Introduction: The amount of physical activity (PA) of working-age people has dropped and the resulting poor physical condition is becoming a threat to their working ability, health and well-being. Occupational rehabilitation courses can promote people’s working ability and health and encourage them towards more active lifestyles. The aim of this study was to compare heartbeat and movement based methods in analyzing the duration and intensity of PA during rehabilitation days.

Methods: The subjects were 12 women and 7 men from two ASLAK® rehabilitation courses at Peurunka Rehabilitation Center in Finland. Their age was 48.2±5.3 years, BMI 26.9±3.8 and VO2max 33.1±6.8 ml/kg/min. They were monitored for four days over a 1-year period, from 8 am to bedtime, using Suunto t6 heartbeat or Alive ECG monitors, Actiwatch movement sensors on the right ankle and activity diaries. After excluding heartbeat measurements with >20% of artifact, 49 days (2-4 days/person) were accepted for further analysis. Heart rate (HR), oxygen consumption (VO2) and intensity of PA as percent of VO2max (%VO2max) were analyzed with Firstbeat PRO heartbeat analysis software (FBT-PRO; www.firstbeattechnologies.com) and movement with Actiwatch activity monitoring system®. Within-subject correlations between the 1-min heartbeat (HR, VO2) and movement (counts per minute) based variables during the day were calculated with Pearson correlation coefficient.

Results: During the studied rehabilitation days there was (mean±SD) 60±51 min of light PA (20-30% VO2max), 48±35 min of health-enhancing PA (30-50% VO2max) and 30±23 min of fitness-enhancing PA (>50% VO2max) per day. The corresponding movement counts were 1118±628, 2092±939 and 2723±1473. In general, the minute-by-minute movement counts and corresponding HR and VO2 values during the day correlated well with each other (counts vs. HR: r=0.57±0.09, range 0.35-0.73 and counts vs. VO2: r=0.58±0.09, range 0.32-0.70; p<0.001). However, the movement counts remained low during biking and rowing, even when HR and VO2 suggested moderate or hard exercise. On the other hand, the movement counts were high during walking despite the HR and VO2 values remaining low with some individuals.

Conclusions: On average, the rehabilitation day included well over two hours of PA, but for some people, the duration and intensity of PA was too low to provide health- or fitness-enhancing effects. The correlation between movement and heartbeat based data was good overall, but a closer look at specific events (e.g. biking or walking) demonstrated some differences between the two methods. Movement counts can differentiate between active and passive movements and days, but they do not tell about the health- or fitness-enhancing intensity of exercise and might under- or overestimate the actual amount of exercise. Heartbeat based PA analysis with FBT-PRO provides detailed information about the duration, intensity and health- and fitness-enhancing effects of exercise.

Keywords: Methodology, Physical Activity