

Use and Satisfaction With Wearable Activity Trackers Among Community Dwelling Older People



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THE use of wearable devices for activity tracking (including exercise and fitness) has increased greatly yet there is relatively little research on the use of wearable devices among older people. This is important as older users may have different needs than younger users; their exercise and activity patterns and preferences have been reported to be different as well. The purpose of this study was to compare three existing wearable devices on measures of use (step and calorie counts) and satisfaction. This study is a secondary analysis of a larger study that tested an investigator developed device and algorithms for human activity classification.¹

Methods: Thirteen community dwelling older people from a continuing care retirement community were recruited to wear JawBone UpTM, Nike+ FuelbandTM and Fitbit FlexTM for one day from the time they awoke until they went to bed. Participants wore all three devices simultaneously as part of the testing of the investigator developed device. The devices recorded the step and calorie counts as programmed and released by the manufacturers. Falls risk assessment was done using the Missouri Alliance for Home Care (MAHC) falls risk assessment. Following the use of the devices, the System Usability Scale (SUS) was completed by the participants to determine satisfaction with the devices.

Results: The 13 participants ranged in age from 72-92 years; 6 were female. The falls risk assessment scores ranged from 2 to 7, with a mean = 3.84 and SD = 1.2. Based on the recommended MAHC cut score of 4 or higher for being at risk of falls, 11 of 13 (84.6%) participants were considered at risk for falls. The recorded number of steps and calories varied widely between the three devices. Mean step counts by device were: JawBone UpTM = 3894 (SD = 3089.8), Nike+ FuelbandTM = 2273 (SD = 1705.6) and Fitbit FlexTM = 4998 (SD = 3153). Mean calorie counts by device were: JawBone UpTM = 2107 (SD = 152.8), Nike+ FuelbandTM = 316 (SD = 136.5) and Fitbit FlexTM = 2511 (SD = 221.2). Although the bivariate correlations between the step counts were all above 0.92, there were individual differences as high as 6000 steps different at the individual participant level. There were low correlations between the calorie counts, with correlations as low as 0.39 between JawBone Up and FitBit. Correlations between falls risk and step counts ranged from -0.31 to -0.41 and between falls risk and calorie count from 0.09 to -.30; none were statistically significant although the small sample size explains the lack of statistical significance. The SUS scores ranged from 37.5 to 82.5 on a scale from 1 to 100, with higher scores indicating more satisfaction; the mean was 66.3 and SD was 11.9.

Discussion: The MAHC falls risk assessment has two sets of cut scores: 4 vs 6 (Calys, Gagnon and Jerrigan). Use of the higher cut score would result in only one of the participants being considered at risk. The wide range in step counts as measured by the device brands within each participant was surprising and may be accounted for by differences in step length, pace of walking and different sensitivities and algorithms within each device brand. There is evidence that slower walking speed affects the accuracy of step count from a tri-axial accelerometer (Cleland et al 2011) and that testing in non-laboratory environments decreases the accuracy of the devices, although there was wide variation in how much the accuracy fell (Feito 2012). To determine which of the commercial devices is most accurate requires further study to measure actual step count and step count as recorded by the devices. Performing this research with older adults with varying step lengths and walking pace would validate the findings from other research. Calorie counts were derived from the devices based on the proprietary algorithms. The calorie counts had even lower correlations and wider ranges within the same participants. This finding calls in to question whether older adults want to use the calorie counts from these devices. The participants were moderately satisfied with the devices using the SUS, perhaps from wearing all three devices simultaneously for testing the investigator-developed device.

Conclusion: Findings from the present study suggest that older adults are moderately satisfied with the wearable devices. The measure of step count indicated wide variations within some participants although the correlations between the devices were high. Further research is needed to validate the step counts and calorie tracking in community-dwelling older adults before recommendations can be made for use of these devices by home health clinicians. While fitness devices are important technological supports for measuring physical activity, it is not clear whether these devices will meet the needs of community-dwelling older adults.

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