Exploring the association between wearable device metrics and frailty syndrome in community-dwelling older adults

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Purpose Frailty Syndrome (FS) assessment is pivotal for identifying older individuals who would benefit from comprehensive gerontological evaluations (Turner et al. 2014). Wearable devices have emerged as a promising tool for monitoring FS in this population. Our study aims to investigate whether metrics provided by smartwatches are associated with FS among community-dwelling older adults. **Method** We conducted a cross-sectional study involving older adults aged 60 years or older of both sexes. We evaluated their physical frailty phenotype based on the criteria developed by Fried et al. (2001). FS was defined as the presence of at least three of the following criteria: muscle weakness (handgrip strength < 16 kgf for women and < 26 kgf for men), slow gait (adjusted for height and sex), self-reported exhaustion, low physical activity (< 150 minutes/week), and unintentional weight loss (≥ 5 kg in the last year). Participants wore the Garmin Forerunner 245® smartwatch (Garmin, USA) continuously for seven days. We analyzed step counts (steps/day) and light sleep time (minutes/day). Multiple linear regression models were developed, including Model 1 (steps counts) and Model 2 (light sleep time), adjusted for age, chronic conditions, and educational level. **Results and Discussion** Ninety-nine older adults participated in the study, with a mean age of 68.7 ± 15.6 years. Most participants were women (n=61, 80.3%). FS was present in 23 participants (30.26%). Step counts and light sleep time did not significantly differ between frail (5420.4 ± 2673.8 steps/day; 276.9 ± 64.8 min/day) and non-frail participants (6839.4 ± 2296.4 steps/day; 249.5 ± 78.0 min/day) (p-value > 0.05). Our multiple linear regression analysis revealed that low physical activity (β = -1945.70; 95%CI: 7027.17 to 11087.06) and muscle weakness (β = -2680.32; 95%CI: -5315.90 to -44.73) were associated with step counts (Model 1 - R^2adjusted = 27.7%). These findings align with prior studies conducted by Watanabe et al. (2020) and Hsueh et al. (2019). Additionally, exhaustion was the sole FS criterion linked to light sleep time (β = 40.07; 95%CI: 3.06 to 77.08) (Model 2 - R^2adjusted = 31.3%), corroborating with Goldman et al. (2008). Our analysis revealed no significant differences in step counts and light sleep duration between frail and non-frail participants. Nonetheless, we identified a notable association between reduced step counts and factors such as low physical activity and muscle weakness, as well as a correlation between increased light sleep duration and self-reported exhaustion.

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