

## **Abstract**

**Title:** Using wearables to monitor physical activity

**Objectives:** The aim of this study is to assess the validity of the Fitbit Charge 5 compared to the ActiGraph wGT3x–BT for the assessment of physical activity (steps, time spent in moderate physical activity, vigorous physical activity and moderate to vigorous physical activity) in adults.

**Methods:** The Fitbit Charge 5 commercial physical activity monitor was compared to the ActiGraph wGT3x–BT under daily living conditions. Healthy adults (n=32) wore both devices in a 7-day field study. Data were analyzed based on days for steps, minutes of moderate physical activity, minutes of vigorous physical activity and minutes of moderate to vigorous physical activity. Pearson's correlation coefficient and Bland-Altman plot were used to assess the correlation between the Fitbit Charge 5 device and the criterion. Mean percentage error (MPE) and mean absolute percentage error (MAPE) were calculated to assess differences.

**Results:** The Fitbit Charge 5 had a very strong correlation ( $r = 0,94$ ; 95% CI 0,92–0,96) on the step measurement with criterion. The MAPE value was 23%. A weak correlation with respect to the criterion was demonstrated for the measured physical activity of moderate intensity ( $r = 0,33$ ; 95% CI 0,27–0,39). For vigorous physical activity a moderate correlation was found ( $r = 0,45$ ; 95% CI 0,39–0,51). Similarly, a moderate correlation ( $r = 0,49$ ; 95% CI 0,44–0,56) with the criterion was found for the combination of physical activity of moderate to vigorous intensity.

**Keywords:** Fitbit, ActiGraph, physical activity, MVPA, step count, validity