



Exercise Isn't Everything: How to spend the other 23 hours of day for better cardiometabolic health?

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Northern Finland Birth Cohort 1966

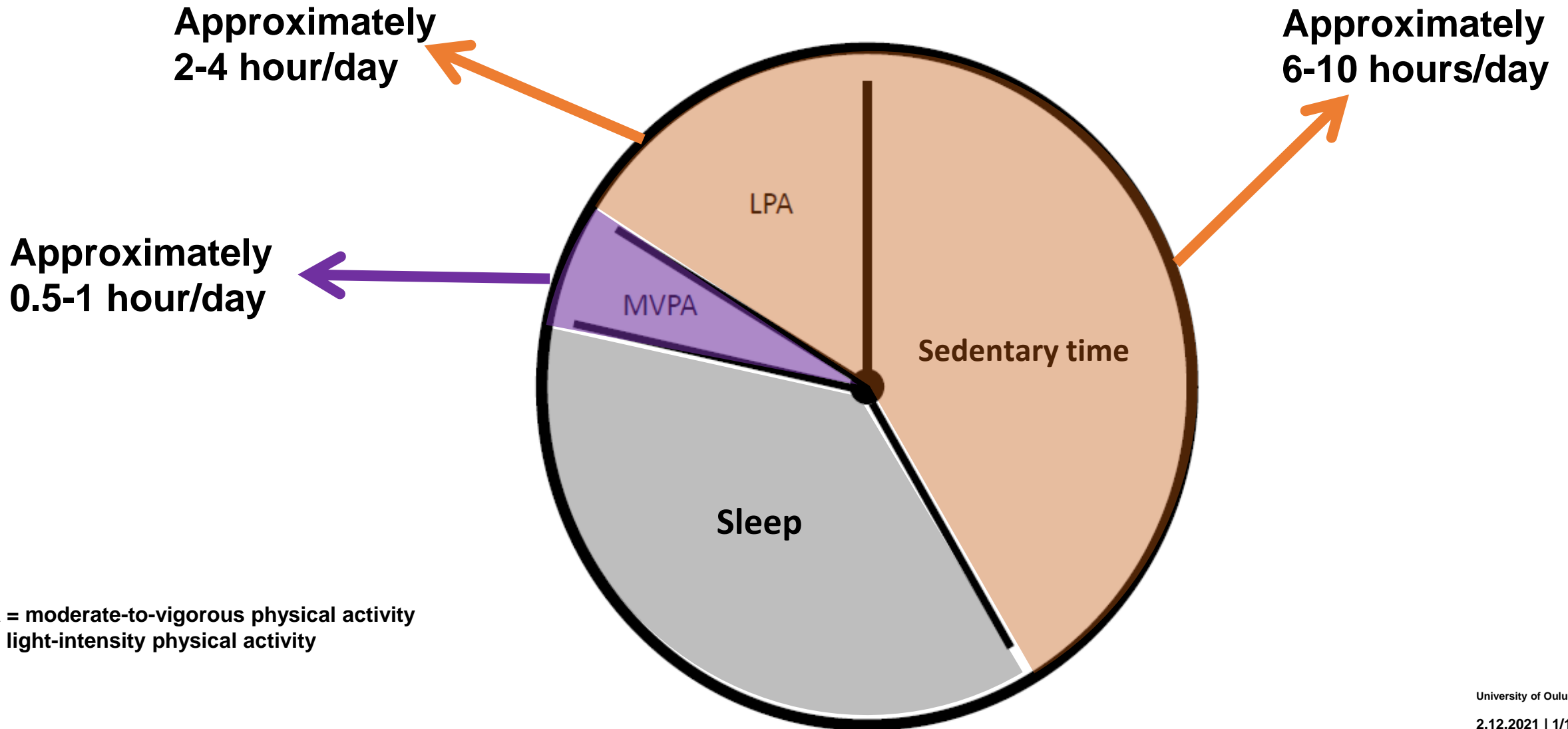


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Typical 24-hour movement and non-movement behavior profile in adults



MVPA = moderate-to-vigorous physical activity
LPA = light-intensity physical activity



All movement and non-movement behaviors across a 24-hour cycle matter, and may be related to cardioembolic health.

7-9 hours per night

150-300 minutes per week

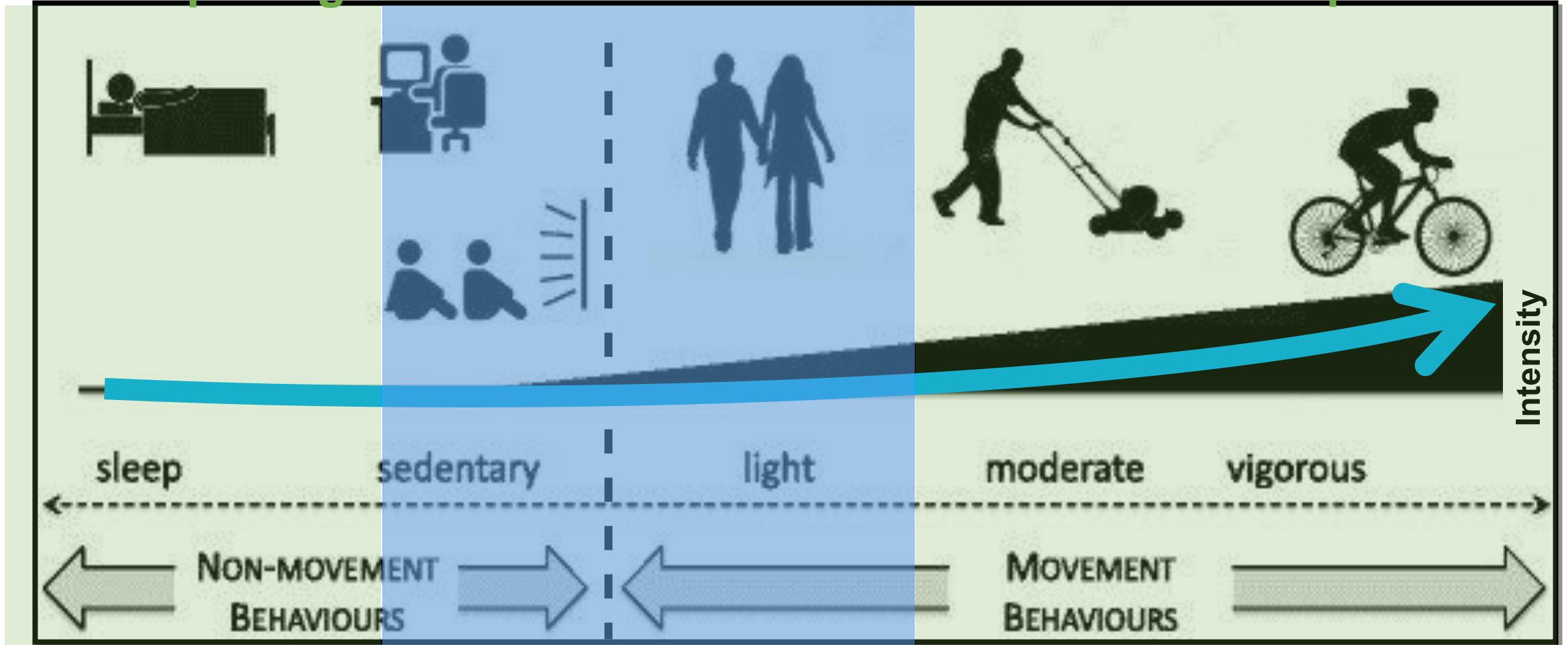


Image: The 24-Hour Activity Cycle: A New Paradigm for Physical Activity, Med & Sci in Sports & Exerc, Rosenberger et. al. 2019.



Recommendation for sedentary time and light-intensity physical activities

LIMIT

the amount of time spent being sedentary



REPLACE

with more physical activity of any intensity (including light intensity).



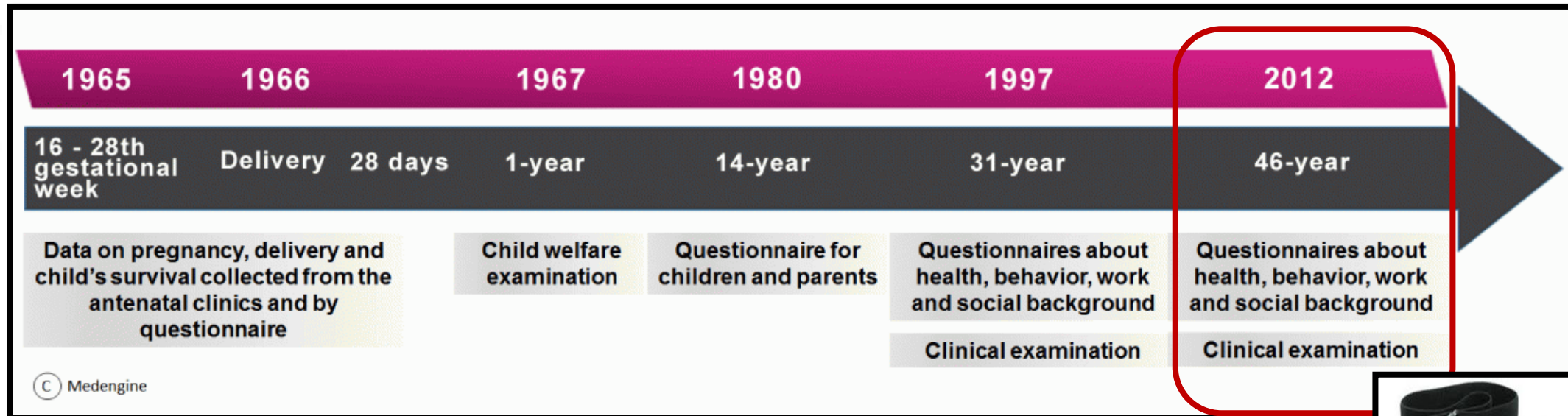
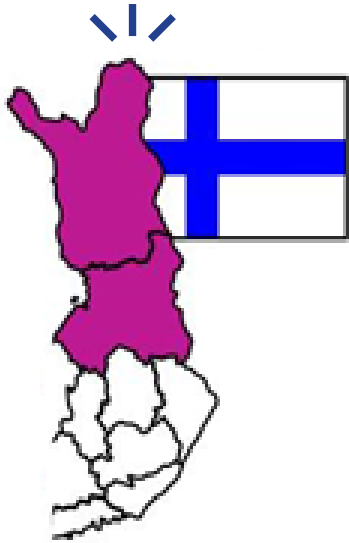
Strong recommendation, moderate certainty evidence based on WHO Guidelines On Physical Activity And Sedentary Behavior.



Our studies explored:

- How composition of time-use during the 24-hour day is associated with cardiometabolic health markers?
- When sedentary time should be interrupted before it becomes detrimental to cardiometabolic health?
- What are the potential cardiometabolic health benefits of light-intensity physical activities?

Study material: Northern Finland Birth Cohort 1966 (NFBC1966)



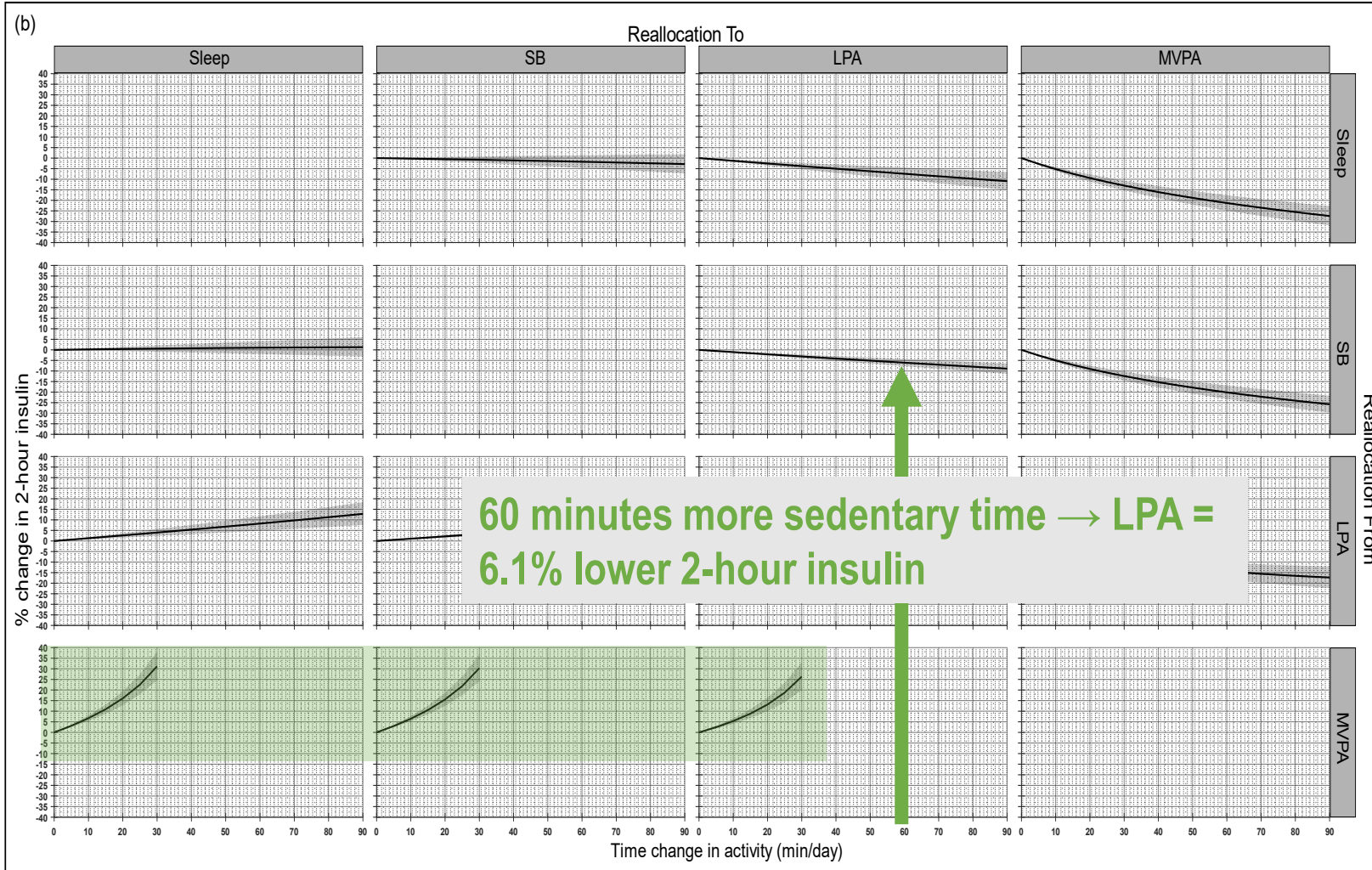
Device-based measurement of daily activities for two weeks with a hip-worn accelerometer.



Data used in our studies:

- **Participants:** A total of 5,861 cohort members participated in the 46-year follow-up and wore the accelerometer.
- **Measurement of daily activities:** Data from the accelerometer was used to obtain estimates of levels and patterns of sedentary time, light-intensity physical activity (LPA), and moderate-to-vigorous physical activity (MVPA).
- **Cardiometabolic health markers:** Adiposity levels, fasting blood glucose and insulin, and cholesterol profiles.

Compositional Associations of Sleep and Activities within the 24-h Cycle with Markers of Cardiometabolic Health



Objective:

- To examine the codependent relationships between mutually exclusive movement and non-movement behaviors across a 24-hour day and cardiometabolic health markers.

Methods:

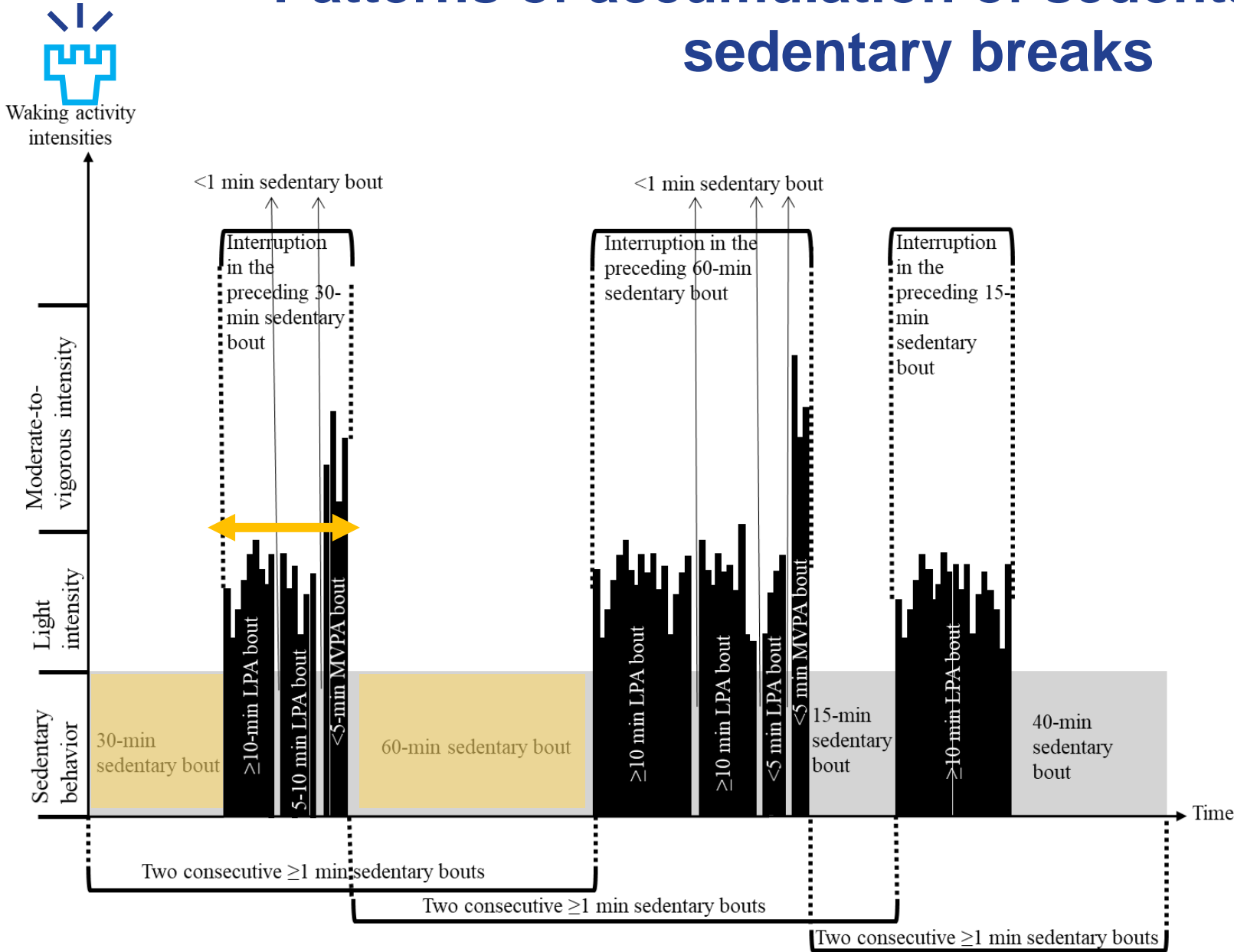
- Time spent in daily activities from the accelerometry, combined with self-reported sleep duration.

Farrahi et. al, Med & Sci Sports Exerc; 2020

Differences in 2-hour post glucose load insulin associated with theoretical pairwise time reallocations among the 24-hour movement and non-movement behaviors.

SB = sedentary behavior; LPA = light physical activity; MVPA = moderate-to-vigorous physical activity.

Patterns of accumulation of sedentary time and sedentary breaks



Objective:

- To identify profiles according to distinct accumulation patterns of sedentary time and sedentary breaks.

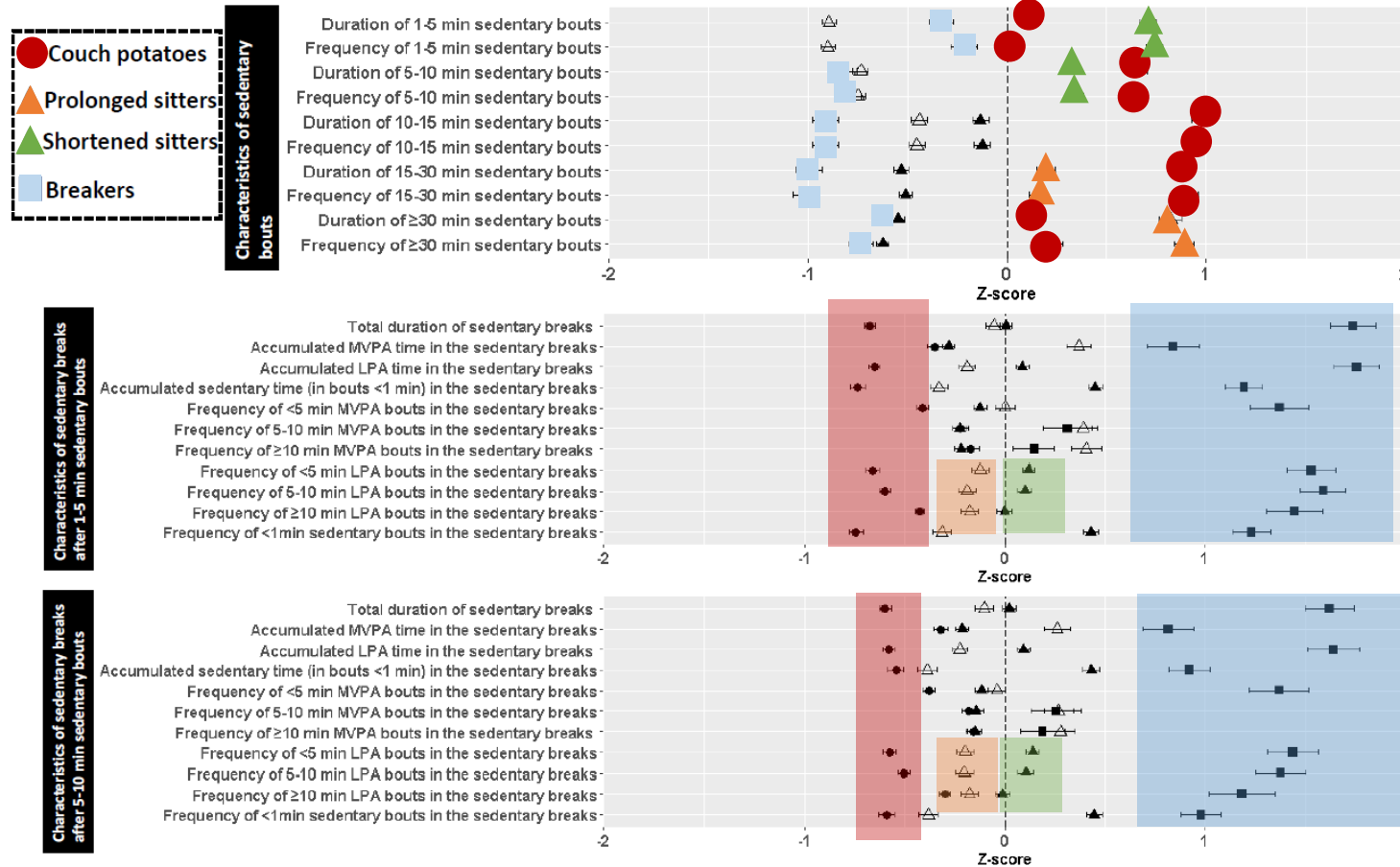
Methods:

- K-means clustering with 65 variables representing how sedentary time was accumulated and interrupted.
- Linear regression to determine the association of profiles with cardiometabolic health markers.

Farrahi et. al, Scand J Med Sci Sports; 2020

Schematic representation of how sedentary bouts and sedentary breaks were defined and identified.

Sedentary time, sedentary breaks, and cardiometabolic health markers



- **‘Couch potatoes’**: the highest level of sedentariness and the shortest sedentary breaks. ← **unhealthiest profile.**
- **‘Prolonged sitters’**: accumulated sedentary time in bouts lasting for ≥15–30 minutes
- **‘Shortened sitters’**: sedentary time in bouts lasting <15 minutes, and more light-intensity sedentary breaks.
- **‘Breakers’**: the lowest level of sedentariness, and most frequently interrupted their sedentary time with LPA and MVPA.

Regression analysis:

- **‘Prolonged sitters’** had no differences in cardiometabolic outcomes compared to **‘Couch potatoes’**.
- **‘Shortened sitters’** and **‘Breakers’** both had better cardiometabolic health compared to **‘Couch potatoes’**.
 - 1.1–25.0% lower values in the cardiometabolic health outcomes, compared to **Couch potatoes**

Figure shows Z-scores with 95% confidence intervals of the variables characterizing how sedentary time was accumulated and interrupted among the four distinct groups of participants.

SED=sedentary, LPA=light-intensity physical activity, MVPA=moderate-to-vigorous physical activity



Joint profiles of sedentary time and physical activity intensities

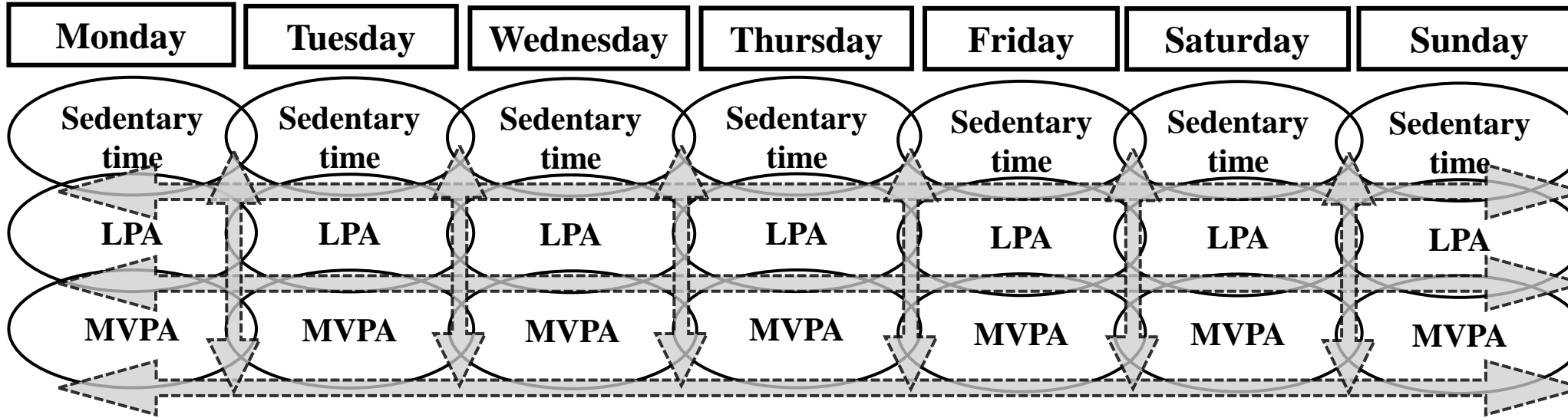


Figure shows the potential interrelationships among the level of activities within a given day as well as other days during the week.

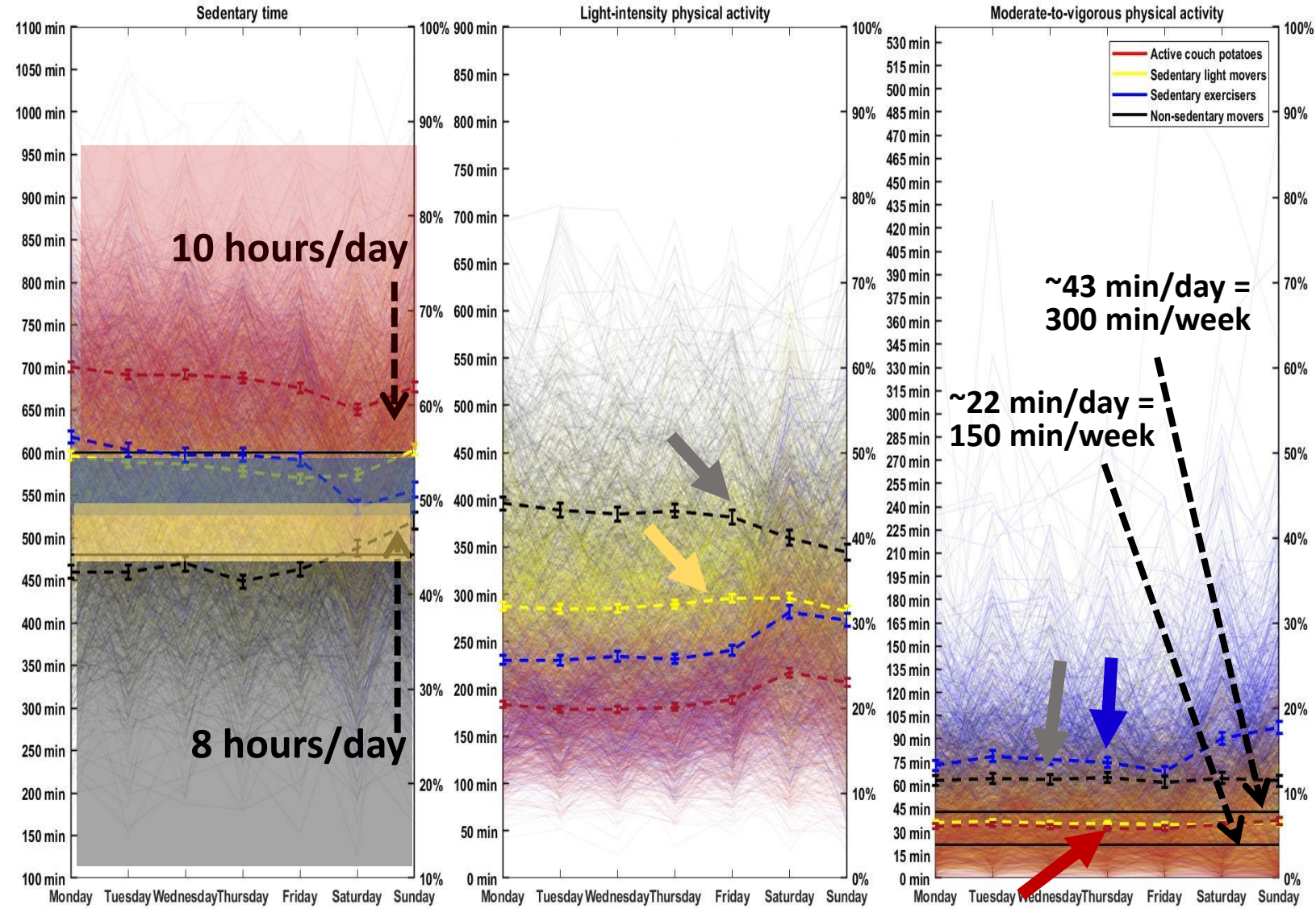
Objective:

- To create joint sedentary time and physical activity profiles.

Methods:

- A 2-way machine-learning-based clustering was applied to trajectories of sedentary time, LPA, MVPA across one full week.
- Linear regression was used to determine the association of joint profiles with cardiometabolic health markers.

Joint profiles of sedentary time and physical activity intensities and their association with cardiometabolic health



- **‘Active couch potatoes’** spent much of their time in sedentary but were physically active. ← unhealthiest profile.
- **‘Sedentary light movers’** and **‘Sedentary exercisers’** spent comparable time in sedentary.
- **‘Non-sedentary movers’** had the lowest level of sedentariness, and spent more time in LPA and MVPA.

Regression analysis:

- **‘Sedentary light movers’**, **‘Sedentary exercisers’**, and **‘Non-sedentary movers’** all had better cardiometabolic health compared to **‘Active couch potatoes’**.
- 1.0%–22.7% lower values in the cardiometabolic health outcomes, compared to **Active couch potatoes**

Sedentary time, light-intensity physical activity, and moderate-to-vigorous physical activity across the seven days of the week by cluster groups.



Towards balancing the 24-hour day for better cardioembolic health

- **MVPA is the most potent health-enhancing movement intensity.**
 - In addition to MVPA, the levels and patterns of sedentary time and light-intensity physical activity also explain the differences in adults' cardiometabolic health, after accounting for sleep duration and MVPA time.
- **Replacing sedentary time with any physical activities at light intensity upwards could be beneficial for cardiometabolic health.**
- **Limiting sedentary time to 15-30 minutes with light-intensity sedentary break may be a good practice for having a healthier 24-hour day.**

Thanks for your attention!



Northern Finland Birth Cohort 1966



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