SPONTANEOUS ACTIVITY, SLEEP, AND HEART RATE WITH WEARABLE SENSORS TO IMPROVE PREDICTION OF INCIDENT FALLS IN OLDER SUBJECTS: THE DARE FALLSPREDICT PROJECTS

Alessandro Silvani *University of Bologna*

Alessandro Silvani [1], Jose Albites-Sanabria [1], Vincenzo Atella [2], Giorgio Bedogni [1], Abdul Haleem Butt [1], Ilaria D'ascanio [1], Paola Di Florio [1], Marco Domenicali [1], Marco Liotta [1], Sabato Mellone [1], Luca Palmerini [1], Francesco Palmese [1], Pierpaolo Palumbo

[1] *University of Bologna,* [2] *University of Rome Tor Vergata*

The occurrence of falls in older persons is a significant public health issue. The current state of the art for fall risk prediction is represented by tools such as the FRAT-up score, which is based on a metanalysis of fall risk factors and is validated over four European cohorts. Information on activities of daily living may be obtained with inertial sensors and analyzed to identify abnormal movement patterns that could lead to a fall. Systematic reviews of the literature indicate that the risk of falls increases with decreased sleep duration and with increased sleep fragmentation estimated with wrist actigraphy. There is evidence that heart rate measurements and, particularly, indexes of decreased parasympathetic modulation of heart rate variability may also carry information on fall risk.On these bases, we designed and obtained ethical approval for the DARE FALLSPREDICT and DARE FALLSPREDICT GP clinical study protocols to develop a multivariable model beyond the state of the art for predicting incident falls in community-dwelling older subjects. In both studies, the subjects will be assessed twice at a 6-month interval. In each assessment, subjects will compile the FRAT-up fall prediction tool and undergo continuous monitoring for one week with a wearable multi-sensor set-up in real-world conditions. All subjects will wear a six-axial accelerometer and gyroscope at the lower back, operating as a data logger. In the DARE FALLSPREDICT study, 1000+ subjects including both frail elderly patients and older subjects from the general population will also wear a triaxial accelerometer at the wrist, operating as a data logger. The DARE FALLSPREDICT GP study will evaluate the practical feasibility of wearing a combined triaxial accelerometer and photoplethysmographic heart rate sensor at the wrist coupled with a dedicated smartphone in 200 additional elderly subjects from the general population. All subjects will be followed-up for 1 year, with monthly telephone interviews to determine the occurrence and circumstances of incident falls and associated costs.
The features of spontaneous daily activities measured with inertial measurement units that best predict the risk of falls will be identified with a systematic review and individual patient data metanalysis. Sleep and heart rate metrics will be computed from wearable sensor data with validated algorithms. Logistic regression and machine learning approaches will be employed for model development. The DARE FALLSPREDICT and DARE FALLSPREDICT GP project ambition is to improve personalized and time-sensitive prediction of incident falls in older subjects, as a prerequisite for optimal allocation of prevention efforts.This research was co-funded by the Italian Complementary National Plan PNC-1.1 "Research initiatives for innovative technologies and pathways in the health and welfare sector" D.D. 931 of 06/06/2022, "DARE - DigitAl lifelong pRvEntion" initiative, code PNC0000002

Symposium V

Tuesday, June 18

4:00-5:30pm, Amphitheatre B

ADVANCING PHYSICAL ACTIVITY RESEARCH: NOVEL ACCELEROMETER METRICS, COMPARATIVE ANALYSIS, AND FUTURE DIRECTIONS IN COHORT STUDIES

Chair: **Joanne McVeigh** *Curtin University*

Discussant: **Joanne McVeigh** *Curtin University*

S.5.1 - ACCELEROMETER-DERIVED METRICS IN MIDDLE-AGED AUSTRALIAN ADULTS AND THEIR ASSOCIATIONS WITH HEALTH OUTCOMES: THE RAINE STUDY

Bingyan Pang *Curtin University*

Bingyan Pang [1], Joanne Mcveigh [1], Leon Straker [1]

[1] *Curtin University*

BACKGROUND: Regular PA is often advocated as a key component in healthy ageing. Recent advancements in data processing and analysis of accelerometer-measured PA enable us to better comprehend accelerometer-derived metrics and their association with health outcomes.METHODS: We utilised wrist accelerometer data collected over seven consecutive days from the Raine Study Generation 1 participants. The Raine Study, commenced in 1989 to investigate the safety of serial ultrasound in 2900 pregnant women in Western Australia. The pregnant women and their spouses are the Generation 1 of the study. Since then, the Raine Study evolved into a cohort study investigating life-course human health and well-being. Accelerometry data from 1098 participants (mean age = 56.7 years, SD = 5.7) at the 26-year follow-up was processed using the GGIR R package. The PA-related metric was derived from the average Euclidean Norm Minus One (ENMO) per day in mg, and moderate-intensity PA was defined as the average daily minutes spent >100mg. Average accelerations in most active minutes (2, 5, 15, 30, 60, 120 minutes) throughout the day were investigated. Linear regressions examined associations between PA and each outcome. Covariates included gender, education, self-reported health, and medication intake. RESULTS: 943 participants with valid accelerometry data and health data were included in this analysis. The average acceleration was 25.6mg (SD = 8.3) per day (men: 24.9mg, SD: 8.7; women: 26.0mg, SD: 7.9). Approximately 20% of the cohort participated in 30 minutes of MPA each day. Higher accelerations in all active minutes of the day were observed in participants with better self-reported health. Participants with excellent self-reported health also engaged in 30 minutes of MPA daily. Minimal statistically significant effects were observed between PA and medication intake. Diabetes medication intake had a small positive effect on PA. Conclusion: Higher accelerations may be associated with better health in middle-aged Australians. Harmonisation of accelerometer-derived data and processing in cohort studies could provide clearer guidance on PA recommendations.

S.5.2 - PHYSICAL ACTIVITY MONITORING IN THE CARDIOVASCULAR RISK IN YOUNG FINNS STUDY – RESULTS AND NEXT STEPS

Janne Kulmala *Jamk University of Applied Sciences*

Janne Kulmala [1], Katja Pahkala [2], Xiaolin Yang [1], Kaisa Kaseva [3], Olli Raitakari [2], Tuija Tammelin [1]

[1] *Jamk University of Applied Sciences,* [2] *University of Turku,* [3] *University of Jyväskylä and University of Helsinki*

Introduction: The Cardiovascular Risk in Young Finns Study is one of the largest follow-up studies on cardiovascular risk from childhood to adulthood. The main aim has been to determine the contribution made by childhood lifestyle as well as biological and psychological measures to the risk of cardiovascular diseases in adulthood. Two pilot studies were carried out in 1978 and 1979, and the first cross-sectional study in 1980 (age 3 to 18 years). Thereafter, this cohort has been followed up in 1983, 1986, 1989, 1992, 2001, 2007 and 2011. In the latest field study phase in 2018–2020, in addition to the original Young Finns Study (YFS) participants (age 41 to 56 years), their parents and children were invited to take part. A total of 7,349 participants attended this three generational field study. METHODS: Physical activity (PA) has been monitored with a questionnaire since 1980, with the addition of a pedometer during 2007 and 2011 and an accelerometer in 2018–2020 (ActiGraph GT3X+ and wGT3X+ on hip for 24/7, N = 1349). RESULTS: Tracking of steps per day

in adulthood was found to be low to moderately high (2007, 2011 and 2018–2020). Compared with the low-active group, the group that was high-active at baseline had a higher probability of being active later in adulthood. Sustained participation in organized youth sports is independently predictive of physical activity patterns, sedentary time, and obesity in midlife, especially in girls, thus contributing to the development of a healthy and active lifestyle across the life course. Parental persistent PA, particularly paternal persistent PA, predicts offspring's PA concurrently and prospectively. Increasing PA and maintaining high PA in comparison to persistently low PA in youth predicts higher PA levels in midlife. Active commuting to school in childhood might be one of the PA modes that contribute to PA in adulthood. If this link turns out to be causal, encouraging active commuting to school at an early age might increase PA levels in midlife.Discussion: Technological development offers advancements in PA monitoring, but it also challenges the consistency and comparability of longitudinal cohort studies lasting decades such as YFS. Device type and location especially need to be carefully balanced when designing follow-ups. The accelerometer has proved to be a convenient tool for cohort studies, but more can be achieved with harmonization and comparison with other cohorts.References: Yang et al. Med Sci Sports Exerc 2021; Yang et al. Am J Prev Med 2022; Yang et al. Prev Med 2022; Kaseva et al. Sci Rep. 2022.

S.5.3 - PHYSICAL ACTIVITY BEHAVIOURS AND THEIR ASSOCIATIONS WITH ADIPOSITY AND TYPE 2 DIABETES RISK: DATA FROM THE MIDDLE-AGED SOWETO COHORT (MASC)

Lisa Micklesfield *University of Witwatersrand*

Lisa Micklesfield [1, 2], Kate Westgate [3], Antonia Smith [3], Clement Kufe [2], Amy Mendham [2], Julia Goedecke [4], Soren Brage [3]
[1] *University of Witwatersrand,* [2] *University of the Witwatersrand,* [3] *University of Cambridge,* [4] *South African Medical Research Council*

PURPOSE: We developed a method of combining hip and thigh accelerometery signals to quantify and describe physical behaviours, and then examined associations with adiposity and type 2 diabetes risk in a cohort of middle aged South African men and women. METHODS: We integrated signals from two triaxial accelerometers worn simultaneously during free-living, in a sub-sample of the Middle-aged Soweto Cohort (n = 794; mean±SD age, 53.7±6.3 yrs). Movement-related acceleration was derived from the combination of acceleration time series from both accelerometers to determine total movement volume (mean Euclidean Norm Minus One, mg) which was then categorised as light-intensity physical activity (LPA, mins/day) or moderate- to vigorous-intensity physical activity (MVPA, mins/day). Using thigh pitch angle and a sleep diary static time (mins/day) was categorised as sleep, awake sitting/lying, or standing. Total body fat mass and regional adiposity were measured using dual-energy X-ray absorptiometry, and oral glucose tolerance tests were completed on a sub-sample of participants from which indicators of type 2 diabetes risk were derived. RESULTS: Movement volume was higher in men than women (15.0± 6.5 vs. 12.2±3.4 mg; <0.001) and men spent more time in MVPA and sitting/lying, whereas women spent more time standing1. Age and socioeconomic status were inversely associated with movement volume and MVPA. In men, reallocating 30 minutes of sitting/lying, standing or LPA to 30 minutes of MVPA was associated with lower fat mass, 1.2-1.4 mmol/L lower fasting glucose and 12.3-13.4 mgl2/mUmin higher insulin sensitivity2,3. In women, reallocation of 30 minutes of sitting/lying, standing or LPA to MVPA was associated with higher basal insulin clearance and lower fat mass. Further, in women reallocation of 30 minutes of sitting/lying to MVPA and 30 minutes of standing to MVPA were associated with a 0.3% and 1.4% lower fat mass, respectively. Just replacing sitting with the same amount of time standing or LPA was associated with 0.5-0.8 mmol/L lower fasting glucose and 3.2 mgl2/mUmin higher insulin sensitivity in women. CONCLUSIONS: Integrating signals from hip and thigh accelerometers enables characterization of physical behaviours that can be applied in an African population, and which we have shown to be associated with adiposity and type 2 diabetes risk. Longitudinal and intervention studies are warranted to provide more specific PA recommendations.References:Micklesfield LK et al., Med Sci Sports Exerc. 2022 Sep 1;54(9):1493-1505. Mendham AE et al., J Phys Act Health. 2022 Jul 19;19(8):548-557. Kufe CN et al., BMJ Open Diabetes Res Care. 2022 Jul;10

Symposium VI

Tuesday, June 18

4:00-5:30pm, Amphitheatre C

BEYOND THE AVERAGE: THE POWER OF TEMPORAL PATTERNS OF PHYSICAL ACTIVITY ACCUMULATION

Chair: **Melvyn Hillsdon** *University of Exeter*

S.6.1 - BEYOND STEP COUNTS: EXPLORING THE COMPOSITION AND TEMPORAL DISTRIBUTION OF UPRIGHT AND STEPPING EVENTS

Joshua Culverhouse *University of Exeter*

Joshua Culverhouse [1]

[1] *University of Exeter*

Accelerometer-based movement behaviour research holds promising potential to revolutionise our comprehension of physical activity patterns, transcending simplistic frequency and duration measures. Employing an event-based approach, we reanalysed activPAL data of 4,527 participants from the 1970 British Cohort Study (BCS70) to produce a suite of upright and stepping event metrics. These metrics aimed to quantify the composition and temporal distribution of these postural events, including 'burstiness', an indicator of how clustered events are versus being more evenly distributed throughout the day. We examined the intricate associations between these metrics and various sociodemographic, lifestyle, and health factors. Our analysis revealed substantial variations in the composition and temporal distribution of upright and stepping events across diverse population groups. We found nuanced "phenotypes" of activity accumulation, revealing significant associations with sex, age, body composition, occupational activity, self-reported health, and more. Even after adjusting for step volume, individuals exhibit distinct patterns in how they accrue steps, with notable observations in temporal distribution and event fragmentation.Furthermore, our exploration extends to the cross-sectional associations of these metrics with performance-based physical function outcomes. Using activPAL data from The Maastricht Study, we produced the same metrics in 6,085 participants (59.6 ± 8.7 years) to analyse the associations with a range of physical function outcomes in an older population. We discovered that more fragmented activity was associated with poorer function, and the temporal distribution of events was also linked with performance, over and above volume. In addition, we returned to our BCS70 population (46 years) and found that these associations were also present in midlife. Our findings underscore the importance of considering not only the total volume of activity but also the manner in which it is accumulated. Associations persist even after adjusting for overall activity volume, suggesting the independent association of activity patterns with physical function. These findings emphasise the imperative for future longitudinal research to understand the implications of different activity patterns on future health outcomes. Such nuanced understanding has the potential for screening, intervention, and empowering individuals to make informed choices regarding their physical activity, thereby fostering healthier lifestyles.

S.6.2 - ONE STEP BEYOND 'TOTAL STEPS': HOW PEOPLE ACCUMULATE THEIR TOTAL DAILY STEPS IS JUST AS IMPORTANT AS HOW MANY STEPS THEY TAKE FOR IDENTIFYING EARLY DECLINES IN PHYSICAL FUNCTION: A LONGITUDINAL STUDY OF OLDER ADULTS

Brad Metcalf *University of Exeter*

Brad Metcalf [1], Melvyn Hillsdon [1], Joss Langford [2]

[1] *University of Exeter,* [2] *Activinsights and University of Exeter*

BACKGROUND/AIMS: While declines in total daily steps counts may be an important marker of declining physical function, changes in the way people accumulate their daily steps may also be important, even in the absence of any decline in total steps (e.g. people may still be able to achieve their total daily steps required for daily living, but they may start to do more of them at a slower pace, in shorter bouts and with longer rests between bouts). The aim of this analysis is to determine whether changes in such features of total daily stepping are associated with lab-based measures of physical function.METHODS:Participants were from the REtirement in ACTion study (REACT, N=777, age≥65years). Measures of free-living daily stepping (7day GENEActiv accelerometery: total steps, %faster-paced walking steps, mean duration of stepping bouts, mean duration of gaps between stepping bouts) and lab-based

physical function (SPPB: sit-to-stand, balance and 4meter walk) were taken at 0, 6, 12 and 24months. Linear Mixed-Effects Regression (LMER) was used to analyse the longitudinal data with age, gender, deprivation and health status entered as covariates. RESULTS: Total steps, %faster-paced walking steps and mean duration of gaps between stepping bouts were all independent predictors of the SPPB physical function score, together explaining 11.1% (ΔR2: 4.1%, 4.5% and 2.5% respectively, all <0.05) of the variance remaining from the covariate-only model. If two people had the same total step count as each other, yet one achieved 20% more of their steps through faster-paced walking, their predicted SPPB score would be ~0.50 units higher at 24mths (deemed to be a clinically important difference). Similarly, if two people had the same step count and percent of faster-paced walking steps, yet the mean duration between stepping bouts was 15mins shorter for one of them, then their predicted SPPB score would be 0.60 units higher at 24mths. CONCLUSION: Simply measuring total step count only tells half the story as it appears that measuring/monitoring the pace and patterns of step count accumulation are just as important when attempting to detect early, pre-clinical signs of decline in physical function, especially as changes in such stepping features may occur before a fall in total step count.

S.6.3 - DAILY PATTERNS OF PHYSICAL ACTIVITY ACCULUMATION OVER 6 MONTHS

Joss Langford *Activinsights Ltd*

Joss Langford [1], Melvyn Hillsdon [2], Brad Metcalf [2]

[1] *Activinsights Ltd,* [2] *University of Exeter*

SafeHeart is a prospective, international, multicentre, observational study developing a personalised model to predict implanted cardiac device therapy for malignant ventricular arrhythmias. The project was supported with grants from Eureka Eurostars and the study was registered at the National Trial Registration in the Netherlands (Trial NL9218; https://www.trialregister.nl). A total of 303 participants were enrolled and went on to collect wrist-worn raw accelerometer data (GENEActiv) continuously for 6 months.Using the longitudinal accelerometer in this sub-study, we explore the hypothesis that changes in patterns of daily physical activity accumulation are a leading indicator of average daily physical activity measures.The associations between health outcomes and daily volumes of a range of physical activity measures have been widely researched (e.g. minutes of MVPA or total steps). Once established, adverse behavioural profiles have significant, quantifiable risks and are notoriously difficult to change. Declines in total physical activity are then also linked to worsening health outcomes. While proven in population-level statistics, the utility of these measures in clinical care is, potentially, hampered by the absence of an overlap between the detection and the opportunity windows. Essentially, we see the problem too late – when damage is already done and change is more difficult – limiting effective, early disease intervention. Measures, calculated from continuous accelerometry data, that presage declines in total physical activity total would provide a leading indicator of the health risks while restorative action is more achievable.Recent research is showing the potential of measures that summarise the patterns of daily physical activity accumulation. Changes in these patterns likely precede the changes in daily aggregate measures and are supported by candidate mechanisms of behaviour, intrinsic capacity and metabolism. The original SafeHeart protocol analysed all accelerometer data on variable-length, bout basis that were then aggregated to create measures of daily activity volume, mean activity intensity, total active duration and total steps per day. Here, we re-analyse the underlying bouts to characterise the daily distributions of active bout lengths and the gaps between them. We report the temporal relationships between the original aggregate and new pattern measures across the cohort.

Symposium VII

Wednesday, June 19

3:30-5:00pm, Amphitheatre A

SEDENTARY BEHAVIOR - FROM METHODOLOGICAL ANALYSIS TO POPULATION SAMPLE AND EFFECTIVE INTERVENTIONS

Chair: **Tommi Vasankar** *The UKK Institute for Health Promotion Research*

S.7.1 - MEASUREMENT OF SEDENTARY BEHAVIOR - THE OUTCOMES OF THE ANGLE FOR POSTURE ESTIMATION (APE) METHOD

Henri Vaha-Ypya *The UKK Institute for Health Promotion Research*

Henri Vaha-Ypya [1], Pauliina Husu [1], Harri Sievänen [1], Tommi Vasankari [1]

[1] *The UKK Institute for Health Promotion Research*

OBJECTIVE: Hip-worn accelerometers are widely used to estimate habitual physical activity (PA), but they are generally believed to have low accuracy in precisely measure sedentary behavior (SB). Recently, new algorithms, like angle for posture estimation (APE) and CHAP, have been developed to measure posture and SB patterns. This paper studies association between cardiorespiratory fitness (CRF) and body mass index (BMI) values and APE output. The APE measures angle between the incident accelerometer orientation and the reference vector for known upright posture. The APE values of 11.6 and 64.9 degrees are used to separate standing, sitting and lying. METHODS: A total of 3475 participants [50.5 (13.0) years, 60 % women] provided substantial accelerometer wear time, and their CRF was estimated via the 6 min walk test. The accumulated stationary behavior time was analyzed in 5 degrees intervals with APE method. Partial Spearman correlations controlled for age and sex was calculated between BMI and CRF and cumulative time in APE intervals. Also, participants were grouped into thirds based CRF and BMI, and accumulated time in APE bins was calculated for each third. RESULTS: The CRF had the strongest positive (r=0.284) correlation for APE between 5° to 10° and negative (r=-0.193) for 65° to 70°. The BMI had the strongest negative (r=-0.320) correlation for APE between 5° to 10° and positive (r=0.196) for 60° to 65°. Participants in low CRF and high BMI group spend more time in reclining and lying postures (APE ≥ 30°) and less time in sitting and standing postures (APE < 30°) than the other groups. CONCLUSIONS: The results show that APE method is valuable for studies investigating the relationships between SB, PA, and health outcomes. This study emphasizes the necessity of reserving the term “sedentary behavior” for studies wherein the classification of SB is based on both intensity and posture.

S.7.2 - SEDENTARY BEHAVIOR AND ITS ASSOCIATIONS WITH INDICATORS OF METABOLIC HEALTH AMONG WORKING-AGED ADULTS

Pauliina Husu The UKK Institute for Health Promotion Research

Pauliina Husu [1], Henri Vähä-Ypyä [1], Kari Tokola [1], Harri Sievänen [1], Tommi Vasankari [1]

[1] *The UKK Institute for Health Promotion Research*

OBJECTIVE: Excess sedentary behavior (SB) seems to be harmful for health. In many studies body postures of SB, lying, reclining, and sitting during waking hours, have been measured and analyzed as a single indicator of SB. The purpose of the present study was to describe components of SB in a population-based sample of working-aged adults and to analyze their associations with indicators of metabolic health. METHODS: The study is based on a combined data of two cross-sectional population-based studies that measured physical behavior of 20-69-year-old Finns 24/7 in terms of physical activity, standing, SB and time in bed (TIB). The present study focuses only on SB and its components (lying, reclining, and sitting) measured with hip-worn accelerometer (UKK RM42) and analyzed by the angle for posture estimation (APE) method. Indicators of metabolic health included HDL- and LDL-cholesterol and measured waist circumference. RESULTS: Participants (n=4298, mean age 50.5, SD=13.1, 61% women) spent on average 9 h 10 min per day sedentary of which 5 h was spent in reclining, 2 h 50 min in sitting and 1 h 18 min in lying posture. Older age groups were on average more sedentary during all waking hours than the younger ones. More lying and reclining regardless of bout length were associated with lower HDL-cholesterol (<=0.001) and larger waist circumference (<0.001). Higher sitting time accumulating from bouts less than 30 min was associated with lower LDL-cholesterol (p=0.004) and smaller waist circumference (<0.001). Higher amount of sitting accumulating from the bouts exceeding 20 min at a time associated with larger waist circumference which indicate that health associations of sitting seem to vary according

to bout length. CONCLUSIONS: Lying and reclining had quite opposite associations with indicators of metabolic health than short sitting bouts. Thus, components of SB should not be measured or analyzed combined.

S.7.3 - MEDICAL AND PHYSIOLOGICAL EFFECTS OF REDUCED SITTING – A 6-MONTH RCT

Ilkka Heinonen *Turku University and Turku University Hospital*

Ilkka Heinonen [1, 2]

[1] *Turku University and Turku University Hospital,* [2] *University of Turku*

Sedentary behavior, thus sitting, has emerged as modifiable risk factor affecting our physiology and health. The evidence for detrimental effects of sedentary behavior/physical inactivity on health still however stems largely from epidemiological studies, which cannot address causalities. Acute and short-term sedentary behavior reduction interventions have been performed, but in these studies sitting has often been replaced by formal physical activity, thus exercise, and long-term studies in subjects with cardiometabolic risk factors are still relatively few. We have recently conducted long-term (6-month) randomized controlled trial to reduce daily sitting, without formal exercise, in metabolic syndrome patients and this symposium presentation discusses these studies with behavioral and physiological aspects. Published results will be presented in terms of the effectiveness of the behavioral change, body composition, whole-body and skeletal muscle-specific insulin sensitivity, blood pressure and maximal oxygen consumption. Preliminary results dealing with cardiac structure and function, blood lipids, metabolic flexibility, liver fat and insulin sensitivity and endogenous glucose production, as well as adipose tissue and bone and bone marrow insulin sensitivity will also be presented.

S.7.4 - A PERSONALIZED 3-MO E-HEALTH INTERVENTION INCREASED NUMBER OF DAILY STEPS AMONG PATIENTS OF ELECTIVE CARDIAC PROCEDURES

Sini Vasankari *Turku University Hospital*

Sini Vasankari [1], Tommi Vasankari [2]

[1] *Turku University Hospital,* [2] *The UKK Institute for Health Promotion Research*

INTRODUCTION: Cardiac procedures are executed in order to enhance daily functionality and quality of life. However, a majority of patients do not reach the recommended level of physical activity (PA) after the procedure. HYPOTHESIS: Our purpose was to study whether a personalized accelerometer- and smartphone-based eHealth intervention (PACO trial) increases PA among patients recovering from cardiac procedures. METHODS: Patients scheduled for elective coronary artery bypass grafting, valvular surgery, coronary angiography or percutaneous coronary intervention (n=210) were randomly assigned either to a 12-week interactive PA guidance (interactive accelerometer + application + cloud) or standard care. Participants received personalized, increasing goals for daily steps, which were monitored with an interactive accelerometer (app for patients and cloud for a physiotherapist at Heart Center). The physiotherapist encouraged patients to increase daily steps using short phone calls twice per month. Data PA was collected before operation, after 3-month intervention and after 12-month follow-up. RESULTS: When pooling all patients we found that the mean moderate to vigorous PA minutes (MVPA) and daily steps increased in the intervention patients by 46% and 21% after 3-month intervention, respectively, and by 29% and 17% at 12-month follow-up, respectively, compared to the control group (5% and 10% decrease at 3 months and 10% and 11% decrease at 12 months, respectively) (p=0.028 for MVPA and p=0.015 for steps).CONCLUSIONS: Personalized, interactive accelerometer-application-cloud based eHealth intervention with increasing goals for daily steps in patients recovering from a cardiac procedure was found effective and the positive effect persisted during 12-month follow-up when compared to patients randomized to usual care.

Symposium VIII

Wednesday, June 19

3:30-5:00pm, Amphitheatre B

PHYSICAL BEHAVIOUR DETECTION FROM TRI-AXIAL ACCELEROMETRY USING WEARABLES AND SMARTWATCHES: DEVELOPMENT OF CLASSIFIERS AND EXTERNAL VALIDATION BASED ON ECOLOGICAL MOMENTARY ASSESSMENT IN THE WEALTH STUDY

Chair: **Christoph Buck**, *Leibniz Institute for Prevention Research and Epidemiology - BIPS*

Discussant: **Alan Donnelly,** *University of Limerick*

S.8.1 - THE WEALTH STUDY DESIGN FOR LABELED DATA ASSESSMENT

Christoph Buck *Leibniz Institute for Prevention Research and Epidemiology - BIPS*

Christoph Buck [1], Annika Swenne [1], Luis Sigcha [2], Jean-Michel Oppert [3], Richard Cimler [4], Steriani Elavsky [5], Tomas Vetrovsky [6], Alan Donnelly [2], Antje Hebestreit [1]

[1] *Leibniz Institute for Prevention Research and Epidemiology - BIPS,* [2] *University of Limerick,* [3] *Université Sorbonne Paris Nord (USPN),* [4] *University of Hradec Kralove,* [5] *Univerzita Hradec Králové, 6 Charles University*

INTRODUCTION: Physical behaviour (PB) assessment with accelerometer-based wearable technologies is important in personalized medicine or to define public health and community guidelines to increase physical activity and prevent lifestyle disorders. However, key problems exist in the use of a plethora of devices, differences in the use of count-based or raw measures and differences in cut-points which hinders comparability of data. Researchers are using machine learning (ML) techniques to classify PB. The development of improved ML models creates the need for ongoing collection of high-quality data. The WEALTH study (WEarable sensor Assessment of physicaL and eaTing beHaviours) funded by the European Joint Programming Initiative “A Healthy Diet for a Healthy Life” (JPI HDHL), aimed to produce a set of labeled data collected with multiple inertial sensors and supported by ecological momentary assessment (EMA) in a large sample of individuals from four European countries. METHODS: In the WEALTH study, we collected data from 600 participants from, Ireland, Germany, Czechia, and France. The study design included a 75-minute scripted lab-based protocol where participants performed specific PBs in a specific order and for fixed time duration, for example, sitting, standing, walking, running or exercising. In the following nine-day free-living assessment phase, activity trackers (Fitbit) were used to trigger EMA prompts for data labeling. Concurrently, participants wore three hip-, thigh-, and wrist-worn accelerometers, i.e. ActiGraph GT3x, activPal and LifeQ enabled smartwatches. Classifiers for PBs were modeled based on raw tri-axial accelerometer data using multiple ML methods ranging from random forests as a benchmark model to convolutional neural networks (CNN) as deep learning applications. Based on the lab-based protocol, holdout validation was performed for model development, and models were further calibrated using free-living sensor data that was weakly labeled via the EMA responses. RESULTS: The collection of comprehensive labeled data and the extension of reporting on free-living data from participants enabled us to train ML models based on data from the lab-based protocol and conduct external validation using weakly labeled data from the free-living assessment to recalibrate classifiers for specific PBs such as sitting, standing, walking, and running. CONCLUSION: Our models might be able to classify physical behaviours such as sitting walking, cycling and running, with higher accuracy and could be applied to raw accelerometry data in free-living settings. We will describe in more detail the effect of intensity on physical behaviours classification and the added value of EMA to classify and record weakly labeled data and will discuss the potential of these methods for use at larger scale in surveillance studies.

S.8.2 - CLASSIFICATION OF PHYSICAL BEHAVIOURS FROM THIGH-WORN ACCELEROMETRY

Luis Sigcha *University of Limerick*

Luis Sigcha [1], Annika Swenne [2], Antje Hebestreit [2], Jean-Michel Oppert [3], Richard Cimler [4], Steriani Elavsky [4, 5], Tomas Vetrovsky [4, 5], Alan Donnelly [1], Christoph Buck [2], Pepijn Van De Ven [1]

[1] *University of Limerick,* [2] *Leibniz Institute for Prevention Research and Epidemiology - BIPS,* [3] *Université Sorbonne Paris Nord (USPN),* [4] *University of Hradec Kralove,* [5] *Univerzita Hradec Králové*

INTRODUCTION: In modern health research, monitoring physical activity (PA) and sedentary behavior is pivotal for comprehending lifestyle patterns and their effects on health. The use of wearable sensors in monitoring human activity offers an opportunity to enhance the accuracy of PA and sedentary behavior monitoring through machine learning

(ML) algorithms. This study focuses on the development of ML algorithms for PA classification using data collected from research-grade tri-axial accelerometers, specifically activPAL. OBJECTIVES: The primary objective is to evaluate the performance of ML methods in classifying 7 different physical activities using a single sensor located at? the thigh. Specifically, this study evaluates the accuracy of a classic ML algorithm such as random forest (RF) and a deep learning approach based on convolutional neural networks (CNN) using data collected in laboratory settings. METHODS: Tri-axial accelerometer data from activPAL sensors was collected from 25 selected participants (17 females/8 males), as part of the WEALTH project (Wearable Sensor Assessment of Physical and Eating Behaviours). Data were collected when participants performed a set of guided activities for 75 minutes. These activities included sedentary, standing, slow walking, brisk walking, jogging, sports activities, and cycling. Raw accelerometer data were segmented using sliding windows of 3.2 seconds (64 samples at 20 Hz). Two ML methods were employed, ranging from a benchmark model (RF) to more advanced techniques based on CNNs. For the benchmark model, a RF (with 120 trees) was fed with a set of 30 features extracted from the accelerometer data. For the CNN, the raw accelerometersignals were scaled in the range of -1 to 1. For model evaluation, datawere divided into training, validation, and testing subsets (13, 6, and 6 participants, respectively). RESULTS: Findings demonstrate promising results in classifying the 7 different physical activities. In specific, a 3-layer CNN with max pooling and global average pooling (GAP) layers performed better (Accuracy: 85%, F1: 0.85 in the test subset) than the RF (Accuracy: 70%, F1: 0.70). Despite these overall results, the accuracy in the CNN was lower (75%) for specific activities such as sports activities and slow walking, indicating potential challenges in accurately identifying these behaviors using a single sensor. Conclusion: This study highlights the potential of ML techniques, particularly CNN, in accurately classifying PA based on data collected from activPAL sensors. While the models achieved high accuracy overall, further refinement to improve the performance will be conducted using data of the main survey, particularly for sports activitiesthat can be mistaken with walking. While additional research with an expanded sample size is warranted, these findings pave the way forimproved monitoring and understanding PA patterns.

S.8.3 - ACCELEROMETRY AND AI: DEVELOPING BEHAVIOURAL (BIO) MARKERS

Alan Godfrey *Northumbria University*

Alan Godfrey [1]

[1] *Northumbria University*

BACKGROUND: Accelerometer-based wearable technologies are nearly ubiquitous in everyday life. They have the power to provide rich and objective data to better determine physical behaviours (PB). The latter may be termed (bio) markers and include examples like sedentary time or number of bouts in a higher intensity of physical activity. The examples are important in personalized medicine or more broadly to define public health and community wellbeing guidelines to increase physical activity and reduce obesity. OBJECTIVE: This talk examines recent wearable research and draws in developments from other closely related fields and how they could/should be applied to accelerometry informed PB. The talk aims to shed light on how associated (bio) markers need to be optimally developed and deployed for routine use and data gathering in habitual/real-world settings. Specifically, it will highlight upcoming challenges pertaining to e.g., accelerometer data quality in assessment of PB before concluding with some recommendations. CONCLUSIONS: The success of accelerometry has also been its own Achilles heel, its popularity to inform health outcomes means that a plethora of hardware has been created with an equal number of software-based tools to interpret/translate raw (sample level) accelerometer data to clinically relevant (bio) markers. Those tools are often black-box or incomprehensible algorithms where a growing number utilize artificial intelligence-based approaches. That creates many challenges for the correct adoption and applied use as little to no harmonized guidance exists.

S.8.4 - CLASSIFICATION OF PHYSICAL BEHAVIOURS USING HIP- AND WRIST-WORN ACCELEROMETRY

Annika Swenne *Leibniz Institute for Prevention Research and Epidemiology - BIPS GmbH*

Annika Swenne [1, 2], Antje Hebestreit [2, 3], Luis Sigcha [4], Jean-Michel Oppert [5, 6], Richard Cimler [7], Steriani Elavsky [8, 9], Tomas Vetrovsky [8, 10], Alan Donnelly [4], Christoph Buck [1, 2]

[1]Leibniz Institute for Prevention Research and Epidemiology, [2] Leibniz Institute for Prevention Research and Epidemiology - BIPS, [3] Leibniz Institute for Prevention Research and Epidemiology – BIPS, [4] University of Limerick, [5] Sorbonne Paris North University, [6] Center of Research in Epidemiology and Statistics (CRESS), [7] University of Hradec Kralove, [8] University of Hradec Králové, 9 University of Ostrava, 10 Charles University

INTRODUCTION: Hip- and wrist-worn accelerometer-based wearables are extensively employed in health research to objectively measure physical behaviours. Traditionally, researchers have relied on activity intensity cut points to categorize physical behaviours from accelerometer data. However, in recent years, machine learning models have emerged as a promising tool for behaviour classification. We aim at exploring the potential of different machine learning algorithms to classify physical behaviours measured using sensors from both hip- and wrist-worn devices. METHODS: Data were collected from 600 adults in four countries, i.e., Ireland, Germany, Czechia, and France, as part of the European WEALTH project (WEarable sensor Assessment of physicaL and eaTing beHaviours). The study design included a laboratory-based 75-min semi-structured protocol with a defined sequence and duration of activities, followed by free-living data collection over one week with Fitbit trackers triggering ecological momentary assessment prompts for data labeling. Tri-axial accelerometer recordings were generated using an ActiGraph GT3X-BT worn on the right hip at a resolution of 100 Hz and a commercial smartwatch worn on the dominant wrist at a 25 Hz resolution. Random forest, extreme gradient boosting and artificial neural network models were trained separately for each device on the semi-structured protocol data to detect six activities: sitting, standing, walking, running, cycling and exercising. For all models, the dataset was divided into training (60%), validation (20%) and test (20%) data based on individual participants. The final performance of each model was evaluated for the test data from the semi-structured protocol. Moreover, the participants' responses to the activity-triggered ecological momentary assessment questionnaires were utilized to label the different activities from the free-living data and to test the performance of the models in a real-world setting. RESULTS: Initial findings demonstrate 81% accuracy in classifying physical behaviours from hip-worn devices with machine learning algorithms. However, the accuracy varied considerably for the different activities. Accuracy was highest for running (96%), followed by exercising, sitting and walking with accuracies around 90%. Cycling had an accuracy of 75% and standing had the lowest accuracy with 51%. Notably, standing was frequently misclassified as sitting. CONCLUSION: Our results provide valuable insights into the applicability and generalizability of different machine learning models for physical behaviour classification in real-world contexts. Furthermore, they offer starting points for further enhancement of the model performance.

Wednesday, June 19

3:30-5:00pm, Amphitheatre C

BIDIRECTIONAL ASSOCIATIONS OF 24-HOUR MOVEMENT BEHAVIOURS AND COGNITIVE FUNCTION AMONG OLDER ADULTS: IS IT REVERSE CAUSATION?

Discussant: **Paul Gardiner,** *University of Queensland*

S.9.1 - ASSOCIATIONS BETWEEN TRAJECTORIES OF COGNITIVE FUNCTION AND PHYSICAL ACTIVITY, SEDENTARY TIME, AND SLEEP INI OLDER ADULTS

Dori Rosenberg *Kaiser Permanente Washington Health Research Institute*

Mikael Anne Greenwood-Hickman *Kaiser Permanente Washington Health Research Institute*

Dori Rosenberg [1], Mikael Anne Greenwood-Hickman [1], Yinxiang Wu [2], Abisola Idu [1], Susan Mccurry [2], Andrea Lacroix [3], Pamela Shaw [1]

[1] *Kaiser Permanente Washington Health Research Institute,* [2] *University of Washington,* [3] *University of California San Diego*

BACKGROUND: Studies show that physical activity, sedentary time, and sleep are associated with cognitive function; however, reverse causality cannot be completely ruled out. We examined whether cognitive function over 10-years is associated with physical activity, sedentary time, and sleep in a sample of community dwelling older adults. METHODS: We used data from the U.S.-based Adult Change in Thought (ACT) study. We measured cognitive function with the Cognitive Assessment Screening Instrument (CASI) scored with item response theory (CASI-IRT). Participants had to have at least 3 CASI-IRT scores over 10-years prior to wearing accelerometers. Outcomes included physical activity and sedentary time measured with 2 accelerometers that were worn at the same time for 7-days. The activPAL measured mean time spent sitting, standing, and stepping; mean daily step count, and mean sitting bout duration. The ActiGraph measured daily minutes of light-intensity physical activity and moderate-to-vigorous physical activity. Self-reported time in bed and sleep quality (PROMIS short form) were additional outcomes. We used growth mixture models to classify CASI-IRT scores into trajectory groups and examine group assignment with outcomes adjusting for health and demographic covariates.RESULTS: Participants were 611 older adults in ACT (mean age = (Mean age = 80.3 (6.5) years, 90.3% White, 57.1% female, 29.3% had less than 16 years of education; 91.8% reported good to excellent self-rated health). Mean activPAL sitting time was 602.94 (SD = 119.62) minutes/day, standing time was 239.75 (SD = 99.84), stepping time was 82.25 (SD = 38.12), and mean daily step count was 6354.56 (SD = 3409.21), mean sitting bout duration was 16.05 (SD = 7.99) mins. Mean ActiGraph light-intensity physical activity was 276.48 (SD = 77.81) and MVPA was 61.29 (SD = 42.60). Mean minutes in bed was516.06 (SD = 65.74). Mean PROMIS sleep quality score was 46.51 (SD = 7.90). Three trajectory groups were identified: 1) average stable CASI-IRT scores (56.1%), 2) high stable CASI-IRT scores (34.0%), and, 3) declining CASI-IRT scores (9.8%). Compared to the average stable CASI-IRT group, those in the declining CASI-IRT group had less 16 mins/day less stepping time (95% CI = 0.6, 31.4), 1517 fewer steps/day (95% CI = 138, 2896), and less 16.3 fewer minutes of moderate-to-vigorous PA (95% CI = 1.3, 31.3). Those in the high stable CASI-IRT score and average stable CASI-IRT score groups did not significantly differ. CASI-IRT trajectory group was not associated with sedentary behavior or sleep outcomes.Conclusion: The results indicate that there is a bidirectional association between cognitive function and physical activity. However, there were no relationships between cognitive decline and sedentary time or sleep. More research is needed on the potential for reverse causality in associations between physical activity and cognition.

S.9.2 - DETERMINANTS OF DEVICE-MEASURED MOVEMENT BEHAVIOURS IN A NATIONALLY REPRESENTATIVE COHORT OF OLDER ENGLISH ADULTS

Laura Brocklebank, *University College London*

Laura Brocklebank 1, Mikaela Bloomberg 1

[1] *University College London*

BACKGROUND: Movement behaviours (physical activity, sedentary behaviour, and sleep) impact various health outcomes. However, they are infrequently objectively measured in large nationally representative cohorts of older adults. We aim to describe the collection and analysis of device-measured movement behaviours in the English Longitudinal Study of Ageing (ELSA), and report associations with key participant characteristics. METHODS: ELSA is a nationally representative cohort of English adults aged ≥50 years. In 2021-23 (wave 10), a random subset of 5,429 participants were invited to wear a wrist-worn triaxial accelerometer for eight consecutive days. 4,400 participants (81.0%) agreed to wear an accelerometer and of them 3,308 (75.2%; 55.6% men; aged 68.5 ± 9.0 years) had sufficient wear time (median [IQR] 8.0 days [7.4-8.4]). We used a machine-learning model validated in the UK Biobank to infer time spent in four movement behaviours that constitute a 24-hour day (sleep, sedentary behaviour, light physical activity [LPA], and moderate-vigorous physical activity [MVPA]). RESULTS: Average acceleration, or overall physical activity, was 22.9 mg/day. On average, participants spent 9.4 hours/day (39.0%) sleeping, 9.8 hours/day (40.8%) being sedentary, 4.4 hours/day (18.1%) in LPA, and 30.4 minutes/day (2.1%) in MVPA. Despite men accumulating more MVPA than women (36.3 vs. 25.7 minutes/day, <0.001), women had higher overall physical activity (23.2 vs. 22.5 mg/day, p=0.02) by accumulating more LPA (4.6 vs. 4.0 hours/day, <0.001) and less sedentary time (9.6 vs. 10.1 hours/day, <0.001). Total sleep duration was similar between men and women (9.3 vs. 9.4 hours/day, p=0.22). Participants aged ≥65 years had lower overall physical activity than those aged 50-64 years (21.1 vs. 26.5 mg/day, <0.001) by spending less time being active (MVPA: 26.9 vs. 37.8 minutes/day, <0.001; LPA: 4.2 vs. 4.8 hours/day, <0.001) and more time being sedentary (9.9 vs. 9.4 hours/day, <0.001) and sleeping (9.4 vs. 9.2 hours/day, <0.001). CONCLUSION: These data will shortly be deposited in national archives for use by other researchers and will enhance our knowledge about the potential relevance of different movement behaviours for healthy ageing.

S.9.3 - ASSOCIATIONS BETWEEN 20-YEAR MEMORY TRAJECTORIES AND DEVICE-MEASURED MOVEMENT BEHAVIOURS

Mikaela Bloomberg *University College London*

Mikaela Bloomberg [1], Laura Brocklebank [1]

[1] *University College London*

BACKGROUND: While many studies suggest that physical activity and sleep are key modifiable risk factors contributing to cognitive ageing and dementia risk, there is also evidence that these associations may occur due to reverse causal impacts of cognitive dysfunction or prodromal dementia symptoms on sleep and activity patterns. To elucidate reverse causal impacts of cognitive function on movement behaviours, we examined associations between 20-year memory trajectories and device-measured movement behaviours. METHODS: We used data from 2,971 men and women aged 50-100 years participating in the English Longitudinal Study of Ageing to examine associations between memory trajectories and device-measured sleep, physical activity, and sedentary behaviour. Memory was assessed using immediate and delayed recall tasks administered at up to 10 interviews occurring between 2002/04 and 2021/23. Memory scores were standardised using the mean and standard deviation of each participants' five-year age group at baseline. We used group-based mean trajectory modelling to classify participants into cognitive trajectories, with the optimal number of trajectories and polynomial degree selected using BIC. Participants also wore an accelerometer on their dominant wrist for 8 days at the end of the cognitive follow-up period. The mean time spent in light physical activity (LPA), moderate-vigorous physical activity (MVPA), sedentary behaviour, and sleep during the wear period was extracted using an algorithm validated in the UK Biobank. Associations between cognitive trajectories and minutes spent in each movement behaviour were examined using linear regression models adjusted for age at baseline, gender, education, chronic conditions, and self-reported physical activity at baseline. RESULTS: Participants were categorised into 5 cognitive trajectories, ordered from most favourable (maintaining the highest cognitive scores) to least favourable (Group 1 to Group 5; n1=709, n2=919, n3=432, n4=596, n5=315). Groups 1, 2, 3, and 5 had a similar rate of memory decline; Group 3 declined faster than the other groups. Group 5 spent 24.8 minutes (95% confidence interval=7.2-42.4; p=0.006) less time in LPA than Group 1. Group 5 spent 43.9 minutes (12.9-74.8; p=0.006) more time sleeping than Group 1. When trajectory was fitted as a continuous variable, a one-unit increase in trajectory group (going from less favourable to more favourable cognitive trajectory) was associated with a 10.4 minute (3.9-16.9; p=0.002) decrease in sleep and a

5.0 minute (1.3-8.7; p=0.008) increase in LPA. There were no strong associations between memory trajectory and time spent in MVPA (p=0.09) or time spent in sedentary behaviour (p=0.10).ConclusionLess favourable cognitive trajectories were associated with less time spent being active and more time spent sleeping. Reverse causation may contribute to associations between movement behaviours and cognitive outcomes found in previous studies.

Symposium X

Wednesday, June 19

3:30-5:00pm, Salle 16/17

HOW ARE CHILDREN REALLY USING THEIR DIGITAL MEDIA? HARNESSING THE POWER OF TECHNOLOGY TO OBJECTIVELY MEASURE TRUE SCREEN USE AND DETERMINE RELATIONSHIPS WITH SLEEP HEALTH

Chair: **Kim Meredith-Jones,** *University of Otago*

Discussant: **Tom Stewart**, *Auckland University of Technology*

S.10.1 - CAN WE HARNESS THE POWER OF TECHNOLOGY TO MEASURE TRUE SCREEN TIME?

Shay-Ruby Wickham *University of Otago*

Shay-Ruby Wickham [1]

[1] *University of Otago*

BACKGROUND: Given the rapidity of technological change and widespread availability of portable electronic devices, it seems unlikely that questionnaires accurately assess screen time in youth, limiting our ability to determine related health effects. The aims of thisstudy were to 1) develop a protocol for objectively quantifying screen time using video camera footage, and 2) apply that protocol in an observational study to determine how young adolescents truly use their screens in the evening hours. METHODS: Adolescents participated in an iterative series of pilot studies undertaking a range of structured and unstructured screen activities in light and dark home environments. Two police body cameras captured screen use; one was worn on a chest harness facing the screen the adolescent was interacting with, and the second stationary and placed in the room to capture a different viewpoint. Extensive examination of both types of simultaneous footage allowed us to develop a protocol which could identify 8 device types (phone, tablet, laptop computer, desktop computer, handheld gaming console, gaming console, television, other) and 8 screen activities (watching, listening, reading, educational/creative, browsing, communication, social media, video gaming, multitasking). This protocol was then applied in the Bedtime and Electronic Devices (BED) study to footage obtained from 85 adolescents aged 11-14 years capturing digital device use from two hours before bedtime until sleep on four non-consecutive nights. RESULTS: Overall reliability was excellent for the full protocol (κ=0.83–0.93), reliably differentiating between different device types (κ=0.92–0.94) and screen behaviors (κ=0.81–0.87). Among the 83 BED participants (mean 12.3 [SD 1.0]years, 42% female, 52% New Zealand European, 37% Māori [indigenous]), 82 used screens in the two hours before bed on 308 of 344 (90%) nights for a mean of 54.4minutes (SD25.5). Televisions (median 37minutes, 56% of nights), phones (19minutes, 64% nights), and multitasking using multiple devices (19minutes, 48% nights) were most commonly used (>75% of adolescents). Once in bed but before trying to sleep, 58% of adolescents engaged in screen time for 17(26.3) minutes on 36% of nights. The most common screen activities were watching (32.5%), social media (26.5%) and communication (20.5%). Even after attempting sleep, 32.5% of participants used screens 8.0minutes (median) on 16% of nights, mostly listening on phones. CONCLUSION: Objective video cameras offer detailed insight into evening screen habits, capturing frequency, content, and duration. Youth frequently engage with screens before bed and throughout the night on a range of activities, despite recommendations to restrict screen time prior to sleep.

S.10.2 - FROM DUSK TO DAWN: DOES USING SCREENS BEFORE BED REALLY IMPAIR SLEEP IN ADOLESCENTS?

Rachael Taylor *University of Otago*

Rachael Taylor [1], Brad Brosnan [1], Shay-Ruby Wickham [1], Jill Haszard [1], Barbara Galland [1], Kim Meredith-Jones [1]

[1] *University of Otago*

BACKGROUND: Existing research suggesting that evening screen use impairs sleep has been limited to questionnaires, only assessed total screen time or a limited number of devices or activity types, and has rarely examined the temporal associations between screens and sleep. Therefore, the aim of this study was to determine how objectively-measured screen time before sleep influenced sleep that night in young adolescents. METHODS: BED was a repeated-measures observational study in 85 healthy adolescents aged 11-14.9 years. Objective screen time data were captured using wearable and stationary video cameras from two hours before bedtime until the first time the adolescent attempted sleep (shuteye time) over four non-consecutive nights in the home environment. Video data were coded using a reliable protocol (κ ≥ 0.8) to quantify device (eight options, e.g., phone) and activity (nine options, e.g., social media) type. Sleep outcomes (sleep timing, total sleep time, and wake after sleep onset [WASO]) were measured objectively via wrist-worn AX3 accelerometers over a full week. Screen use was related to sleep on a night-by-night basis using a mixed-effects regression model, which considered the participants as a random effect and was adjusted for weekends. RESULTS: Matched nights of video and accelerometry data were available for 79 participants. Screen time (total or by device or activity type) in the two hours before bed had little effect on sleep that night. No meaningful difference in sleep was observed between those or did or did not have screen time in the 30, 60 or 120 minutes before bed. However, once in bed, screen time delayed sleep onset by 35 (95% CI: 20, 50) minutes compared to nights without screen use, and shortened total sleep time (TST) by 3minutes (–6, –1) for every 10 minutes of screen time. Interactive screen use reduced TST more than passive screen use (9 compared with 4 minutes for every 10 minutes of use), and gaming and multitasking (using more than one device simultaneously) were particularly detrimental to TST. CONCLUSION: The use of objective methods shows that screen time may impair sleep once in bed, especially if interactive or involving multitasking. Current sleep hygiene recommendations to restrict all screen time before bed seem neither achievable nor appropriate, at least in this age group.

S.10.3 - DOES GETTING LESS SLEEP INCREASE SCREEN TIME IN CHILDREN? ANALYSIS FROM THE DREAM CROSSOVER TRIAL

Rosie Jackson *University of Otago*

Barbara Galland [1], Jill Haszard [1], Silke Morrison [1], Kim Meredith-Jones [1], Dean Beebe [2], Dawn Elder [1], Rachael Taylor [1]

[1] *University of Otago,* [2] *University of Cincinnati*

BACKGROUND: While wearable cameras offer huge potential for improving the measurement of screen time in children via an objective method, many questions remain. The aims of this project were to a) explore how different intervals between image capture impact estimates of total screen time, b) explore how coding assumptions impact estimates of screen time, and c) determine experimentally whether getting less sleep influences screen time in children. METHODS: In this crossover trial (DREAM study), children aged 8-12 years underwent one week of sleep restriction (went to bed 1 hour later than usual) and one week of sleep extension (went to bed 1 hour earlier than usual) to assess how mild sleep deprivation impacts health behaviours including screen time. Children wore a Brinno TLC130 camera on a chest harness facing outwards for two days of each intervention week. The camera was set to take photos at 2-second intervals and captured the world around them including screen use. Data from 22 children who wore the cameras for full days on both intervention weeks was analysed for time spent on screens (including device and screen activity type). Analysis explored differences in screen time estimates when using different photo intervals ranging from 2 to 60 seconds between each image. Because it is not always clear whether a screen is being used, we tested how different assumptions (e.g. 10 images of blocked images bookended by screen image counted as screen time) affected estimates of total screen time. Total screen time on sleep restriction versus extension days was compared. RESULTS: Coding assumptions resulted in different mean daily estimates of total screen time within each condition, ranging from212.7 (SD 122.6)mins to276.9 (SD 136.3)mins during sleep extension and216.7 (SD 145.6)to289.1 (SD 159.1)during sleep restriction. However, different intervals of image capture appeared to make little difference to daily screen time estimates; the median difference between 60 second and 2 seconds intervals was just 1.6 minutes.Children did not appear to engage with screens more when they slept less (median-12.6 [-103.7, 80.4], even though they had more opportunity as they were awake for longer.CONCLUSIONS: Although estimates for total daily screen time may change meaningfully depending on the rules used to deal with blocked images, it is reassuring that longer intervals between images appear able to capture total screen time in children over the day. Getting less sleep appears to make little difference to weekend screen time in children.

Symposium XI

Thursday, June 20

9:45-11:15am, Amphitheatre A

PHYSIOLOGY-DRIVEN BEHAVIOUR ASSESSMENT

Chair: **Nicky Ridgers** *University of South Australia*

S.11.1 - PHYSICAL DETERMINANTS OF DAILY PHYSICAL ACTIVITY IN OLDER ADULTS

Laura Karavirta, *University of Jyväskylä*

Laura Karavirta [1], Timo Aittokoski [1], Katja Lindeman [1], Joona Neuvonen [1], Katja Pynnönen [1], Lotta Palmberg [1], Antti Löppönen [1], Timo Rantalainen [1], Taina Rantanen [1]

[1] *University of Jyväskylä*

BACKGROUND AND AIM: Physical activity (PA) and physical function decrease with ageing, but the causal relationship between the two remains unclear. Feasible methods for PA assessment that consider individual differences and temporal changes in physical function are scarce. This presentation explores the impact of physical function on daily PA in a Finnish population-based cohort of 75, 80, and 85-year-old men and women.Methods. From the total sample of 1021 participants (57.3 % women), 910 individuals participated in the laboratory assessments of physical function and were thus invited to the monitoring of PA. A thigh-mounted tri-axial accelerometry and an additional heart rate for at least 3 full days (mean 6.6 (SD 0.8) days) were obtained from 484 and 409 participants, respectively. Acceleration (100 Hz, 13-bit, ±16 g) was summarised as mean amplitude deviation (MAD). PA energy expenditure (PAEE) was estimated using combined accelerometry and heart rate sensing. Physical measurements included preferred walking speed, maximal knee extension strength, and body fat percentage. Relative and absolute PA were quantified as minutes accumulated at or above the MAD of the preferred walking intensity and 3 METs, respectively. The follow-up measurements were performed four years after the baseline. RESULTS: At baseline, path modelling was used to examine indirect associations between sex, physical characteristics, and PAEE, and the model explained 33 % of the variance in PAEE. The direct association of sex on PAEE was non-significant, whereas the association between sex and PAEE through body fat (β=0.20, <0.001) and walking speed (β=0.05, p=0.001) were significant. During the follow-up, walking speed slowed down from 1.2 (0.2) to 1.1 (0.2) m/s (<0.001), and the decline was steeper in older age (p=0.013 for time*age group in repeated measures ANOVA). Daily mean MAD decreased from 0.025 (0.008) to 0.022 (0.008) g (<0.001), and more in older age (p=0.035 for time*age group). Absolute activity (≥ 3 METs) decreased from 347 (196) to 274 (188) min/week (<0.001) but relative activity (≥ preferred walking intensity) increased from 60 (87) to 84 (109) min/week (<0.001). In cross-lagged panel models, relative activity at baseline preceded faster walking speed four years later (β=0.09, 95% CI 0.04, 0.15), but absolute activity at baseline was not associated with later walking speed. DISCUSSION: In older men and women, PA may reflect differences in walking speed and adiposity rather than in habitual physical behaviour. The selection of an absolute versus relative cut point led to opposing conclusions on the physical behaviour change over four years. The longitudinal evidence suggests that a higher volume of relative but not absolute PA is associated with maintaining a faster walking speed in ageing. Therefore, we encourage the inclusion of both physical function and activity assessments in epidemiological studies to avoid errors in causal inference.

S.11.2 - OPERATIONALISING MECHANOBIOLOGY IN SKELETAL LOAD ASSESSMENT BASED ON FREE-LIVING ACCELEROMETRY

Timo Rantalainen, *University of Jyväskylä*

Timo Rantalainen [1]

[1] *University of Jyväskylä*

Skeletal mechanobiology has been studied extensively using animal models and a tight coupling between site-specific mechanical loads and corresponding bone adaptations has been discovered. Loaded sites gain more bone and unloaded sites lose bone with the former being more specific to the location and the latter more spurious in the specificity of the localisation. These findings have been formulated into a heuristic mathematical model that includes the product of loading rate and load magnitude and a logarithm of the loading cycles. That is, high magnitude loads, such as those caused by maximal force efforts in resistance training can be efficacious provided at least a modest

loading rate. On the other hand, vibration with a low load magnitude can be efficacious provided a high loading rate. And finally, only a limited number of load cycles per day are prudent since the bone generating stimulus is quickly evoked with further cycles only serving to add to the risk of an overuse injury. With all of the above in mind high impact activities, such as jumping, have been identified as the mode of exercise most reasonable for targeting bone gains and subsequently shown to be efficacious in randomised controlled trials. Due to the physiological underpinnings introduced above I argue that the activity minute-based approach to accelerometer-based physical activity assessment is not optimally geared towards identifying bone-relevant free-living behaviours. Completing a jump takes less than a second and can therefore appear as a relatively modest intensity activity in an epoch based analysis. Moreover, the time taken to complete the roughly 30 impacts three days a week to initiate positive bone gains is such a minor proportion of the 7 x 24 h of the week that the contribution is entirely negligible towards daily/weekly activity minute counts. Therefore, an event count-approach is a reasonable operationalisation for free-living skeletal load assessment. Such an approach can be and has been implemented by identifying impact peaks in free-living accelerometry records and subsequently summarizing the events in a daily osteogenic index. The approach has been shown to be associated with high impact (jump training) exercise intervention-caused bone gains among pre-menopausal women, and to bone traits in cross-sectional explorations among age-groups from adolescents to older adults. I suggest that this success in operationalising mechanobiology could or even ought to be used as a template in envisioning novel targeted accelerometry-based metrics for other tissue or organ system targets such as the intervertebral discs.

S.11.3 - FREE-LIVING SIT-TO-STAND KINEMATICS AS AN INDICATOR OF LOWER EXTREMITY PHYSICAL FUNCTION

Antti Löppönen *University of Jyväskylä*

Antti Löppönen [1], Laura Karavirta [1], Kaisa Koivunen [1], Lotta Palmberg [1], Erja Portegijs [2], Taina Rantanen [1], Taija Finni 1, Christophe Delecluse [3], Evelien Van Roie [3], Timo Rantalainen [1]

[1] *University of Jyväskylä,* [2] *University of Groningen,* [3] *KU Leuven*

BACKGROUND AND AIM: Strength-demanding daily activities such as sit-to-stand (STS) transitions are essential for independent living among community-dwelling older adults. Measurement of STS transitions using advanced wearable sensors offers a broader picture of physical activity and may potentially be indicative of a future decline in physical functioning. This presentation describes a method that can be used to detect and quantify the intensity of free-living STS transitions. In addition, it shows how free-living STS characteristics are associated with laboratory-based measurements and considers whether STS characteristics could be an indicator of future decline in physical functioning among older adults. METHODS: The data consists of the Active Ageing (AGNES) study baseline (n = 479) and 4-year follow-up measurements (n = 340). The participants were community-dwelling older adults aged 75, 80 and 85 years at baseline. Free-living STS characteristics were measured using a custom-made algorithm that processed thigh-worn accelerometer data (100 Hz, 13-bit, ±16 g, UKK RM42; UKK Terveyspalvelut Oy, Tampere, Finland) of 3–7 days of continuous recording. From this data, the number of STS was determined as the mean number of transitions per monitoring day. The free-living mean angular velocity of the STS transitions was determined as the daily mean of free-living median transitions from sitting to standing, and the free-living peak STS angular velocity was defined as the median of the ten fastest STS transitions over the full monitoring period. Lower-extremity physical functioning was assessed with the Short Physical Performance Battery (SPPB) and maximal isometric knee extension strength. RESULTS: The algorithm's accuracy in detecting STS transitions was over 93% and thigh angular velocity quantification of the algorithm corresponded to the results of the 2-D motion analysis. The number of STS transitions and the mean and peak angular velocity were positively associated with the total SPPB points and maximal isometric knee extension force (r = 0.18–0.39, all < .001) and negatively associated with the 5 × STS test time (r = −0.13 to −0.45, < .05) cross-sectionally. Higher free-living peak STS angular velocity (odds ratio [OR] 0.70; 95% confidence interval [CI] 0.52-0.92, per 20 deg/s increase) predicted a future lower-extremity physical functioning decline when adjusting for age, sex, and baseline SPPB. The number of STS transitions and mean STS angular velocity did not predict a future decline in lower-extremity physical functioning. DISCUSSION: Free-living STS transitions can be reliably detected using a single thigh-worn three-axial accelerometer. STS volume and quantified intensity were associated with laboratory-based lower extremity functioning and maximal strength among community-dwelling older adults. Free-living peak STS velocity shows promise as an early indicator of functional decline in old age.

S.11.4 - PHYSIOLOGY-DRIVEN BEHAVIOUR ASSESSMENT

Henri Vähä-Ypyä *The UKK Institute for Health Promotion Research*

Timo Rantalainen[1], Laura Karavirta[1], Antti Löppönen[1], University of Jyväskylä[1], Nicky Ridgers[1], Henri Vähä-Ypyä[2]
[1]*University of South Australia,* [2]*The UKK Institute for Health Promotion Research*

The symposium will comprise four talks on the topic of identifying aspects of free-living behaviour that would be expected to evoke physiological responses. Laura Karavirta will talk about considering the physiological function of an individual when assessing daily physical activity. Timo Rantalainen will discuss identifying bone generating free-living activities from accelerometry records. Henri Vähä-Ypyä will present on how relating the intensity of activity to cardiorespiratory fitness may affect our view of physical activity in a population representative sample. Antti Löppönen will postulate that sit-to-stand (STS) transitions could be used as a proxy of strength demanding daily activities among older individuals. The symposium will conclude with inviting the audience to discuss the claim that device-based physical activity metrics ought to be aligned with the well-recognised physiological underpinnings regarding organ-system adaptations."

Symposium XII

Thursday, June 20

9:45-11:15am, Amphitheatre B

NOVEL INSIGHTS INTO DAILY PHYSICAL ACTIVITY AND FUNCTION IN FITTEST-TO-FRAILEST OLDER ADULTS: FROM VALIDATION TO REAL WORLD PERFORMANCE

Chair: **Nina Skjæret-Maroni**, *Norwegian University of Science and Technology*

S.12.1 - PHYSICAL PERFORMANCE IN THE HUNT4 70+ STUDY BY AGE AND EDUCATIONAL LEVEL

Kjerstin Melsæter *Trondheim Municipality, and Norwegian University of Science and Technology*

Kjerstin Melsæter[1], Beatrix Vereijken[2], Gro Gujord Tangen[3]
[1]*Trondheim Municipality, and Norwegian University of Science and Technology,* [2]*Norwegian University of Science and Technology,* [3]*Oslo University Hospital, and Oslo Metropolitan University*

Physical performance in the HUNT4 70+ Study by age and educational level Kjerstin N. Melsæter, Beatrix Vereijken, Gro G. Tangen, Bjørn H. Strand, and Pernille Thingstad BACKGROUND: The Trøndelag Health Study (HUNT) is a longitudinal, population-based cohort study that includes data on self-reported health and health-related behavior in a population living in Mid-Norway, collected in waves since 1984(1). In the fourth wave of HUNT, participants aged 70 years and older (HUNT4 70+) were invited to an additional examination of physical and cognitive function, as well as sensor-based physical activity monitoring. The current presentation introduces the HUNT4 70+ Study and describes physical performance in the 70+ population by age and education. METHODS: In order to include older adults across the entire range of age and function, participants were offered examination at a test station, their own home or nursing home. Living situation, perceived health and level of education were based on self-reported questionnaires, while physical and cognitive function were assessed using the Short Physical Performance Battery (SPPB) and the Montreal Cognitive Assessment (MoCA). Self-reported measurements are reported by number of observations and percentages, while BMI and MoCA are presented as mean and standard deviation (SD). The distribution and variation in SPPB are presented by age, sex, and educational level. RESULTS: A total of 11,675 (47.7%) individuals participated in the 70+ examination, where 11,394 had valid registrations for the SPPB and were included in the analyses. Age ranged from 70 – 105.4 years, 54.8% were women, and 1,891 individuals were 85 years and older. A total of 23.4% of the women and 34.9% of the men had completed higher education (≥ 14 years), 47.2% (women) and 21.5% (men) were living alone, and 61.7% (women) and 67.8% (men) had good or very good self-reported health. Mean MoCA score was 22.9 (SD 4.8) and 22.7 (SD 4.3) in women and men, respectively. SPPB score decreased 0.33 points per year in women and 0.27 points per year in men. We observed earlier onset of frailty in those with lower levels of education (≤ 10 years) compared to those with higher levels of education (≥ 14 years). CONCLUSION: We succeeded in including a large and diverse population of older adults, enabling better understanding of diversity in health and function with increasing age and how age-related decline is affected by sex and educational level. REFERENCES: Åsvold et al. Cohort Profile Update: The HUNT Study, Norway. Int J Epidemiol. 2022 May 17;52(1):e80–91.

S.12.2 - DEVICE-MEASURED PHYSICAL AVTIVITY IN 9,235 OLDER ADULTS ACCORDING TO AGE, SEX AND EDUCATION. THE HUNT STUDY.

Karen Sverdrup, *Norwegian National Centre for Ageing and Health*

Karen Sverdrup [1], Astrid Ustad [2], Gro Gujord Tangen [1, 3], Atle Austnes Kongsvold [2], Beatrix Vereijken [2], Bjørn Heine Strand [4], Geir Selbæk [1], Linda Ernsten [2], Paul Jarle Mork [2]

[1] *Norwegian National Centre for Ageing and Health,* [2] *Norwegian University of Science and Technology,* [3] *Oslo University Hospital, and Oslo Metropolitan University,* [4] *Norwegian Institute of Public Health*

OBJECTIVE: To quantify time spent in type-specific daily physical activity (PA) bysex, and education in older adults. METHODS: This cross-sectional population-based study used data from the fourth wave of the Trøndelag Health study (HUNT4). PA was measured using two Axivity AX3 tri-axial accelerometers worn on the lower back and thigh, for seven consecutive days. PA types (walking, running, cycling) and posture (standing) were classified using a validated machine learning model and analysed as mean minutes per day (min/d).Periods detected as walking was further classified as slow (≤4 km/h ~ ≤1.11 m/s), moderate (4.1-5.4 km/h ~ 1.12-1.50 m/s), and brisk (≥5.5 km/h ~ ≥1.51 m/s) walking. Additionally, walking, running, and cycling combined was labelled moderate-to-vigorous PA (MVPA), and analysed as mean minutes per week. To investigate PA by age, sex, and education, linear regression was used. To allow PA to be modelled flexibly, and to differ by age, sex, and education, we included interaction terms between sex and age and between education and age. All participants ≥65 years in HUNT4 with ≥1 day with complete 24h monitoring was included in this study (N=9,235).RESULTS: In total, older adults spent 346 min/d in PA. Most of the time was spent standing (252 min/d). Older adults spent 87 min/d walking and slow walking accounted for 69 min/d of total time walking. With increasing age, time spent in all PA types decreased. Women spent more time in standing and less time in MVPA than men, across age. Both women and men with ≥14 years education spent more time in standing, walking and MVPA in ages 70–85, than women and men with ≤13 years education.CONCLUSION: This study provides novel and validated estimates of device-measured PA in older adults. There are sex differences in time spent in type-specific PA in older adults, but independently of sex, older adults with higher education spend more time in all PA types than older adults with primary/secondary education.

S.12.3 - HOW OLDER ADULTS WALK IN DAILY LIFE IN RELATION TO AGE, SEX, AND LEVEL OF PHYSICAL FUNCTION - THE HUNT4 TRONDHEIM 70+ STUDY

Karoline Blix Grønvik *Norwegian University of Science and Technology*

Karoline Blix Grønvik [1], Anisoara Ionescu [2], Nina Skjæret-Maroni [1], Jorunn Helbostad [1], Gro Gujord Tangen [3], Beatrix Vereijken [1]

[1] *Norwegian University of Science and Technology,* [2] *Ecole Polytechnique Federale de Lausanne,* [3] *Oslo University Hospital, and Oslo Metropolitan University*

INTRODUCTION: For older adults, age-related decline in gait function may threaten independent living and quality of life. Although we have detailed knowledge about how older adults walk in a controlled lab environment and some knowledge about the volume of walking in daily life, there is a lack of finer-grained information about how they walk in real-world settings. However, state-of-the-art wearable sensors in combination with validated digital mobility outcomes allow the investigation of how older adults walk in their daily lives. The objective of the current study is to describe how older adults walk in daily life in relation to age, sex, and level of physical function. METHODS: As part of the HUNT4 Trondheim 70+ Study, we monitored 1,278 older adults, age range 70-105 years, for one week using Axivity AX3 sensors. From the lower-back sensor, we estimated the following walking characteristics: daily walking bouts, walking bout duration, number of steps, cadence, distance covered, and walking speed, using algorithms validated by the Mobilise-D consortium (1). Physical function was assessed using the Short Physical Performance Battery. RESULTS: As expected, Mean and Maximum values of all walking characteristics decreased with age and functional decline for both sexes. However, the Mode of most walking characteristics remained remarkably stable across age and function, differing barely between groups or only in the oldest age groups. CONCLUSION: Our findings indicate that older adults manage to maintain their overall habitual way of walking throughout older age, even when faster gait speeds and longer walking periods dissipate from their daily life.(1) Micó-Amigo, M., Bonci, T., Paraschiv-Ionescu, A. et al. Assessing real-world gait with digital technology? Validation, insights and recommendations from the Mobilise-D consortium. J NeuroEngineering Rehabil 20, 78 (2023).

S.12.4 - DAILY PHYSICAL ACTIVITY AND TRAJECTORIES OF CARE SERVICES USE AMONG OLDER ADULTS: THE HUNT4 TRONDHEIM 70+ STUDY

Astrid Ustad *Norwegian University of Science and Technology*

Astrid Ustad [1], Kjerstin Melsæter [2], Trine Holt Edwin [3], Karen Sverdrup [4], Gro Tangen [5], Øystein Døhl [2], Beatrix Vereijken [1], Pernille Thingstad [2], Nina Skjæret-Maroni [1]

[1] *Norwegian University of Science and Technology,* [2] *Trondheim Municipality, and Norwegian University of Science and Technology,* [3] *Oslo University Hospital,* [4] *Norwegian National Centre for Ageing and Health,* [5] *Norwegian National Advisory Unit on Ageing and*

BACKGROUND: There is limited evidence on the relationship of daily physical activity (PA) and the development of care services use among older adults. Understanding the factors that influence future care services use is crucial for enhancing efforts to prevent functional decline in the older adult population. This study aimed to identify distinct trajectory groups of care services use and determine if patterns of daily PA are relevant indicators for belonging to each group. METHODS: This prospective cohort study included 1514 home-dwelling participants aged 70 years or older from the HUNT4 Trondheim 70+ Study. Monthly data on care services use was retrieved from municipal registers over a 3-years follow-up period. Data included home care, rehabilitative services, short institutional stays, safety alarm, food service, admission to long-term care, and deaths. PA was assessed using two Axivity AX3 accelerometers (on thigh and lower back) over 7 consecutive days and was classified into activity types (walking, standing, running, cycling, sitting, and lying) using the HAR70+ activity type recognition model. Number of walking bouts and duration of bouts were also provided. Distinct groups of care services use were identified using group-based trajectory modeling. Regression models were used to evaluate the associations between group belonging and daily PA. In addition, relevant baseline characteristics (physical function, cognition, sex, and age) were added to the models. RESULTS: Mean age at baseline was 77.5 years (range: 70.1-105.4, 56% female) and 1042 (65%) had valid activity data. At baseline, 11% (n=160) received home care services, 4% (n=60) received rehabilitative services, and 15% (n=229) had safety alarm and/or food service. Over the 3-years follow-up period, 4% (n=61) of the sample were admitted to long-term care, and 9% (n=139) died. In addition to those who received services at baseline, the proportion of the sample receiving home care increased with 10% (n=151), while additional 17% (n=254) received rehabilitative services, and additional 9% (n=143) received safety alarm and/or food service during the 3-years follow-up period. Trajectories, association with daily PA and group characteristics analyses are ongoing work and will be presented at the conference. CONCLUSIONS:This study will provide new knowledge on the relationship of daily PA with care services use over time, thereby enabling targeted interventions to maintain function and independence in older adults.

Symposium XIII

Thursday, June 20

9:45-11:15am, Amphitheatre C

ADVANCES AND FUTURES OF 24 HOUR ANALYTICS

Chair: **Sebastien Chastin** *Glasgow Caledonian University, Ghent University*

S.13.1 - USING AI TO OPTIMISE 24H TIME USE

Dot Dumuid *University of South Australia*

Dot Dumuid [1], Adel Nikfarjam [2], Ty Stanford [1], Aneta Neumann [2], Frank Neumann [2]

[1] *University of South Australia,* [2] *University of Adelaid*

Few studies have attempted to define optimal time-use compositions. Knowledge of these optima would provide people with time-use goals they can aim for when deciding how to spend their time.We present the use of evolutionary algorithms within a compositional log-ratio framework as a novel approach to time-use optimisation. We demonstrate the methods using empirical data from ~900 children in the Australian CheckPoint study. The methods are applied to time-use composition with four health objectives (adiposity, fitness, life satisfaction and cognition). Objective functions linking the time-use compositions with health outcomes were defined in the log-ratio space, with the compositions expressed as isometric log ratios. We employed a quality diversity approach (MAP-Elite algorithm) which randomly crosses two 'parents' (solutions), thus generating an offspring on which the mutation operator is applied. If the

offspring solution for similar behaviour descriptors (time-use composition) is better in terms of meeting the objective, it replaces the existing solution. This process is iteratively repeated until termination criteria are met.

S.13.2 - BAYESIAN MULTILEVEL COMPOSITIONAL DATA ANALYSIS: A GENTLE INTRODUCTION

Flora Le *Monash University*

Flora Le [1], Dot Dumuid [2], Tyman E. Stanford [2], Joshua F. Wiley [1]

[1] *Monash University,* [2] *University of South Australia*

Multilevel compositional data, such as repeated measures of the 24-hour movement behaviours in intensive, longitudinal studies, are common, yet analytically challenging. We introduce a Bayesian approach to analysing multilevel compositional data and investigating the association between the reallocation of movement behaviours and other phenomena (e.g., emotion) at a daily level. We explain the theoretical framework and software implementation of this method in our R package, multilevelcoda, and demonstrate its application in a real data study and robust performance via a simulation study.

S.13.3 - DATA-DRIVEN ANALYSIS OF COMPOSITION OF TIME SPENT IN PHYSICAL ACTIVITY INTENSITIES AND SEDENTARY BEHAVIORS

Vahid Farrahi *TU Dortmund Univeristy*

Vahid Farrahi [1], Mehrdad Rostami [2], Dot Dumuid [3], Sebastien Chastin [4], Maisa Niemelä [2], Raija Korpelainen [2], Timo Jämsä [2], Mourad Oussalah [2]

[1] *TU Dortmund Univeristy,* [2] *University of Oulu,* [3] *University of South Australia,* [4] *Glasgow Caledonian University, Ghent University*

Recently, a conceptual shift has occurred in analytical approaches used to assess associations with movement behaviors, moving away from exploring sedentary time, light-intensity physical activity, and moderate-to-vigorous intensity physical activity as independent exposures toward using more advanced approaches to study the combined effects of these activities on various health markers. Among newer analytical approaches, isotemporal substitution modeling has been most frequently used for studying the joint associations of physical activity behaviors with health outcomes, whereas data-driven, person-centered approaches have recently gained momentum. While compositional data analysis is excellent for studying the composition of total time spent in physical activities and sedentary behaviors, as well as predicting the changes in health markers through theoretical time reallocation among these behaviors, data-driven approaches can naturally accommodate a higher number of variables. This makes data-driven approaches potentially better candidates for studying how trajectories of the composition of physical activity intensities and sedentary behaviors, such as over one full week, may explain differences in health outcomes. Our aim was 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. We utilized data from 3702 participants of the Northern Finland Birth Cohort 1966 at age 46 years, who wore a hip-worn accelerometer during waking hours and provided seven consecutive days of valid data. Sedentary time, light-intensity physical activity, and moderate-to-vigorous-intensity physical activity on each valid day were obtained, and a data-driven clustering approach ("KmL3D") was used to characterize distinct joint profiles of sedentary time and physical activity intensities. We found four distinct waking activity behavior profiles, which were associated with cardiometabolic health markers including adiposity level, blood glucose, insulin, and cholesterol levels, even after accounting for cardiorespiratory fitness, self-reported sleep duration, and other confounders.

S.13.4 - FUNCTIONAL REGRESSION AND ISOTEMPORAL SUBSTITUTION ANALYSIS IN THE CONTEXT OF TIME-USE DATA

Paulína Jašková *Palacký University Olomouc*

Paulína Jašková [1], Karel Hron [1], Javier Palarea-Albaladejo [2], Aleš Gába [1], Dot Dumuid [3], Željko Pedišić [4], Jana Pelclová [1]

[1] *Palacký University Olomouc,* [2] *University of Girona,* [3] *University of South Australia,* [4] *Victoria University*

To find out how are relative reallocations of time between physical activity of various intensities associated with health, we describe a newly developed compositional functional isotemporal substitution analysis. Physical activity intensity data can be considered as probability density functions, which better reflects the continuous character of their measurement using accelerometers. These probability density functions are characterised by specific properties, such as scale invariance and relative scale, and they are geometrically represented using Bayes spaces with the Hilbert

space structure. This makes possible to process them using standard methods of functional data analysis in the L2 space, via centred logratio (clr) transformation. The scalar-on function regression with clr transformation of the explanatory probability density functions and compositional functional isotemporal substitution analysis were applied to a dataset from a cross-sectional study on adiposity conducted among school-aged children in the Czech Republic. We obtained a detailed insight into the dose–response relationship between physical activity intensity and adiposity.

Symposium XIIII

Friday, June 21

9:45-11:15am, Amphitheatre A

INTEGRATING INTERSECTIONALITY IN BEHAVIORAL DATA ANALYSIS: LABDA ADVANCING HEALTH INSIGHTS THROUGH 24-HOUR ACTIVITY DATA

Chair: **Mai Chin A Paw** *Child and Adolescent Public Health Research and Innovation*

Discussant: **Jasper Schipperijn**, *University of Southern Denmark*

S.14.1 - INTEGRATING INTERSECTIONALITY IN BEHAVIORAL DATA ANALYSIS: LABDA ADVANCING HEALTH INSIGHTS THROUGH 24-HOUR ACTIVITY DATA

Mai Chin A Paw *Child and Adolescent Public Health Research and Innovation*

Mai Chin A Paw [1]

[1] *Child and Adolescent Public Health Research and Innovation*

The Learning network for Advanced Behavioural Data Analysis (LABDA) Symposiumon “Integrating Intersectionality in Behavioral Data Analysis” focuses on the innovative intersection of data science and human movement epidemiology, emphasizing the integration of intersectionality throughout the value chain of data analysis. This includes methods, tools, and sensors to unravel the relationship between 24-hour activity data and health outcomes. Traditional approaches in public health have often overlooked the complex interplay of factors such as gender, age, ethnicity, and socio-economic position. However, LABDA’s novel approach recognizes that these elements map onto social hierarchies, interacting and intertwining to produce unique behavioral patterns and health outcomes. This symposium will explore how LABDA advances this field by tailoring algorithms to specific intersections, moving beyond generalized movement guidelines and delving into the diversity of characteristics like gender, ethnicity, and socio-economic position using multiple datasets from diverse samples and contexts. Symposium Presentation 1: Prof. Chin A Paw (15 min)Prof. Chin A Paw will present the overall aims of the LABDA learning network, highlighting the adopted intersectionality framework. In LABDA, intersectionality is crucial in analyses, considering how factors like gender, age, ethnicity, and socio-economic position interact within social hierarchies, leading to distinct behavioral patterns and health outcomes. Current movement guidelines, often tailored only to broad age groups, fail to address this diversity. LABDA aims to explore these variations using multiple datasets collected from diverse samples and contexts, emphasizing the importance of intersectional analysis in creating more inclusive and effective health guidelines.

S.14.2 - DEVELOPING A UNIVERSAL TAXONOMY OF 24-HOURS HUMAN ACTIVITY: AN INTERSECTIONAL HUMAN CENTERED APPROACH

Sebastien Chastin *Glasgow Caledonian University, Ghent University*

Sebastien Chastin [1], Usman Sani Dankoly [2]

[1] *Glasgow Caledonian University, Ghent University,* [2] *Glasgow Caledonian University*

BACKGROUND: The classification of human activity behaviour is fundamental for understanding and analysing patterns of daily life from body worn sensors. Taxonomies that categorise these activities are a pivotal tool. The need for a universal taxonomy is paramount for ensuring interoperability and facilitating comparative research across diverse populations. Existing frameworks, such as the Compendium of Physical Activity and classifications based on posture and movement intensity, provide a basic structure for understanding 24-hour movement behavior. However, these existing taxonomies often fail to capture the complexity and diversity inherent in human daily life, particularly due to their development predominantly from a white, Caucasian perspective. This limitation highlights the necessity for a more inclusive and comprehensive taxonomy that recognizes the varied experiences and behaviors resulting from intersectional identities.Method: In developing a universal taxonomy that also embraces intersectionality, our approach

is threefold. Firstly, we emphasize the reconciliation of universality with intersectionality, understanding that while human experiences are diverse, there are underlying universal patterns in daily activities. To achieve this, we adopt a human-centric approach, rooted in the principle that humans engage and recollect events as part of their daily life narrative. Secondly, we derive our nomenclature of activities directly from the narratives of people's daily lives. This narrative-based methodology ensures that the taxonomy is not only inclusive but also reflective of the real-life experiences of people from various intersectional backgrounds. By carefully curating these narratives, we aim to develop a taxonomy that is both intersectionally diverse and universally applicable. Thirdly, we recognise that each activity is part of a sequence that provides a context. This innovative approach promises to broaden our understanding of human activity behavior, moving beyond traditional models and offering a more nuanced view that considers the health implications of activities in the context of diverse life experiences.RESULTS: In the symposium we will present and discuss initial results about the key methodological features that are required to achieve these objectives. We will engage the audience in a open science survey about the narrative of the 24 hour day.

S.14.3 - OPEN-SOURCE LABDA TOOLBOX OF ADVANCED ANALYSES METHODS FOR WEARABLE DATA

Marian Paiva Marchiori *Southern Denmark University*

Gaia Segantin, *Amsterdam UMC*

Sebastien Chastin [1], Jasper Schipperijn [2], Gaia Segantin [3], Marian Paiva Marchiori [4], Mai Chin A Paw [5]

[1] *Glasgow Caledonian University, Ghent University,* [2] *University of Southern Denmark,* [3] *Amsterdam UMC,* [4] *Southern Denmark University,* [5] *Child and Adolescent Public Health Research and Innovation*

LABDA fellows Gaia Segantin and Marian Paiva Marchiori will present the open-source LABDA toolbox of advanced analysis methods for wearable dataguiding users to the optimal method for their research question. Novelties range from its co-creation with various stakeholders, and standardization of data collection, metrics and movement behavior classification taxonomy. Moreover, the toolbox will provide unique insights on how to incorporate intersectionality in movement behavior analysis. The co-creation with stakeholders, ensures that the tools are relevant, user-friendly, and effective in addressing the diverse needs of different communities.

Symposium XV

Friday, June 21

9:45-11:15am, Amphitheatre B

EXPLORING THE IMPACT OF USING WEARABLE MOVEMENT SENSORS IN COLLEGIATE SPORT: FROM RESEARCH TO PRACTICE AND REHABILITATION TO COMPETITION

Chair: **Alexander Montoye** *Alma College*

Discussant: **Dinesh John** *Northeastern University*

S.15.1 - SETTING THE STAGE: CREATING ACADEMIC-ATHLETIC PARTNERSHIPS THAT ADDRESS PRACTICAL NEEDS AND RESEARCH QUESTIONS IN SPORT SCIENCE

Karin Pfeiffer *Michigan State University*

Karin Pfeiffer [1]

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The definition of the term sport science has evolved over time. A general definition for sport science currently entails elements of collecting various forms of data to improve sport performance. It is becoming more common to use sport science in the collegiate setting to not only improve performance but to track athlete fatigue and health characteristics. Various types of data can contribute, but a proliferation in types and amount of available wearable technology has moved this type of information to the forefront. While athletic departments use the data for practical purposes, it can also be used to answer several research questions. Creating partnerships between practitioners and researchers can be valuable in achieving both goals. This presentation will focus on aspects of creating sport science partnerships between academic and athletic departments, particularly one example at Michigan State University. Considerations that will be addressed include: setting up the partnership, facilitating buy-in, obtaining institutional support (including human subjects approval), deciding which tools to use and collecting data logistics, amalgamating and sharing data

and resources, and maintaining communication and partnerships. Other elements to be addressed include details of each consideration, such as who to consider serving in various roles and how to make decisions.

S.15.2 - THE APPLICATION OF WEARABLE DEVICES AND BIO-MECHANICAL DATA TO INFORM PROGRAMS AND DECISION-MAKING IN ELITE SPORTS

William Burghardt *Michigan State University*

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In the competitive realm of elite collegiate sports, the strategic integration of technology is pivotal. This portion of the presentation focuses on the use of wearable devices and strength data to enhance collegiate athletic performance and decision-making.This portion begins with an exploration of wearable device data collection in sports settings, emphasizing the importance of minimal intrusiveness for athlete comfort and practicality. We discuss the logistical aspects, such as the necessity of dedicated personnel and budget considerations for device procurement, and the importance of session breakdowns for effective future data analysis. In addition, we will address the importance of accounting for the differences between coaches and their preferences on using real-time data for immediate decision-making and athlete feedback.Data analysis is the core of our discussion, where we advocate for prioritizing key metrics and leveraging evidence-based research. Additionally, we will discuss the importance of recognizing each athlete's unique response to training stimuli, while also emphasizing the need to consider their current training and competition schedule when devising training plans and assessing the risks associated with training volume. Furthermore, we will discuss the challenges in accurately assessing skill acquisition and performance readiness. Beyond team training and performance, we will explore the planning of return-to-play protocols and the integration of each support unit (sports medicine, strength & conditioning, sport science, and coaching staff). Included in this portion will be a discussion dedicated to the integration of additional data sources like strength assessments and motion capture analysis.Finally, we highlight promising opportunities for future research in this field, including longitudinal tracking, the necessity for multi-team and multi-year projects, local joint assessments, and the development of improved skill assessment techniques.This presentation aims to shed light on how wearable technology and strength data can be effectively utilized in elite sports, offering attendees insights into cutting-edge methods for performance enhancement and injury prevention.

S.15.3 - USING DATA TO UNDERSTAND COLLEGIATE ATHLETE TRAINING VOLUMES AND PREDICTORS OF PERFORMANCE

Alexander Montoye *Alma College*

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INTRODUCTION: Data science is increasingly used in collegiate sport, with performance data collected during resistance training, conditioning, practices, and competition. This presentation will cover examples from several studies conducted with data from Division 1 (D1) and 3 (D3) sports teams in the United States.METHODS: The EliteForm (Lincoln, NE, USA) tracked barbell movement during resistance training exercises to assess muscular strength and power. Vald systems (Vald Performance, Charlotte, NC, USA) assessed muscular force and power during jumping, isometric hip abduction and adduction, and eccentric hamstring contraction tests. The Catapult system (Boston, MA, USA) assessed variables such as distance covered, movement speed and acceleration, and training volume during on-field/court practices and competitions. Analysis 1 assessed relationships between lower-body power (squats and reverse lunges) and on-field sprint speed and acceleration in D1 Men's American Football. Analysis 2 evaluated on-field/court training volumes during practices and competitions in D1 Women's Soccer, Field Hockey, and Volleyball players. Analysis 3 compared player demographics and lower-body strength/power between D1 and D3 Men's and Women's Soccer players.RESULTS: In analysis 1, maximum running velocity and acceleration during off-season practices were moderately correlated to peak power in squat and reverse lunge exercises in the skilled players (quarterbacks, running backs, tight ends, linebackers, special teams; r=0.46-0.66) and were moderately correlated with peak power for reverse lunges for the big players (defensive and offensive linemen; r=0.49-0.56), but correlations were small/negligible for small players (defensive ends, wide receivers; r=0.13-0.26). Offseason jump height and peak power were moderately correlated with maximum running velocity and acceleration in big players (r=0.41-0.57) but weakly correlated for small (r=0.07-0.21) and skilled players (r=0.32-0.38).In analysis 2, weekly practice durations and total player workload rose from the pre-season to the beginning of the season (29-63%) and stayed consistent through the season. Player workload was higher during competitions than during the hardest weekly practices (~30% for field hockey and soccer, 12% for volleyball). Analysis 3 revealed small differences in player height (2-6 cm taller in D1) for both men's and

women's teams. Muscular power and jump heights were similar between divisions for the men but greater in D1 for women. Peak power during eccentric hamstring contraction and strength during hip adduction were similar between divisions for men and women, but hip abduction strength was higher in D1 vs. D3 men (20%) and women (42%). CONCLUSION: These analyses provide examples of how collegiate sports data science aids in comparison of on- and off-field/court metrics and different divisions to better understand player performance and to track training volumes.

S.15.4 - BEYOND THE CLINIC: INTEGRATING WIRELESS ULTRASOUND AND SENSOR TECHNOLOGIES FOR KNEE HEALTH ASSESSMENT

Matt Harkey *Michigan State University*

Matt Harkey [1]

[1] *Michigan State University*

The symposium presentation focuses on the integration of clinically accessible technologies, specifically wearable sensors and wireless ultrasound imaging, to advance the monitoring and management of female collegiate athletes and patients following knee surgery. Emphasis will be placed on the significant role these wearable technologies play in linking clinical assessments to real-world applications in the realm of sports medicine and rehabilitation. In the collaboration with athletic programs, emphasis has been placed on understanding how real-world Catapult player load data is correlated with laboratory imaging measures like DXA scans for bone mineral density and ultrasound assessments of knee-related structures. This segment will showcase the innovative approach to combining wearable sensor data with laboratory assessments, demonstrating the relationships between player load, bone health, and the structural integrity of knee components in female collegiate athletes. This detailed analysis offers insights into the functional recovery throughout an athletic season, highlighting the practical application of integrating diverse data sets to understand athlete health comprehensively.Further, the presentation will explore collaborative efforts with orthopaedic surgeons to facilitate a data-driven recovery process for patients during the critical first year following knee surgery. The use of "Report Cards," which synthesize objective metrics from clinical assessments, will be highlighted to guide decision-making on return-to-sport. A specific focus will be given to the application of Loadsol force-sensing insoles in assessing asymmetries in walking gait and their correlation with outcomes such as knee effusion-synovitis and cartilage thickness. This analysis has illuminated the relationship between gait asymmetries and structural knee conditions, offering valuable insights into the mechanisms of rehabilitation improvements following knee surgery. Additionally, the coupling of these insoles with wireless ultrasound imaging to observe muscle and joint responses during physical activities will be examined. By highlighting these findings, the presentation will illustrate how wearable sensor data can inform and enhance clinical understanding of knee health and rehabilitation processes. Through a detailed examination of methodologies, collaborative models, and specific applications of wearable and imaging technologies, the presentation seeks to significantly contribute to the discourse on technology integration in rehabilitation and sports medicine. It aims to underscore the innovative tools' role in enhancing the precision of knee health monitoring and management, promising to redefine recovery pathways post-injury and surgery.

Symposium XVI

Friday, June 21

9:45-11:15am, Amphitheatre C

ACCURACY: THE HOLY GRAIL OF PHYSICAL BEHAVIOR ASSESSMENT — HOW BIG IS THE PROBLEM, ARE THERE SOLUTIONS, AND HOW HAVE OTHER DISCIPLINES SOLVED THIS ISSUE?

Chair: **Aiden Doherty** *University of Oxford*

Discussant: **Aiden Doherty** *University of Oxford*

S.16.1 - MEASUREMENT OF PHYSICAL ACTIVITY AND SEDENTARY BEHAVIOR IN EPIDEMIOLOGIC STUDIES: DOES ACCURACY MATTER?

Charles Matthews, *National Cancer Institute, National Institutes of Health*

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Accelerometer-based measures ofphysical activity have become an essential tool for epidemiologic studies investigating the relationships between these behaviors and disease risk. Findings in recent years have expanded our understanding of the role of lower and higher intensity physical activities and health, and they have further characterized dose-response relationships between physical activity and a variety of disease endpoints. With the growth of fitness trackers and smartwatches we now have unprecedented opportunities for translation of our research into health promotion efforts and expanded use of research-oriented devices in large population studies opens the door for implementation of more consistent public health surveillance measures internationally. The field of ambulatory monitoring has achieved great success, and this accomplishment raises the bar for us in terms of enhancing the consistency and accuracy of data derived from our methods.Our research has revealed many new scientific insights and accelerometer-based measures offer the potential for better surveillance of physical activity. However, large group-level differences are commonly observed when comparing estimates of sedentary time, moderate-vigorous intensity physical activity, and step counts from different prediction methods. The term “prediction method” is used here to describe various analytic approaches employed to estimate relevant behavioral metrics, including simple cut-points, results from regression equations, and more sophisticated modeling methods (e.g., machine learning)—independent of device type or wear location. Limited comparability between prediction methods can lead to inconsistency and uncertainty in estimating dose-response relationships in epidemiologic studies that are essential for informing public health guidelines; incorrect conclusions when examining long-term trends in physical activity surveillance data; and, in the clinical setting more variable information about patient’s physical activity which could reduce the value of this information in electronic medical records.This presentation will review select etiologic studies of physical activity and health with an eye towards examining differences in results between studies that may be due to variation in the prediction methods employed rather than differences in the populations studied. Challenges in our ability to consistently identify the absolute amounts of physical activity and sedentary behavior associated with lower or higher disease risk will be discussed. Given this variation in results the strengths and limitations of these data for our ability to translate epidemiologic results into health promotion efforts and prevalence estimates in public health surveillance will be considered. Finally, design elements of studies typically used to develop and test prediction methods will be discussed, and important next steps will be outlined.

S.16.2 - A FRAMEWORK FOR RIGOROUS, CONSISTENT AND SYSTEMATIC DEVELOPMENT AND EVALUATION OF WEARABLE SENSORS

Sarah Keadle *California Polytechnic State University San Luis Obispo*

Sarah Keadle [1]

[1] *California Polytechnic State University San Luis Obispo*

Wide variation in how our prediction algorithms have been developed/calibrated and evaluated have led to differences in the accuracy across methods and devices. This is a problem that stifles detailedbetween-study comparisons and efforts to pool data to generate more precise estimates of health effects of relevant physical behavior metrics, all of which are necessary to translate our research findings into clear public health recommendations. In this session we will review recent efforts by our team and others to develop a phase-based framework for device methods development and evaluation. The phases within the frameworkprogress from initial mechanical testing of the sensor signal (phase 0), to methods development under controlled laboratory or semi-structured conditions ((I and II), and end with a comprehensive naturalistic validation in real world conditions where individual variation is high (phase III). The phases become more reflective of real-world conditions as studies progress along the framework.We will focus on placing current literature into the context of our proposed aphase-based framework and highlight a scarcity of “phase III” studies, which include representative activities, robust ground-truth measures, and evaluation in independent samples. Significant advances in the field will require large, consistently labeled, free-living datasets that are now scarce due to the high cost to collect and annotate data. Efforts to harmonize data across studies are hindered by inconsistent terminology and a lack of core operational definitions for ground-truth measures.We will present data from four independent research labs comparing the within-and between site agreement for posture and intensity annotation of ground truth data, including between site agreement forintensity categories was 94.6% for sedentary, 80.9% for light, and 82.8% for moderate-vigorous. Three of the four sites had common labels for 8 posture/whole-body movements, with within-site agreements of 94.5% and between-site agreements of 86.1%. These data show that distinct research groups can annotate key features of physical behavior with good to excellent inter-rater reliability, but also show challenges in combining labels for other variables, including activity type due to differences ground-truth annotation. The goal of this session is to stimulate discussion on best practices formethods development and evaluation will lead to more rapid identification, refinement, and utilization of accurate and reliable methods.

S.16.3 - HOW DO OTHER MEDICAL AND RESEARCH DEVICES DEVELOP ACCURACY STANDARDS?

Kong Chen, *NIDDK, NIH*

Kong Chen [1]

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Accuracy is a critical measure for any sensors and predictive algorithms. One type of wearable device that have been rigorously researched, tested, approved, and applied in clinical use is the continuous glucose monitor (CGM). It typically uses a wearable sensor, a wireless transmitter, and a receiver/processing unit that automatically measure and report glucose levels at a regular interval (every 1-15 minutes) over days to weeks. With an estimated 2.4 million users, CGM systems were originally intended only for people with diabetes to monitor blood sugar levels (often with real-time updates) but have been applied more broadly in applications for personal health and nutrition in people with prediabetes and without diabetes. The accuracy of CGMs can be defined by analytical accuracy or clinical accuracy. The analytical accuracy can refer to point accuracy (measured interstitial glucose levels compared to validated blood glucose levels) or trend accuracy (algorithm-predicted rate of change or “shape” of glycemia over time). Clinical accuracy can be based on mean analytical accuracy performance in different clinical settings. Since CGMs are used to inform abnormal glycemia (particularly hypoglycemia) and guide insulin dosing which carried significant health risks, the accuracies of CGMs are critically important. There have been several point accuracy measures and standards of CGMs in the past 20+ years, such as the mean absolute difference (MAD), mean absolute relative difference (MARD), Clarke error grid, and Bland-Altman plot, and Trend Compass for trend accuracy. Research and regulatory (e.g., FDA and ISO) requirements have set standards for CGM systems with variable acceptable accuracy ranges at different glucose concentrations to minimize clinical risks, and describe the validation processes. Recently, the Glycemia Risk index of hypoglycemia and hyperglycemia for CGMs was developed for clinical accuracy. For research applications of other measurement technologies (e.g., room indirect calorimeters for energy metabolism and PET/CT imaging for human brown fat), consensus standards have been developed to guide the calibration and validation of the measurement systems, establish cut-off thresholds, as well as to ensure consistency reporting and facilitate meaningful comparisons between studies. Learning from the development of these accuracy standards, we can formulate and optimize a similar standardization framework for our wearable physical behavior monitors.

AUTHORS AND PRESENTERS

All authors (lead and additional) and presenters are listed here for easy cross-referencing to their respective abstract.

The full abstract is available in the abstract's listing in the Whova Agenda.

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Hunter, Heather	O.5.1
Hyun Lim, Song	O.16.5
Imbesi, Silvia	P2.6.61
Imhoff, Meghan	O.14.5
Indaco, Rossella	P2.7.70
Intille, Stephen	P2.4.48
Ionescu, Anisoara	O.6.1, O.6.3
Ireson, Neil	O.5.3
Ishihara, Asuka	P2.4.41
Jansen, Carl-Philipp	O.6.1, O.6.4, O.7.5
Joao Cardoso, Maria	P1.3.30
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John, Dinesh	P1.2.28, P2.4.48
Juarez-Colunga, Elizabeth	O.7.1
Judd, Dana	O.7.2
Kabb, Sami	O.15.1
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Karni, Arnon	O.1.5
Karpe, Fredrik	P2.5.52
Keadle, Sarah	P1.1.11
Keijsers, Noel	O.1.1, P2.4.47
Kenney, Laurence	P1.3.31
Khunti, Kamlesh	O.16.1
Kim, Joseph	O.3.5
King, Laurie	O.1.2
King-Dowling, Sara	O.12.5
Kingsnorth, Andrew	O.16.1
Kirk, Cameron	O.5.3, O.10.1
Kirk, Paul	O.2.1
Kirsch, Leslie	O.10.4
Kittle, Jamie	O.15.2
Klenk, Jochen	O.6.4, O.7.5
Kline, Paul	O.7.1
Kluge, Felix	P2.4.46
Koch, Sarah	O.6.1
Koëter, Sander	O.1.4
Kolb, Simon	O.14.4, P1.1.12
Koletzko, Berthold	O.8.5
Konstabel, Kenn	O.11.3
Koster, Annemarie	O.14.3
Kukko, Tuomas	P1.3.33
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La Porta, Fabio	P1.2.29
Lacroix, Andrea	P2.6.66
Lamonte, Michael	P2.6.66
Lamunion, Samuel	O.12.3, P2.4.41
Landré, Benjamin	O.14.1
Lang, Charlotte	P1.3.35
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Le, Alexis	P2.5.56, P2.5.57
Leblong, Emilie	P2.6.69
Lee, Jung Eun	P2.4.42
Lee, Daehyoung	P2.4.42
Lee, I-Min	P2.6.66
Lee, Miyoung	O.16.5
Lemos, Jorge	O.6.1
Lendt, Claas	O.4.3, O.12.4
Leonard, Krista	P1.1.11
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Letts, Elyse	O.8.3, O.12.5
Lever Taylor, Jessie	P2.7.70
Lim, Miranda	O.5.5
Liu, Zijia	P1.2.25
Logacjov, Aleksej	O.13.2
Long, Michael	O.6.1
Lopane, Giovanna	P2.6.61
Loudon, David	O.9.2
Lucerón-Lucas-Torres, Maribel	P1.1.17, P1.1.18
Lullini, Giada	P1.2.29
Ma, David	P1.2.21
Macrae, Victoria	O.3.3
Madsen, Cathrine	P1.2.20
Maetzler, Walter	O.6.1, P1.3.35, P2.4.46
Magrini, Mitchel	P2.4.44
Mahé, Guillaume	P2.5.56, P2.5.57
Malveiro, Carla	P1.3.30
Mancini, Martina	O.1.2, O.5.5, P1.3.36
Manor, Brad	O.10.4
Marchena, José	O.6.1
Martínez-Vizcaíno, Vicente	P1.1.17, P1.1.18
Mathiassen, Svend Erik	O.15.4

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Matos, Leonor	P1.3.30
Matthews, Charles	O.3.1, O.4.2
May, Stephen	O.2.5
Maylor, Ben	O.16.1
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Mazeas, Alexandre	O.9.3
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Mcginnis, Ryan	O.10.2
Mckee, Katherine	O.2.5
Mcmeekin, Peter	O.5.4, P2.6.64
Mcparland, Joanna	O.16.2
Mcveigh, Joanne	O.11.2, P1.1.13
Meijer, Kenneth	O.13.1
Melanson, Edward	O.7.1
Melaro, Jake	O.12.3, P2.4.49
Melendez-Calderon, Alejandro	O.15.1
Mendoza, Albert	P1.3.32, P1.3.37
Merete Brændvik, Siri	O.13.2
Mertes, Gert	O.5.2
Meskers, C.G.M.	P2.6.60
Meyer, Brett	O.10.2
Mincolelli, Giuseppe	P2.6.61
Monoli, Cecilia	P2.4.63
Montoye, Alexander	O.2.5, O.8.3
Moore, Jason	O.5.4
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Murd, Carolina	O.11.3
Murphy, Blake	P2.4.44
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Nakagata, Takashi	O.13.4
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Neuvonen, Joona	P1.2.26
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Nienja Langerak, A.J.	P2.6.60
Niessen, Martjin	O.5.1
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Nieuwboer, Alice	O.10.4
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Oppert, Jean-Michel	O.2.4
Orlandi, Silvia	P1.2.29
Orme, Mark	O.16.1
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Packer, Emma	O.5.1
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Pangallo, Domenico	P2.7.70
Papier, Keren	O.3.1
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Torres Costoso, Ana	P1.1.17
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Toth, Lindsay	P2.4.50
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Tucker, Trish	O.12.5
Tynan, Josh	O.9.1
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Van Beijnum, B.J.F.	P2.6.60
Van De Ven, Myrthe	O.1.4
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Van Hees, Vincent	O.14.1
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Visch, Lara	O.1.1
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Zaccardi, Francesco	O.16.1
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Zhai, Bing	O.3.3
Zheng, Xin	O.3.2

ORAL SESSIONS

Wednesday, June 19
10:15-11:15am

Oral Session #1

CLINICAL POPULATIONS 1
Location: Amphitheatre A

O.1.1 - THE RELATIONSHIP BETWEEN GAIT CAPACITY AND GAIT PERFORMANCE IN NEUROLOGICAL PATIENTS

Michelle Van Mierlo[1], Marijne Nieuwelink[1], Lara Visch[1], Katrijn Smulders[1], Noel Keijsers[1]

[1]Sint Maartenskliniek

O.1.2 - WEARABLE SENSORS CAN CAPTURE CHANGES IN TURNING MOBILITY IN DAILY LIFE AFTER MTBI REHABILITATION

Laurie King[1], Kody Campbell[1], Martina Mancini[1]

[1]Oregon Health & Science University

O.1.3 - ALTERATIONS IN THE DAILY LIVING GAIT AND MOBILITY DURING THE DAY AND NIGHT AMONG INDIVIDUALS WITH CEREBELLAR ATAXIA, SCA3: AN EXPLORATORY STUDY

Penina Ponger[1], Amit Salomon[1], Marina Brozgol[1], Eran Gazit[1], Jeffrey Hausdorff[1]

[1]Tel Aviv Sourasky Medical Center

O.1.4 - ASSOCIATIONS BETWEEN REAL WORLD GAIT AND PAIN IN INDIVIDUALS SCHEDULED FOR KNEE ARTHROPLASTY: FEASIBILITY STUDY

Frank Bruning[1], Myrthe Van De Ven[2], Michelle Van Mierlo[1], Joke Vriezekolk[1], Els Van Den Ende[1], Sander Koëter[2], Katrijn Smulders[1]

[1]Sint Maartenskliniek, [2]Canisius Wilhelmina Ziekenhuis

O.1.5 - EXPLORING THE RELATIONSHIP BETWEEN FRAGMENTATION AND CIRCADIAN RHYTHM OF DAILY-LIVING PHYSICAL ACTIVITY, FUNCTIONAL SYSTEM DISABILITY SCORES, AND PHYSICAL FATIGUE IN PEOPLE WITH MULTIPLE SCLEROSIS

Irina Galperin[1], Amit Salomon[2], David Buzaglo[2], Arnon Karni[2], Keren Regev[2], Jeffrey Hausdorff[2]

[1]Tel Aviv University and Tel Aviv Sourasky Medical Center, [2]Tel Aviv Sourasky Medical Center

Oral Session #2

MEASUREMENT INNOVATIONS
Location: Amphitheatre B

O.2.1 - BUILDING AN INTERACTIVE ONLINE NETWORK APPLICATION FOR HARMONISING PHYSICAL ACTIVITY DATA FROM WEARABLES

Matthew Pearce[1], Tom Bishop[1], Tomas Gonzalez[1], Paul Kirk[1], Simon White[1], Stephen Sharp[1], Soren Brage[1]

[1]University of Cambridge

O.2.2 - LET'S DO IT AGAIN: A NEW TOOL FOR ADDING SPATIOTEMPORAL CONTEXT TO HUMAN MOVEMENT BEHAVIOUR DATA

Josef Heidler[1], Jasper Schipperijn[1], Marian Paiva Marchiori[1]

[1]University of Southern Denmark

O.2.3 - ANNOTATING VALIDATION STUDIES USING VISION-LANGUAGE MODELS

Abram Schonfeldt[1], Aiden Doherty[1], Ronald Clark[1]

[1]University of Oxford

O.2.4 - PILOT EVALUATION OF THE ROBUSTNESS OF ECOLOGICAL MOMENTARY ASSESSMENT LABELING FOR FREE-LIVING PHYSICAL ACTIVITY DATA

Luis Sigcha[1], Grainne Hayes[1], Tomas Vetrovsky[2], Steriani Elavsky[2], Jean-Michel Oppert[3], Greet Cardon[4], Janas Harrington[5], Antje Hebestreit[6], Christoph Buck[6,7], Pepijn Van De Ven[1], Alan Donnelly[1]

[1]University of Limerick, [2]University of Hradec Králové, [3]Sorbonne Paris North University, [4]Ghent University, [5]University College Cork, [6]Leibniz Institute for Prevention Research and Epidemiology – BIPS, [7]Leibniz Institute for Prevention Research and Epidemiology

O.2.5 - A NOVEL APPROACH TO TRUE FREE-LIVING VALIDATION OF ACCELEROMETER-MEASURED MOVEMENT BEHAVIORS

Kimberly Clevenger[1], Stephen May[1], Katherine Mckee[1], Alexander Montoye[2]

[1]Utah State University, [2]Alma College

Oral Session #3

PREDICTING HEALTH OUTCOMES
Location: Amphitheatre C

O.3.1 - ACCELEROMETER-MEASURED DAILY PHYSICAL ACTIVITY AND RISK OF INCIDENT CANCER IN THE UK BIOBANK PROSPECTIVE COHORT

Alaina Shreves[1], Scott Small[2], Shing Chan[2], Pedro Saint-Maurice[3,4], Steven Moore[4], Keren Papier[2], Kezia Gaitskell[2], Ruth Travis[2], Charles Matthews[4], Aiden Doherty[2]

[1]University of Oxford & US National Cancer Institute, [2]University of Oxford, [3]Champalimaud Foundation, [4]National Cancer Institute, National Institutes of Health

O.3.2 - TEMPORAL ANALYSES OF PHYSICAL BEHAVIOR AND THE ASSOCIATION WITH HEALTH INDICATORS

Xin Zheng[1], Mai Chin A Paw[1,2], Wessel Wieringen[1]

[1]Amsterdam UMC, [2]Child and Adolescent Public health Research and Innovation

O.3.3 - CAN MEASURES OF HABITUAL ACTIVITY INTENSITY STRATIFY PRIMARY SJOGREN'S SYNDROME PARTICIPANTS WITH PERSISTENT FATIGUE? INSIGHTS FROM THE BRC TOOLS STUDY.

Chloe Hinchliffe[1], Bing Zhai[2], Victoria Macrae[1], Jade Walton[1], Wan-Fai Ng[1], Silvia Del Din[1]

[1]Newcastle University, [2]Northumbria University

O.3.4 - CAN WEARABLE ACCELEROMETERS IMPROVE THE PREDICTION OF CARDIOVASCULAR DISEASE?

Adam Sturge[1], Aiden Doherty[1]

[1]University of Oxford

O.3.5 - ESTIMATING BMI FROM THE COMPLEXITY OF GAIT DYNAMICS IN FREE LIVING DATA

James Williamson[1], Karl Friedl[2], Brian Telfer[1], Adam Potter[2], Joseph Kim[1]

[1]MIT Lincoln Laboratory, [2]US Army Research Institute of Environmental Medicine

Oral Session #4

ALGORITHMS 1
Location: Room 12-13

O.4.1 - PROOF OF CONCEPT: EXTRACTING PHYSICAL BEHAVIOURS FROM 24-HOUR NARRATIVE DATA USING INTEGRATED LARGE LANGUAGE MODELS AND A PHILOSOPHY OF EVENT APPROACH

Usman Sani Dankoly[1], Philippa Dall[1], Jasper Schipperijn[2], Sebastien Chastin[3]

[1]Glasgow Caledonian University, [2]University of Southern Denmark, [3]Glasgow Caledonian University & Ghent University

O.4.2 - VARIATION IN STEP COUNTS BY DIFFERENT PREDICTION METHODS IN RELATION TO EPIDEMIOLOGIC STUDIES AND PUBLIC HEALTH TRANSLATION

Charles Matthews[1]

[1]National Cancer Institute, National Institutes of Health

O.4.3 - IDENTIFYING PHYSICAL ACTIVITY TYPES USING THIGH-WORN ACCELEROMETRY: COMPARISON OF TWO NO-CODE CLASSIFICATION METHODS

Claas Lendt[1], Theresa Braun[1], Bianca Biallas[1], Ingo Froboese[1], Pasan Hettiarachchi[2], Peter J. Johansson[2]

[1]Auckland University of Technology, [2]Uppsala University

O.4.4 - DO WE NEED AGE-SPESIFIC HUMAN ACTIVITY RECOGNITION MODELS FOR CLASSIFICATION OF ACTIVTY TYPES IN CHILDREN AND ADOLECENTS? –EFFECT OF AGE AND LENGTH OF ACTIVITY BOUTS

Ellen Marie Bardal[1], Roar Fenne[1], Kerstin Bach[1]

1 Norwegian University of Science and Technology

O.4.5 - HEART RATE MONITORING FROM MOTION-CORRUPTED PHOTOPLETHYSMOGRAPHY: A BENCHMARK STUDY OF OPEN-SOURCE ALGORITHMS

Marcello Sicbaldi[1], Luca Palmerini[1], Alessandro Silvani[1], Lorenzo Chiari[1]

[1]University of Bologna

11:45am-12:45pm

Oral Session #5

PARKINSON'S
Location: Amphitheatre A

O.5.1 - EXPLORING THE IMPACT OF DOPAMINERGIC MEDICATION ON REAL WORLD DIGITAL MOBILITY OUTCOMES IN PEOPLE WITH PARKINSON'S

Emma Packer[1], Philip Brown[2], Heather Hunter[2], Fabio Ciravegna[4], Jordi Evers[5], Martjin Niessen[5], Alison Yarnall[1], Lynn Rochester[1], Lisa Alcock[1], Silvia Del Din[1]

[1]Newcastle University, [2]Newcastle upon Tyne Hospitals NHS, Foundation Trust, [4]University of Turin, [5]McRoberts BV

O.5.2 - WALKING RECOGNITION IN PARKINSON'S DISEASE POPULATIONS USING WRIST-WORN ACCELEROMETERS

Aidan Acquah[1], Andrew Creagh[1], Valentin Hamy[2], Scott Small[1], Shing Chan[1], Hang Yuan[1], Gert Mertes[1], David Clifton[1], Aiden Doherty[1]

[1]University of Oxford, [2]GSK plc

O.5.3 - CAN LOCALISATION INFORMATION IMPROVE OUR UNDERSTANDING OF REAL-WORLD WALKING IN PEOPLE WITH PARKINSON'S AND OLDER ADULTS?

Cameron Kirk[1], Lisa Alcock[1], Kirsty Scott[1], Neil Ireson[2], Lynn Rochester[1], Alison Yarnall[1], Silvia Del Din[1]

[1]Newcastle University, [2]University of Sheffield

O.5.4 - HARNESSING WEARABLE CAMERAS AND COMPUTER VISION TO CONTEXTUALISE FREE-LIVING MOBILITY IN PARKINSON'S DISEASE

Jason Moore[1], Alan Godfrey[1], Samuel Stuart[1], Peter Mcmeekin[1], Richard Walker[2]

[1]Northumbria University, [2]Northumbria Healthcare NHS Foundation Trust

O.5.5 - DAILY-LIFE MEASURES OF GAIT AND TURNING ACROSS THE SPECTRUM OF NORMAL, PRODROMAL, EARLY AND MODERATE PARKINSON'S DISEASE

Martina Mancini[1], Vrutangkumar Shah[2], Pablo Burgos[1], Patricia Carlson-Kuhta[1], Lauren Talman[1], Miranda Lim[1], Joseph Quinn[1], Fay Horak[1]

[1]Oregon Health & Science University, [2]CLARIO

Oral Session #6

DIGITAL MOBILITY
Location: Amphitheatre B

O.6.1 - REQUIREMENTS FOR RELIABLE ESTIMATES OF DIGITAL MOBILITY OUTCOMES OF WALKING ACTIVITY AND GAIT FROM A LOWER BACK INERTIAL MEASUREMENT UNIT IN A LARGE MULTI-COHORT STUDY

Joren Buekers[1], Julia Chernova[2], José Marchena[1], Sarah Koch[1], Jorge Lemos[1], Clemens Becker[3], Tecla Bonci[4], Julia Braun[5], Brian Caulfield[6], Silvia Del Din[7], Heleen Demeyer[8], Anja Frei[5], Eran Gazit[9], Jeffrey Hausdorff[9], Anisoara Ionescu[10], Carl-Philipp Jansen[11], Michael Long[4], Walter Maetzler[12], Basil Sharrack[4], David Singleton[6], Thierry Troosters[8], Lynn Rochester[7], Judith Garcia-Aymerich[1]

[1]Barcelona Institute for Global Health (ISGlobal), [2]Bayer plc, [3]Bosch Research Foundation, [4]University of Sheffield, [5]University of Zurich, [6]University College Dublin, [7]Newcastle University, [8]KU Leuven, [9]Tel Aviv Sourasky Medical Center, [10]Ecole Polytechnique Federale de Lausanne, [11]Robert-Bosch-Hospital, [12]University Hospital Schleswig-Holstein

O.6.2 - THE NUMBER OF DAYS REQUIRED FOR A RELIABLE ESTIMATE OF DIVERSE DIGITAL MOBILITY OUTCOMES FROM VARIOUS GAIT DOMAINS, DERIVED FROM A 1-WEEK WORN LOWER BACK SENSOR. ANALYSIS ACROSS DIFFERENT SUBJECT COHORTS

Eran Gazit[1], Judith Garcia-Aymerich[2], Joren Buekers[2], Silvia Del Din[3], Arne Mueller[4], Alison Yarnall[3], Thierry Troosters[5], Heleen Demeyer[5], Basil Sharrack[6], Ellen E Buckley[6], Clemens Becker[8], David Singleton[9], Beatrix Vereijken[10], Lynn Rochester[3], Jeffrey M Hausdorff[1]

[1]Tel Aviv Sourasky Medical Center, [2]Barcelona Institute for Global Health (ISGlobal), [3]Newcastle University, [4]Novartis Pharma AG, [5]KU Leuven, [6]The University of Sheffield, [8]Robert-Bosch-Hospital, [9]University College Dublin, [10]Norwegian University of Science and Technology

O.6.3 - WALKING SLOWLY – THE ACCURACY OF REAL-WORLD DIGITAL MOBILITY ESTIMATES AFTER A HIP FRACTURE

Martin Berge[1], Anisoara Ionescu[2], Beatrix Vereijken[1]

[1]Norwegian University of Science and Technology, [2]Ecole Polytechnique Federale de Lausanne

O.6.4 - DIGITAL MOBILITY OUTCOMES IN HIP FRACTURE PATIENTS THE FIRST YEAR AFTER HIP FRACTURE SURGERY

Jorunn Helbostad[1], Jochen Klenk[2], Carl-Philipp Jansen[3], Tobias Eckert[2], Monika Engdal[1], Martin Berge[1], Beatrix Vereijken[1], Clemens Becker[3]

[1]Norwegian University of Science and Technology, [2]Bosch Research Foundation, [3]Robert-Bosch-Hospital

O.6.5 - PREDICTING FUTURE FALLS THROUGH DIGITAL MOBILITY BIOMARKERS IN REAL-WORLD MONITORING OF COMMUNITY-DWELLING OLDER ADULTS

Jose Albites-Sanabria[1], Pierpaolo Palumbo[1], Stefania Bandinelli[2], Luca Palmerini[1], Lorenzo Chiari[1]

[1]University of Bologna, [2]Azienda Sanitaria Toscana Centro

Oral Session #7

POST JOINT REPLACEMENT
Location: Amphitheatre C

O.7.1 - BRISK CADENCE IS POSSIBLE AND ENHANCED FOLLOWING A PHYSICAL ACTIVITY BEHAVIOR INTERVENTION AFTER TOTAL KNEE ARTHROPLASTY

Rashelle Hoffman[1], Shawn Hanlon[2], Paul Kline[3], Vanessa Richardson[2], Elizabeth Juarez-Colunga[2], Edward Melanson[4], Cory Christiansen[2]

[1]Creighton University, [2]VA Eastern Colorado Healthcare System, [3]Virginia Commonwealth University, [4]University of Colorado

O.7.2 - IMPROVEMENTS IN PHYSICAL CAPACITY MAY NOT INDICATE REDUCTIONS IN REAL-WORLD SEDENTARY ACTIVITY: A LONGITUDINAL POST-TOTAL HIP ARTHROPLASTY STUDY

Rashelle Hoffman[1], Lauren Hinrichs-Kinney[2], Jeri Forster[2], Michael Dayton[3], Douglas Dennis[4], Dana Judd[2], Cory Christiansen[2], Jennifer Stevens-Lapsley[2]

[1]Creighton University, [2]University of Colorado Anschutz Medical Campus, [3]University of Colorado, [4]Colorado Joint Replacement

O.7.3 - FEASIBILITY OF INSTRUMENTED INSOLES FOR LONG-TERM MONITORING OF GAIT AFTER TIBIAL FRACTURES

Elke Warmerdam[1], Christian Wolff[2], Marcel Orth[1], Tim Pohlemann[1], Bergita Ganse[1]

[1]Saarland University, [2]German Research Center for Artificial Intelligence (DFKI)

O.7.4 - MONITORING REAL-WORLD GAIT TO EVALUATE CHANGES IN MOBILITY AFTER TOTAL KNEE ARTHROPLASTY

Frank Bruning[1], Ramon Boekesteijn[1], Koen Defoort[1], Els Van Den Ende[1], Katrijn Smulders[1]

[1]Sint Maartenskliniek

O.7.5 - EVALUATION OF REAL-WORLD MOBILITY RECOVERY AFTER HIP FRACTURE USING DIGITAL MOBILITY OUTCOMES

Monika Engdal[1], Kristin Taraldsen[2], Carl-Philipp Jansen[3], Raphael Peter[4], Beatrix Vereijken[1], Clemens Becker[5], Jorunn Helbostad[1], Jochen Klenk[6]

[1]Norwegian University of Science and Technology, [2]Oslo Metropolitan University, [3]Robert-Bosch-Hospital, [4]Ulm University, [5]Heidelberg University, [6]Bosch Research Foundation

Oral Session #8

SEDENTARY BEHAVIOUR
Location: Room 12-13

O.8.1 - VALIDATION OF AN ALGORITHM FOR SIT-TO-STAND AND STAND-TO-SIT IDENTIFICATION DURING ACTIVITIES OF DAILY LIVING

Jose Albites-Sanabria[1], Jorunn Helbostad[2], Luca Palmerini[1], Lorenzo Chiari[1]

[1]University of Bologna, [2]Norwegian University of Science and Technology

O.8.2 - PATTERNS OF SEDENTARY TIME ACCUMULATION ACCORDING TO AGE IN THE UNITED STATES: A 2003-2006 NHANES ANALYSIS

Pierre-Yves De Müllenheim[1], Florian Congnard[1], Benedicte Noury[1]

[1]IFEPSA - UCO

O.8.3 - TESTING THE CONSENSUS METHOD FOR SEDENTARY TIME FROM A HIP-WORN ACCELEROMETER

Elyse Letts[1], Alexander Montoye[2], Kimberly Clevenger[3]

[1]McMaster University, [2]Alma College, [3]Utah State University

O.8.4 - EFFECT OF BRIEF PEDALING BOUTS DURING ONE HOUR OF VIDEO GAME PLAY ON POPLITEAL ARTERY DIAMETER AND VELOCITY

Macey Dunn[1], Madalyn Hickey[1], Nicholas Lerma[1]

[1]Grand Valley State University

O.8.5 - IMPACT OF CUT POINT SELECTION ON LEVELS OF PHYSICAL ACTIVITY AND SEDENTARY TIME OF TODDLERS

Jill Marie Ferry[1,2], Lotta Rohmert[1], Martina Totzauer[1], Joaquin Escribano[3], Marta Zaragoza-Jordana[3], Mariona Gispert-Llauradó[3], Berthold Koletzko[1], Veit Grote[1]

[1]Ludwig Maximilian University, [2]Dr von Hauner Children's Hospital, [3]University of Rovira I Virgili

2:00-3:00pm

Oral Session #9

INTERVENTIONS
Location: Amphitheatre B

O.9.1 - ASSESSING PHYSICAL BEHAVIOUR IN A COMMUNITY LED LIFESTYLE INTERVENTION IN A REMOTE AUSTRALIAN ABORIGINAL COMMUNITY: ELCHO ISLAND TEACHINGS

Bronwyn Clark[1], Hasthi Dissanayake[2], George Guruwiwi[2], Hasthi Dissanayake[2], Josh Tynan[2], Sabine Braat[2], Ben Harrap[2], Tim Trudgen[3], Sarah Hanieh[2], Michael Christie[4], Leonard Harrison[5], John Wentworth[5], Julie Brimblecombe[6], Beverley-Ann

[1]University of Queensland, [2]University of Melbourne, [3]Hope For Health, [4]Charles Darwin University, [5]Walter and Eliza Hall Institute, [6]Monash University

O.9.2 - HOME VS COMMUNITY STEPPING PATTERNS: A MEASURE OF PARTICIPATION

Lauren Gracey-Mcminn[1], David Loudon[2], Alix Chadwell[3], Chantel Ostler[4], Samantha Curtin[1], Malcolm Granat[1]

[1]University of Salford, [2]ActivPal Ltd., [3]University of Southampton, [4]Solent NHS Trust and University of Southampton

O.9.3 - ENHANCING DIGITAL HEALTH EVALUATION: INTEGRATING INTENSIVE LONGITUDINAL MONITORING OF PHYSICAL ACTIVITY IN A RANDOMIZED CONTROLLED TRIAL – A CASE STUDY FROM THE DIPPAO RCT

Alexandre Mazeas[1], Aïna Chalabaev[1], Martine Duclos[2]

[1]University Grenoble Alpes, [2]University Hospital Clermont- Ferrand

O.9.4 - INFLUENCE OF A TABLET-BASED, GAMIFIED EXERCISE APPLICATION ON PHYSICAL FUNCTION AND PHYSICAL ACTIVITY FOR OLDER ADULTS: A FEASIBILITY STUDY

Nina Skjæret-Maroni[1], Emilie Bertelsen[2], Astrid Ustad[1]

[1]Norwegian University of Science and Technology, [2]Artic University of Norway

O.9.5 - WEARABLE FITNESS TRACKERS FOR CONTINUOUS ACTIVITY MONITORING IN PATIENTS WITH HAEMOTOLOGICAL MALIGNANCIES UNDERGOING STEM-CELL TRANSPLANT: A 16-WEEK INTERVENTION STUDY

Christian Brakenridge[1], Dulari Hakamuwalekamlage[2], Hayley Dillon[3], David Dunstan[4], Agus Salim[2], Erin Howden[3]

[1]Swinburne University of Technology, [2]University of Melbourne, [3]Baker Heart and Diabetes Institute, [4]Deakin University

Thursday, June 20
2:00-3:00pm

Oral Session #10

CLINICAL POPULATIONS 2
Location: Amphitheatre B

O.10.1 - WRIST ACCELEROMETER MEASURES CORRELATE WITH DISEASE ACTIVITY IN RHEUMATOID ARTHRITIS AND ARE ROBUST TO FREQUENCY DOWNSAMPLING

Javad Sarvestan[1], Cameron Kirk[1], Kenneth Baker [1], Silvia Del Din[1]

[1]Newcastle University

O.10.2 - THE BENEFITS OF PASSIVE MONITORING: A COMPARATIVE ANALYSIS OF WALKING IN REAL WORLD USING PATIENT REPORTED MEASURES

Brett Meyer[1], Ryan Mcginnis[2], Melissa Ceruolo[1]

[1]Medidata Solutions, [2]Wake Forest University School of Medicine

O.10.3 - CAN FEEDBACK FROM INERTIAL MEASUREMENT UNITS ENHANCE FOOT STRIKE ANGLE AND FORWARD PROPULSION IN INDIVIDUALS RECOVERING FROM STROKE?

Carmen Ensink[1], Theo Theunissen[2], Cheriel Hofstad[1], Rene Van Ee[1]

[1]Sint Maartenskliniek, [2]HAN University of Applied Sciences,

O.10.4 - A MACHINE LEARNING CONTEST ENHANCES AUTOMATED FREEZING OF GAIT DETECTION AND REVEALS TIME-OF-DAY EFFECTS

Amit Salomon[1], Eran Gazit[1], Pieter Ginis[2], Alice Nieuwboer[2], Leslie C Kirsch[3], Ryan Holbrook[4], Brad Manor[5], Jeffrey Hausdorff[1]

[1]Tel Aviv Sourasky Medical Center, [2]KU Leuven, [3]Michael J Fox Foundation for Parkinson's Research, [4]Kaggle, [5]Harvard Medical School

O.10.5 - MEASURING AND PREDICTING DAILY PHYSICAL ACTIVITY IN PEOPLE WITH CHRONIC DISEASES: THE ROLE OF EXERCISE-RELATED AFFECTIVE RESPONSES AND PERCEIVED EXERTION

Layan Fessler[1], Philippe Sarrazin[1], Boris Cheval[2]

[1]University Grenoble Alpes, [2]University of Rennes

Oral Session #11

SLEEP
Location: Amphitheatre C

O.11.1 - CONCURRENT VALIDITY OF THE ACTIVPAL CREA ALGORITHM AND SELF-REPORT DIARY TO MEASURE TIME IN BED AND SLEEP IN OLDER ADULTS

Philippa Dall[1], Pau Farrés-Godayol[2], Sebastien Chastin[3], Simon Cox[4], Ian Deary[4], Mary K Hannah[6], Dawn A Skelton[1]

[1]Glasgow Caledonian University, [2]University of Victoria - Central University of Catalonia, [3]Glasgow Caledonian University & Ghent University, [4]University of Edinburgh, [5]University of Glasgow

O.11.2 - WEARABLES AND NEARABLES MEASURING SLEEP AND PHYSICAL ACTIVITY AMONG AUTISTIC ADULTS

Phoebe Wan[1], Joanne Mcveigh[1], Amy Reynolds[2], Craig Thompson[1], Eleanor Quested[1]

[1]Curtin University, [2]Flinders Health and Medical Research Institute (Sleep Health)

O.11.3 - SUBJECTIVE REPORTS OF SLEEP TIME: VALIDATION AGAINST ACCELEROMETRY-BASED ESTIMATES

Kenn Konstabel[1], Carolina Murd[1], Merle Havik[1], Hedvig Sultson[1]

[1]National Institute for Health Development

O.11.4 - USING SMARTPHONE SCREEN TIMES TO ESTIMATE SLEEP TIMES IN UNIVERSITY STUDENTS

Michael Schmidt[1], Daniel Gallagher[1], Benjamin Boudreaux[2]

[1]University of Georgia, [2]Columbia University

O.11.5 - SLEEP TIMING AND VARIABILITY: ASSOCIATIONS WITH OTHER COMPONENTS OF THE 24-HOUR ACTIVITY CYCLE

Michael Schmidt[1], Daniel Gallagher[1], Benjamin Boudreaux[2], Ginny Frederick[1], Patrick O'Connor[1], Ellen Evans[3]

[1]University of Georgia, [2]Columbia University, [3]Indiana University

3:30-4:30 pm

Oral Session #12

CHILDREN AND YOUNG PEOPLE
Location: Amphitheatre A

O.12.1 - COMPARISON OF MACHINE LEARNING TECHNIQUES FOR ESTIMATING ENERGY EXPENDITURE IN PRESCHOOL CHILDREN FROM GERMANY AND CANADA THROUGH ACCELEROMETRY ASSESSMENT

Hannah Coyle-Asbil[1], Lukas Burk[2], Marvin N. Wright[2], Christoph Buck[2], Berit Brandes[2], Mirko Brandes[2], Lori Ann Vallis[1]

[1]University of Guelph, [2]Leibniz Institute for Prevention Research and Epidemiology – BIPS

O.12.2 - ASSESSING 24-HOUR MOVEMENT BEHAVIORS IN 0-4-YEAR-OLD CHILDREN: A COMPARATIVE ANALYSIS OF ACCELEROMETERS AND PROXY-RERPORT USING THE MY LITTLE MOVES APP

Anne Lettink[1], Jelle Arts[1], Jessica S. Gubbels[2], Teatske Altenburg[1], Mai Chin A Paw[1]

[1]Amsterdam UMC, [2]Maastricht University

O.12.3 - RESPONSIVENESS OF ACCELEROMETER-BASED PHYSICAL ACTIVITY ESTIMATES IN YOUTH

Nicholas Remillard[1], Brett Davis[1], Jake Melaro[1], Paul Hibbing[2], Samuel Lamunion[3], Scott Crouter[1]

[1]University of Tennessee, Knoxville, [2]University of Illinois Chicago, [3]National Institutes of Health

O.12.4 - ASSESSING THE ACCURACY OF ACTIVITY CLASSIFICATION USING THIGH-WORN ACCELEROMETRY: A VALIDATION STUDY OF ACTIPASS IN CHILDREN

Claas Lendt[1], Pasan Hettiarachchi[2], Peter J. Johansson[2], Scott Duncan[1], Tom Stewart[1]

[1]Auckland University of Technology, [2]Uppsala University

O.12.5 - MACHINE LEARNING MODELS TO DETECT PHYSICAL ACTIVITY AND SEDENTARY TIME FROM A HIP-WORN ACCELEROMETER IN TODDLERS

Elyse Letts[1], Sara King-Dowling[2], Natascja Di Cristofaro[1], Trish Tucker[3], John Cairney[4], Brian Timmons[1], Joyce Obeid[1]

[1]McMaster University, [2]Children's Hospital of Philadelphia, [3]University of Western Ontario, [4]University of Queensland

Oral Session #13

ALGORITHMS 2
Location: Amphitheatre B

O.13.1 - OPTIMIZED MACHINE LEARNING MODELS FOR THE ESTIMATION OF ENERGY EXPENDITURE BASED ON PHYSIOLOGICAL SIGNALS MEASURED WITH WEARABLES

Wouter Bijnens[1], Kenneth Meijer[1], Guy Plasqui[1]

[1]Maastricht University

O.13.2 - VALIDATION OF TWO NOVEL HUMAN ACTIVITY RECOGNITION MODELS FOR TYPICALLY DEVELOPING CHILDREN AND CHILDREN WITH CEREBRAL PALSY

Marte Tørring[1], Aleksej Logacjov [1], Siri Merete Brændvik[1], Astrid Ustad[1], Karin Roeleveld[1], Ellen Marie Bardal[1]

[1]Norwegian University of Science and Technology

O.13.3 - INNOVATIVE REAL-WORLD GAIT DETECTION IN HUNTINGTON'S DISEASE: UNRAVELING THE CHALLENGES OF CHOREA THROUGH DEEP LEARNING

Dafna Schwartz[1], Jeffrey Hausdorff[1], Lori Quinn[2], Ran Gilad-Bachrach[1]

[1]Tel Aviv Sourasky Medical Centre, [3]Columbia University,

O.13.4 - ACTIVITY RECOGNITION USING DATA FROM WEARABLE SENSORS AND SMART SHOE DEVICES: CLASSIFYING KICK-BOARD AND SKATEBOARD COMMUTING BEHAVIORS

Hitomi Hatori[1], Nathanael Aubert-Kato[1], Takashi Nakagata[2], Yuji Ohta[1], Julien Tripette[1]

[1]Ochanomizu University,2 National Institutes of Biomedical Innovation, Health and Nutrition

O.13.5 - QUANTIFYING DAILY HEAD TURNS AND HEAD-TRUNK COUPLING IN HEALTHY ADULTS

Selena Cho[1], Peter Fino[1]

[1]University of Utah

Oral Session #14

24 HOUR BEHAVIOURS
Location: Amphitheatre C

O.14.1 - IDENTIFICATION OF NUMBER OF DAYS NEEDED TO MEASURE RELIABLY FRAGMENTATION OF REST ACTIVITY PATTERNS: A PSEUDO-SIMULATION STUDY BASED ON WHITEHALL ACCELEROMETER SUB-STUDY

Ian Danilevicz[1], Vincent Van Hees[2], Sam Vidil[1], Benjamin Landré[1], Aline Dugravot[1], Séverine Sabia[1]

[1]Institut national de la santé et de la recherche médicale, [2]Accelting

O.14.2 - FEASIBILITY OF CONTINUOUS 24-HOUR ACCELEROMETRY ACROSS PREGNANCY

Sylvia Badon[1], Alex Asera[1], Elizabeth Ryan[1], Kelley Gabriel[2], Monique Hedderson[1]

[1]Kaiser Permanente, [2]University of Alabama at Birmingham

O.14.3 - COMBINED ASSOCIATIONS OF TYPE 2 DIABETES AND VIBRATION SENSATION LOSS WITH DEVICE-MEASURED PHYSICAL ACTIVITY AND SEDENTARY BEHAVIOUR. – THE MAASTRICHT STUDY

Touria Ahaouari Lemrabet[1], Nicolaas Schaper[2], Brenda Berendsen[1], Hans Bosma[1], Marleen Van Greevenbroek[1], Bastiaan De Galan[1], Miranda Schram[1], Hans Savelberg[1], Annemarie Koster[1]

[1]Maastricht University, [2]Maastricht University Medical Center

O.14.4 - THE ASSESSMENT OF THE 24-HOUR PHYSICAL BEHAVIOR CONSTRUCT VIA WEARABLES: A SYSTEMATIC REVIEW OF VALIDATION STUDIES.

Marco Giurgiu[1], Simon Woll[1], Alexander Burchartz[1], Simon Kolb[1], Birte Von Haaren-Mack[1], Janis Fiedler[1], Johannes Bussmann[2]

[1]Karlsruhe Institute of Technology, [2]Erasmus University Medical Center

O.14.5 - DAILY PHYSICAL ACTIVITY AND VIDEO GAME AND TV TIME ON BODY MASS INDEX IN YOUTH: NATIONAL YOUTH FITNESS SURVEY

Meghan Imhoff[1], Nicholas Lerma[1]

[1]Grand Valley State University

Friday, June 21
11:45-12:45 am

Oral Session #15

WORKPLACE
Location: Amphitheatre B

O.15.1 - ACCURACY AND ACCEPTABILITY OF THE DESK POSITIONING SYSTEM (DPS): A NEW SIT-STAND DESK MEASUREMENT DEVICE

Genevieve Healy[1], George Thomas[1], Alejandro Melendez-Calderon[1], Sami Kabb[1], Katherine Heseltine[1], Chan Hi Yue[1], Bronwyn Clark[1]

[1]University of Queensland

O.15.2 - DEVICE-BASED MEASUREMENT OF OFFICE-BASED PHYSICAL BEHAVIOUR: A SYSTEMATIC REVIEW

Bronwyn Clark[1], Noah Bongers[1], George Thomas[1], Jamie Kittle[1], Genevieve Healy[1]

[1]University of Queensland

O.15.3 - ASSOCIATION BETWEEN DEVICE MEASURED PHYSICAL ACTIVITY AT WORK AND SELF-PERCEIVED PHYSICAL WORK DEMANDS AMONG HOSPITAL WORKERS IN NORWAY - THE STUNTH STUDY

Roar Fenne[1], Sigmund Ø. Gismervik[1], Lene Aasdahl[1], Ellen Marie Bardal[1]

[1]Norwegian University of Science and Technology

O.15.4 - SITTING, STANDING AND ACTIVE BEHAVIORS OF OFFICE WORKERS PARTICIPATING IN AN ERGONOMIC INTERVENTION: HOW CLOSE DO THEY GET TO A 'JUST RIGHT' ERGONOMIC BALANCE?

Luiz A. Brusaca[1], Svend Erik Mathiassen[2], David M. Hallman[2], Ana Beatriz Oliveira[1], Nidhi Gupta[3]

[1]Federal University of São Carlos, [2]University of Gävle, [3]National Research Centre for the Working Environment

O.15.5 - THE EFFECT OF A CO-DESIGNED EIGHT-WEEK WORKPLACE HEALTH PROMOTION INITIATIVE ON OCCUPATIONAL SEDENTATY TIME, PHYSICAL ACTIVITY AND GLUCOSE CONTROL WITH ADULTS WHO HOLD DESK-BASED OCCUPATIONS: PRELIMINARY BASELINE RESULTS

Aidan Buffey[1], Brian Carson[1], Alan Donnelly[1]

[1]University of Limerick

Oral Session #16

MEASUREMENT INNOVATIONS 2
Location: Amphitheatre C

O.16.1 - QUANTIFYING THE INTENSITY OF FREE-LIVING PHYSICAL ACTIVITY IN ABSOLUTE AND RELATIVE TERMS: IMPROVING UNDERSTANDING OF DIFFERENCES IN ACTIVITY BY AGE AND ASSOCIATIONS WITH MORTALITY.

Alex Rowlands[1], Mark Orme[1], Ben Maylor[1], Andrew Kingsnorth[2], Kamlesh Khunti[1], Francesco Zaccardi[1], Tom Yates[1]

[1]University of Leicester, [2]Loughborough University

O.16.2 - DEVELOPMENT OF A SCREENING TOOL TO IDENTIFY SELF-REPORT AND DEVICE-BASED MEASURES OF HABITUAL PHYSICAL ACTIVITY FOR USE IN A SYSTEMATIC REVIEW: THE OPTIMA STUDY

Philippa Dall[1], Dawn A Skelton[1], Christopher Seenan[1], Sarah Rhodes[2], Trish Gorely[3], Joanna Mcparland[1], Julie Brittenden[4], Ebuka Anieto[5], Lorna Booth[1], Cathy Gormal[6], Jeremy Dearling[6], Candida Fenton[7], Sarah Audsley[8], Kimberly Fairer 9, Linsda

[1]Glasgow Caledonian University, [2]University of Manchester, [3]University of the Highlands and Islands, [4]University of Glasgow, [5]Glasgow Caledonian University & University of Suffolk, [6]East of England Citizens' Senate, [7]University of Edinburgh, [8]Northumbria University, [9]Oxford University Hospitals NHS Foundation Trust, [10]University of London, [11]Glasgow Caledonian University & University of the West of Scotland

O.16.3 - AN INTERSECTIONAL APPROACH TOWARDS ACCELEROMETER-BASED PHYSICAL BEHAVIOUR PATTERN ANALYSIS: SEQUENCE MAPPING

Mari Sone[1], Teatske Altenburg[1], Lauren Sherar[2], Dale Esliger[2], Mai Chin A Paw[1]

[1]Amsterdam UMC, [2]Loughborough University

O.16.4 - IDENTIFICATION OF CIRCADIAN RHYTHM PROFILES IN OLDER ADULTS: A COMPREHENSIVE APPROACH USING DATA FROM THE WHITEHALL II ACCELEROMETER SUB-STUDY

Sam Vidil[1], Ian Danilevicz[2], Aline Dugravot[2], Séverine Sabia[2]

[1]Center of Research in Epidemiology and Statistics (CRESS), [2]Institut national de la santé et de la recherche médicale

O.16.5 - COMPARATIVE EVALUATION OF ECOLOGICAL MOMENTARY ASSESSMENT (EMA), GLOBAL PHYSICAL ACTIVITY QUESTIONNAIRE (GPAQ), AND BOUCHARD'S PHYSICAL ACTIVITY RECORD (BAR) FOR MEASURING PHYSICAL ACTIVITY: A MULTILEVEL MODELING APPROACH

Jung Min Noh[1], Song Hyun Lim[1], Miyoung Lee [2], Ji-Yeob Choi[1]

[1]Seoul National University, [2]Kookmin University

POSTER SESSIONS INSTRUCTIONS

To make the most of the ICAMPAM poster sessions – please review the following information:

Presenters will be at their poster in the Foyer during their assigned poster time.

Posters abstracts are available in Whova.

Poster Sessions during ICAMPAM are as follows:

- **Poster Session 1 (P1) WEDNESDAY, JUNE 19, 2024 12:45-2:00 PM**
- **Poster Session 2 (P2) THURSDAY, JUNE 20, 2024 12:45-2:00 PM**

POSTER SESSIONS

Poster Session #1
Wednesday, June 19
12:45-2:00pm

P1.1.11 - REALLOCATING RECREATIONAL SEDENTARY SCREEN TIME AND 24-HOUR BEHAVIORS: ASSOCIATIONS WITH ADIPOSITY IN ADULTS WITH HIGH LEVELS OF REPORTED SCREEN TIME

Kristina Hasanaj[1], Krista Leonard[2,3], Dorothy D. Sears[2], Fang Yu[2], Megan E. Petrov[2], Sarah Keadle[4], Matthew Buman[2]

[1]Northwestern University, [2]Arizona State University, [3]VivoSense, Inc., [4]California Polytechnic State University, San Luis Obispo

P1.1.12 - STUDY PROTOCOL FOR THE MOMO 2.0 ACCELEROMETER STUDY TO INVESTIGATE 24-HOUR PHYSICAL BEHAVIOR PATTERNS IN 4-17-YEAR-OLDS

Birte Von Haaren-Mack[1], Alexander Burchartz[1], Carmen Volk[1], Simon Kolb[1], Claudia Niessner[2], Alexander Woll[2]

[1]Karlsruhe Institute of Technology, [2]Karlsruhe Institute of Technology, Germany

P1.1.13 - PROMOTING PHYSICAL ACTIVITY IN ADULTS TRANSITIONING TO RETIREMENT THROUGH VIGOROUS INTERMITTENT LIFESTYLE PHYSICAL ACTIVITY – A PILOT STUDY

Bingyan Pang[1], Joanna Moullin[1], Craig Thompson[1], Cecilie Thøgersen-Ntoumani[2], Emmanuel Stamatakis[3], Joanne Mcveigh[1]

[1]Curtin University, [2]University of Southern Denmark, [3]University of Sydney

P1.1.14 - UNLOCKING DIVERSITY IN PHYSICAL BEHAVIOUR RESEARCH: INSIGHTS FROM THE 2015-2022 ICAMPAM ABSTRACTS

Julia Baumgart[1], Jorunn Helbostad[1], Beatrix Vereijken[1]

[1]Norwegian University of Science and Technology

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Constanza Vielma[1], Guillaume Chevance[1], Joan Ballester[1]

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P1.1.16 - VEGA, AN APP FOR REAL-WORLD MONITORING EXPLOITING COMMERCIAL DEVICES

Paola Di Florio[1], Marcello Sicbaldi[1], Luca Palmerini[1], Lorenzo Chiari[1], Alessandro Silvani[1]

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P1.1.17 - THE PHYSICAL ACTIVITY PATTERNS IN CHILDREN: AN ANALYSIS OF DIFFERENCES AND AGREEMENT BETWEEN WEEKDAYS AND WEEKENDS

Eva Rodríguez Gutiérrez[1], Bruno Bizzozero Peroni[1], Valentina Díaz-Goñi[1], Sergio Núñez De Arenas-Arroyo[1], Irene Sequí-Domínguez[1], Maribel Lucerón-Lucas-Torres[1], Santiago Mula-Muñoz[1], Ana Torres Costoso[1], Vicente Martínez-Vizcaíno[1]

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Bruno Bizzozero-Peroni[1], Eva Rodríguez Gutiérrez[1], Valentina Díaz-Goñi[1], Sergio Núñez De Arenas-Arroyo[1], Irene Sequí-Domínguez[1], Maribel Lucerón-Lucas-Torres[1], Santiago Mula-Muñoz[1], Arthur Eumann Mesas[1], Vicente Martínez-Vizcaíno[1]

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P1.1.19 - EXPLORING THE EFFECT OF A HOME-BASED OBESITY PREVENTION INTERVENTION ON YOUNG CHILDREN'S PHYSICAL ACTIVITY AND SLEEP

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P1.2.20 - THE POTENTIAL OF CAMERA-BASED OBSERVATIONS IN PLAYGROUND RESEARCH: A PROOF-OF-CONCEPT STUDY

Cathrine Madsen[1], Jasper Schipperijn[1]

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Hannah Coyle-Asbil[1], Bridget Coyle-Asbil[1], Julia Gruson-Wood[1], David W.L. Ma[1], Jess Haines[1], Lori Ann Vallis[1]

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Jinseok Oh[1], Beth A. Smith[2], Peter Rohloff[3]

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Marian Paiva Marchiori[1], Jasper Schipperijn[2]

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Zijia Liu[1], Brenda Berendsen[1], Hans Savelberg[1], Kurt Driessens[1]

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Joona Neuvonen[1]

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Anna Clark[1], Alexandra Clarke-Cornwell[1], Anna Cooper-Ryan [1], Stephen Preece[1], Tamara Brown[1]

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P1.2.28 - EXPLORING THE FEASIBILITY OF COMMERCIAL LARGE LANGUAGE MODELS FOR SEMANTIC TAGGING OF HEALTH COACH MESSAGES

Ethan Rogers[1], Deigo Arguello[2], Quinn Anderson-Song[1], Dinesh John[1,3]

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P.1.3.29 - EXPLORING THE RELATIONSHIP BETWEEN PAIN AND PHYSICAL ACTIVITY IN THE REAL WORLD ON PEOPLE WITH MULTIPLE SCLEROSIS

Serena Moscato[1], Marcello Sicbaldi[1], Pozzi Stefania[2], Loredana Sabattini[3], Giada Lullini[3], Fabio La Porta[3], Lorenzo Chiari[1], Silvia Orlandi[1]

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P1.3.30 - STABILITY OF SLEEP PATTERNS AMONG BREAST CANCER PATIENTS UNDERGOING NEOADJUVANT CHEMOTHERAPY

Pedro Saint-Maurice[1], Carla Malveiro[1], Ines Correia[2], Leonor Matos[1], Maria Joao Cardoso[3], Luis Sardinha[2]

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P1.3.31 - THE INTRODUCTION OF AN ADJUSTABLE UPPER LIMB PROSTHETIC SOCKET SYSTEM INTO A UGANDAN CLINICAL SERVICE

Nicolaas Pickard[1], Laurence Kenney[1], Lauren Gracey-Mcminn[1], Malcom Granat[1], Robert Ssekitoleko[2], Benedict Mulindwa[2], Alix Chadwell[3]

[1]University of Salford, [2]Makerere University, [3]University of Southampton

P1.3.32 - FREE-LIVING PHYSICAL BEHAVIORS IN CHRONIC POST-STROKE ADULTS WITH APHASIA

Emily Van Horn[1], Albert Mendoza[1], Jennifer Sherwood[1], Michelle Gravier[1]

[1]California State University, East Bay

P1.3.33 - PHYSICAL ACTIVITY MONITORING OF CHILDREN AND ADOLESCENTS WITH DISABILITIES: FINDINGS AND EXPERIENCES FROM FALLA STUDY

Janne Kulmala[1], Kati Karinharju[2], Tuomas Kukko[1], Tuija Tammelin[1], Piritta Asunta[1]

[1]Jamk University of Applied Sciences, [2]Satakunta University of Applied Sciences

P1.3.34 - PHYSICAL ACTIVITY INTO CANCER CACHEXIA MANAGEMENT: RECOMMENDATIONS AND BENEFITS ?

Romane Peyrachon[1], Cindy Richard[2], Brigitte Gelein[3], Nathalie André[4], Karl Chaory[2], Amélie Rébillard[1]

[1]University of Rennes, [2]SPORMED, [3]Université de Rennes, [4]University of Poitiers

P1.3.35 - CLOSING THE GAP BETWEEN LAB AND REAL-WORLD: TRANSLATING OUTCOMES OF GAIT INTERVENTIONS IN PARKINSON'S DISEASE

Charlotte Lang[1], Navrag Singh[1], Jaap van Dieën[2], Matthew Brodie[3], Walter Maetzler[4], Julius Welzel[4], Deepak Ravi[1]

[1]ETH Zurich, [2]Vrije Universiteit Amsterdam, [3]University of New South Wales, [4]University Hospital Schleswig-Holstein

P1.3.36 - DIGITAL MEASURES OF TURNING IMPAIRMENTS DURING DAILY LIFE IN RETROSPECTIVE FALLERS WITH PARKINSON'S DISEASE: MULTILEVEL MODEL APPROACH

Vrutangkumar Shah[1], Robin Baudier[1], Carla Batista[1], Pablo Burgos[1], Anjanibhargavi Ragothaman[1], Patricia Carlson-Kuhta[1], Jodi Lapidus[1], Fay Horak[1], Martina Mancini[1]

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P1.3.37 - OBJECTIVELY-MEASURED MODERATE-TO-VIGOROUS PHYSICAL ACTIVITY IN CHRONIC POST-STROKE ADULTS WITH APHASIA

Albert Mendoza[1], Jennifer Sherwood[1], Michelle Gravier[1]

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P1.3.38 - DAILY LIVING GAIT AND PHYSICAL ACTIVITY METRICS CAN IDENTIFY PEOPLE WITH MULTIPLE SCLEROSIS WHO EXPERIENCE TRAIT AND STATE PHYSICAL FATIGUE.

Irina Galperin[1], Amit Salomon[2], David Buzaglo[2], Jeffrey Hausdorff[2]

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Poster Session #2
Thursday, June 20
12:45-2:00pm

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Grainne Hayes[1], Susan Giblin[1], Ciara Murray[1], Alan Donnelly[1], Clodagh O Gorman[1]

[1]University of Limerick

P2.4.41 - CHARACTERIZING THE IMPACT OF ActiGraph's IDLE SLEEP MODE ON FREE-LIVING NOCTURNAL SLEEP PARAMETERS

Samuel Lamunion[1], Robert Brychta[2], Lindsey Smith[2], Asuka Ishihara[2], Antoinette Rabel[2], Ranganath Muniyappa[2], Kong Chen[3]

[1]National Institutes of Health, [2]National Institute of Diabetes, Digestion, and Kidney Disease, [3]National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health

P2.4.42 - DOES THE PLACEMENT MATTER? COMPARISON OF ActiGraph CentrePoint INSIGHT WATCHES WORN ON DOMINANT AND NON-DOMINANT WRISTS IN FREE-LIVING ENVIRONMENTS

Daehyoung Lee[1], Haley Voermans-Dean[2], Jung Eun Lee[2], Gregory Dominick[1]

[1]University of Delaware, [2]University of Minnesota

P2.4.43 - AGREEMENT BETWEEN WRIST-WORN TDK SILMEE W22 AND WAIST-WORN ACTIGRAPH WGT3X-BT FOR ESTIMATING DAILY ACCUMULATION OF STEPS AND TIME SPENT IN MODERATE TO VIGOROUS PHYSICAL ACTIVITY IN ADULTS UNDER FREE-LIVING SETTINGS

Hiroko Shimura[1], Shinpei Okada[2], Kaori Daimaru[1], Naoki Deguchi[1], Shuichi Awata[1], Hiroyuki Sasai[1]

[1]Tokyo Metropolitan Institute for Geriatrics and Gerontology, [2]Physical Education and Medicine Research Foundation

P2.4.44 - AGREEMENT OF COMMON LINEAR POSITION TRANSDUCERS MEASURING MEAN AND PEAK VELOCITIES DURING A BELT SQUAT

Blake Murphy[1], Mitchel Magrini[1], Jacob Siedlik[1], Kelley Hammond[1], Devon Stoffel[1], Rashelle Hoffman[1]

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P2.4.45 - IMPACT OF VARYING ACCELEROMETER EPOCH LENGTH ON PHYSICAL ACTIVITY PATTERNS IN ADULTS: CONSIDERATIONS FOR PUBLIC HEALTH

Rayane Haddadj[1], Charlotte Verdot[2], Benoît Salanave[3], Valérie Deschamps[3], Jeremy Vanhelst[4]

[1]Norwegian University of Science and Technology, [2]Santé publique France, The French Public Health Agency, [3]The French Public Health Agency, [4]Center of Research in Epidemiology and Statistics (CRESS)

P2.4.46 - AUTOMATED GAIT DETECTION FROM A WRIST-WORN ACCELEROMETER IN OLDER ADULTS USING SELF-SUPERVISED LEARNING

Yonatan Brand[1], Felix Kluge[2], Luca Palmerini[3], Clemens Becker[4], Andrea Cereatti[5], Walter Maetzler[6], Beatrix Vereijken[7], Alison Yarnall[8], Lynn Rochester[8], Silvia Del Din[8], Kamiar Aminian[9], Arne Mueller[2], Jeffrey Hausdorff[10], Or Perlman[1]

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P2.4.47 - CAN IMU BASED GAIT CLASSIFICATION ALGORITHMS CLASSIFY GAIT AMONG OTHER DAILY LIFE ACTIVITIES?

Michelle Van Mierlo[1], Katrijn Smulders[1], Noel Keijsers[2]

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P2.4.48 - ESTIMATING GAIT SPEED FROM WRIST- AND ANKLE-WORN SENSORS

Hoan Tran[1], Dinesh John[2,3], Stephen Intille[3]

[1]PhD Student, [2]National Institute on Aging, [3]Northeastern University

P2.4.49 - PREDICTION OF RESISTANCE TRAINING EXERCISES USING ACCELEROMETER AND GYROSCOPE SENSORS

Brett Davis[1], Jake Melaro[1], Nicholas Remillard[1], Scott Conger[2], Scott Crouter[1]

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P2.4.50 - ACCURACY OF PERSONALLY OWNED WEARABLE ACTIVITY MONITORS FOR ESTIMATING VO2MAX

Lindsay Toth[1], Andrew Gomez[1], Hanadi Hamadi[1]

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P2.5.51 - FACILITATING USE OF THE INTENSITY GRADIENT ACROSS COMMONLY DERIVED ACCELEROMETER ACTIVITY METRICS: A LABDA (LEARNING NETWORK FOR ADVANCED BEHAVIOURAL DATA ANALYSIS) PROJECT

Henrik Eckmann[1], Cameron Razieh[1], Sebastien Chastin[2], Lauren Sherar[3], Bjørge Hansen[4], Alex Rowlands[1]

[1]University of Leicester, [2]Glasgow Caledonian University & Ghent University, [3]Loughborough University, [4]University of Agder

P2.5.52 - IMPROVING WEARABLE-BASED DETECTION AND CLASSIFICATION OF 24H PHYSICAL BEHAVIOURS AND HEART RATE: PROTOCOL FOR THE GENERATION OF AN ACCESSIBLE GROUND-TRUTH VALIDATION DATASET CONSISTING OF OVER 10,000 HOURS OF ANNOTATED DATA

Benjamin Maylor[1], Scott Small[1], Stefan Van Duijvenboden[1], Tatiana Plekhanova[1], Rachel Sharman[1], Elizabeth Hill[1], Fredrik Karpe[1], Simon Kyle[1], Aiden Doherty[1]

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P2.5.53 - ESTIMATING ENERGY EXPENDITURE BY USING FLOOR VIBRATION MONITORING TECHNOLOGY IN BEDROOM SETTINGS

Yuki Nakajima[1], Nobuhisa Motooka[1], Yuji Ohta[1], Julien Tripette[1]

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P2.5.54 - TO CORRECT OR NOT TO CORRECT AN AUTOMATED TIME IN BED ALGORITHM? - A COMPARISON OF SITTING TIME ESTIMATES USING TWO DATA PROCESSING METHODOLOGIES

Charlotte Edwardson[1], Stacy Clemes[2], Melanie Davies[1], David Dunstan[3], Malcolm Granat[4], Benjamin Maylor[1], Gemma Ryde[5], Tom Yates[1], Alexandra Clarke-Cornwell[4]

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P2.5.55 - DEMOCRATIZING HUMAN MOVEMENT MONITORING THROUGH GNSS DATA INTEGRATION: A PILOT STUDY ON THE POTENTIAL OF OPEN-SOURCE INFRASTRUCTURE FOR SCALABLE AND AFFORDABLE MOVEMENT MONITORING

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P2.5.56 - VALIDITY OF ACCELEROMETER DEVICES AND METHODS USED IN EPIDEMIOLOGICAL STUDIES ON ASSOCIATION BETWEEN PHYSICAL ACTIVITY BOUT DURATION AND HEALTH OUTCOMES: A SYSTEMATIC REVIEW

Adrien Chanteau[1], Guillaume Mahé[1], Alexis Le Faucheur[1]

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P2.5.57 - VALIDITY OF ACCELEROMETER DEVICES AND METHODS IN THE ASSESSMENT OF DAILY-LIFE WALKING BOUTS

Adrien Chanteau[1], Guillaume Mahé[1], Alexis Le Faucheur[1]

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P2.5.58 - ACUTE MICROVASCULAR CHANGES IN THE LOWER LEG FROM SEATED PEDALING WHILE PLAYING VIDEO GAMES

Nicholas Lerma[1], Madalyn Hickey[1], Macey Dunn[1]

[1]Grand Valley State University

P2.5.59 - CHARACTERISING A NOVEL DIGITAL BIOMARKER OF PHYSICAL PERFORMANCE, THE PEAK TWO-MINUTE STEP COUNT, IN A WORKING AGE POPULATION

Craig Speirs[1]

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P2.6.60 - TEST-RETEST RELIABILITY AND CONCURRENT VALIDITY OF IMU SENSOR-BASED KINEMATIC METRICS DURING UPPER LIMB EXERCISES IN STROKE PATIENTS.

A.J. Nienja Langerak[1], S.L. Roux[2], Ruben Regterschot[1], Ruud Selles[3], G.M. Ribbers[1], C.G.M. Meskers[4], B.J.F. Van Beijnum[5], Johannes Bussmann[1]

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P2.6.61 - A MOBILE HEALTH BIOFEEDBACK SYSTEM FOR POSTURAL REHABILITATION OF PERSONS WITH PARKINSON'S DISEASE

Ilaria D'ascanio[1], Luca Palmerini[1], Chiara Pirini[1], Silvia Imbesi[2], Carlo Tacconi[3], Ilaria Cani[4], Luca Baldelli[4], Giulia Giannini[4], Giuseppe Mincolelli[2], Lorenzo Chiari[1], Giovanna Lopane[4]

[1]*University of Bologna,* [2]*University of Ferrara,* [3]*mHealth Technologies s.r.l.,* [4]*IRCCS Istituto delle Scienze Neurologiche di Bologna*

P2.6.62 - COMPARING MINIMUM FOOT CLEARANCE WITH FOUR FOOT-ANKLE PROSTHESES DURING UNSUPERVISED NEIGHBORHOOD WALKS RECORDED IN EVERYDAY LIVING

Katherine Heidi Fehr[1], Yisen Wang[1], Jennifer Bartloff[1], Peter Adamczyk[1]

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P2.6.63 - INSTRUMENTED TIMED TANDEM GAIT ACUTELY AFTER MILD TRAUMATIC BRAIN INJURY

Cecilia Monoli[1], Amanda Morris[2], Regan Crofts[1], Christina Geisler[1], Tessa Petersell[1], David Quammen[1], Adam Hollien[1], Lee Dibble[1], Peter Fino[1]

[1]*University of Utah,* [2]*California State University*

P2.6.64 - CO-DESIGNING A NOVEL AND PERSONALISED SMARTPHONE APP TO REDUCE FALLS IN PARKINSON'S DISEASE

Peter Mcmeekin[1], Conor Wall[1], Victoria Hetherington[2], Richard Walker[3], Alan Godfrey[1]

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P2.6.65 - ADVANCING PROSTHETIC PRESCRIPTIONS: DEVELOPING A SENSOR-BASED SYSTEM FOR OBJECTIVE ACTIVITY ASSESSMENT

Matthew Wassall[1], Malcolm Granat[1], Sibylle Thies[1], Saeed Zahedi[2]

[1]*University of Salford,* [2]*Blatchford Prosthetics*

P2.6.66 - THE ASSOCIATION OF LATENT CLASS ACCELEROMETRY PATTERNS WITH INCIDENT AND FATAL CANCER: THE WOMEN'S HEALTH ACCELEROMETRY COLLABORATION

Kelly Evenson[1], Annie Green Howard[2], Fang Wen[2], Chongzhi Di[3], Humberto Parada Jr.[4], Michael Lamonte[5], Andrea Lacroix[6], I-Min Lee[7]

[1]*University of North Carolina,* [2]*University of North Carolina - Chapel Hill,* [3]*Fred Hutchinson Cancer Research Center,* [4]*San Diego State University,* [5]*State University of New York at Buffalo,* [6]*University of California, San Diego,* [7]*Brigham and Women's Hospital*

P2.6.67 - FREE-LIVING GAIT CADENCE ESTIMATED FROM WRIST-WORN ACCELEROMETERS CAN TRACK SEVERITY OF PARKINSON'S DISEASE

Emily Redington[1], Danni Tu[1], Darrian Rice[1], Rolando Acosta[1], Jacek Urbanek[1]

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P2.6.68 - HOW TO GAIN INSIGHTS INTO MENTAL HEALTH USING WEARABLE TECHNOLOGIES AND MACHINE LEARNING: A SYSTEMATICAL REVIEW

Simon Woll[1], Ulrich Ebner-Priemer[1], Marco Giurgiu[1]

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P2.6.69 - UNDERSTANDING SPECIFIC PROXEMICS TO PROMOTE MOBILITY IN POWER WHEELCHAIR : A STUDY OF PEDESTRIAN-CHAIR AVOIDANCE IN REAL LIFE AND IN VR

Emilie Leblong[1], Fabien Grzeskowiak[2], Sébastien Thomas[3], Louise Devigne[2], Bastien Fraudet[4], Marie Babel[2], Anne-Hélène Olivier[2]

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P.2.7.70 - VERIFICATION AND VALIDATION OF THE EMPATICA EMBRACEPLUS FOR INERTIAL SENSOR-BASED GAIT ANALYSIS AT MULTIPLE SENSOR LOCATIONS

Rossella Indaco[1], Matteo Serafino[1], Manuela Galli[2], Veronica Cimolin[2], Serena Cerfoglio[2], Teo Bistoni[1], Massimo Grillo[1], Davide Ariberto Domenico Cassani[1], Domenico Ruben Pangallo[1], Umberto Mazzucchelli[1], Ludovica Nestore[1], Jessie Lever Taylor[3], Marisa Cruz[3], Giulia Regalia[1], Simone Tognetti [1]

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