Physical activity, sleep and cognitive function
Clinical pilot study on crowd-sourced mHealth for cognitive rehabilitation
Background

We have known for long that sleep, physical activity and cognitive function are related in complex ways. Until now, most of the existing clinical evidence has been gathered through years of observational studies in sleep clinics and in controlled settings. The latest generation of smart watches from Withings, together with their sleep tracker, enable us to observe sleep patterns and physical activity in an objective matter at home. For the first time, these are studied in real-life settings by using logged data, 24/7 observations, and long time-spans – something that was unconceivable before smartphones and wearables made their ways into our lives.
Clinical setup

Exploring the relation between physical activity, sleep, and cognitive function, the study was carried out over a period of six months in 2017. The participants shared their individual health and lifestyle data, leading to a collected 11,232 days of data.

54 participants with scores between 17-27 on the Montreal Cognitive Assessment (MoCa) test were included.

More than 51,000 hours of sleep were monitored with the Withings Aura - Smart Sleep System for monitoring sleep quality.

More than 32,470,000 steps over the study period of six months were tracked with the Withings Steel HR watch.
Preliminary results

Across the six months of study, results show a positive association between Montreal Cognitive Assessment (MoCA) scores at baseline and average number of daily steps, average daytime heart rate, and average time to fall asleep. Individually, there was not a significant association between average daily steps and average sleep duration (neither REM, deep, nor total). Daily steps were associated both with REM sleep duration and the total sleep duration for the night following.

Sleep monitoring included detection of

- Time-to-fall asleep
- Light sleep
- Deep sleep
- Rapid Eye Movement (REM) sleep
- Time to get up

Figure 1. There is a positive association between individual average daily steps and baseline MoCa score.
The team

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