

A Simple and Affordable Way to Monitor 24-hour Physical Activity Patterns with Consumer Wearables

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0 Purpose

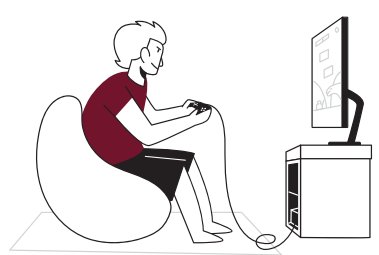
Physical activity (PA) – an essential factor in the prevention of diseases (cardiovascular disease, diabetes, colon cancer).^[1–2]

PA positively influences the level of mental health, delays the onset of dementia.^[3–4]



Studies confirmed that many people do not follow PA recommendations.^[7–9]

Therefore, it is necessary to find out the parts of the day in which PA is neglected, and target these parts with PA interventions leading to an overall increase of the daily volume of PA → healthier population.



Sedentary behavior (SB) – associated with an increased incidence of cardiovascular disease, cancer → mortality.^[5–6]

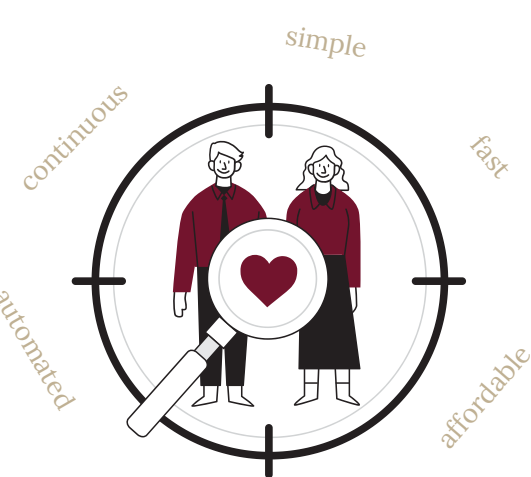
Therefore, it is clear that supporting PA and promoting PA recommendations is crucial.

These facts lead to the need to simply and efficiently monitor the 24-hour PA behavior of individuals.



Our 24-hour PA behavior monitoring and transformation process

1 Aim



24-hour PA behavior monitoring with precise time accuracy

2 Requirements

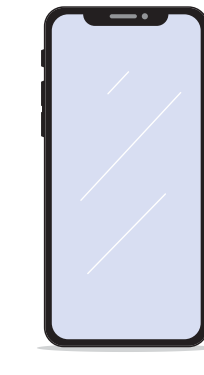
- affordable & available
- 1-min step counts, heart rate
- 14+ days battery & memory

waterproof



Mi Band
Xiaomi

sync
multiple wearables
50:1



Gadgetbridge^[9]
Android device

- cloudless (GDPR ready)
- open-source
- supports multiple brands

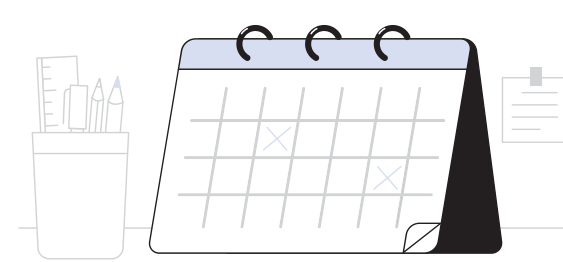
3 Monitoring

Distribute fitness bands with battery chargers to individuals for 14 days.

4 Sync

Synchronize bands one by one in the Gadgetbridge app. With one click, export all data to a database file (SQL).

5 Transformation



Parts of the day annotation

based on the school timetable

- before school
- in school
- after school



Intensity transformation

based on the steps per minute^[10]

- 0 sedentary behavior
- <100 light PA
- ≥100 moderate PA
- ≥130 vigorous PA

6 Analysis



- volumes (day, week...)
- recommendations^[11] (daily, segmental...)
- clustering^[12] (early bird, night owl...)

7 Collaboration

If you require any further information, feel free to contact: josef.heidler@ujep.cz

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