

Objectively Measured Physical Activity Varies by Task and Accelerometer Location in Younger and Older Adults

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Assessing physical activity with accelerometers has become common in research; however, most accelerometer validation studies have been performed using treadmills and young, healthy individuals. Treadmills alter stride length and step cadence and have been shown to exacerbate balance difficulties in older adults. Thus, movement difference between young and old when walking on a treadmill could lead to inaccurate representation of physical activity detected by accelerometers. **PURPOSE:** To examine differences in movement patterns between younger and older adults using accelerometers at the hip and the wrist. **METHODS:** Physical activity was measured simultaneously using three separate Actigraph Link accelerometers placed at: 1) dominant-anterior-superior iliac spine (hip), 2) dominant wrist (D), and 3) non-dominant wrist (ND) in 10 younger (age 23 ± 3) and 10 older (age 71 ± 3) adults. Subjects performed 4 walking tasks, for 5 minutes each: 1) treadmill walking at 1.5 mph, 2 & 3) normal-paced walking on a 20m course with and without a walker, and 4) fast-paced walking on a 20m course. The accelerometer data was downloaded in 30 second epochs and physical activity during each task was calculated as the average vector magnitude over the five minutes, excluding the first 30 second epoch. **RESULTS:** Treadmill walking activity measured at the hip did not differ between old and young (1180 ± 252 vs. 1286 ± 236 respectively, $p=0.35$), however, significantly higher activity was recorded at both wrist locations in older adults (D: 1775 ± 528 vs. 1246 ± 377 , $p<0.05$; ND: 1907 ± 686 vs. 1340 ± 329 , $p<0.05$). No significant differences between young and old were found during the normal-paced over ground walking tasks; however, as a group, pushing the walker resulted in significantly lower measurement of physical activity at both wrists (D: 2593 ± 873 vs. 762 ± 321 , $p<0.001$; ND: 2801 ± 885 vs. 558 ± 236 , $p<0.001$) with a trend toward lower measurement at the hip (2025 ± 433 vs. 1937 ± 436 , $p=0.06$). Fast-paced walking activity was significantly lower in older adults at the hip (2464 ± 556 vs. 2926 ± 435 , $p=0.05$), but not at the wrist (D: 3687 ± 1384 vs. 4471 ± 1427 , $p=0.23$; ND: 3955 ± 1581 vs. 4619 ± 1123 , $p=0.29$). **CONCLUSION:** Physical activity movement patterns may differ by age and type of walking task. Further accelerometer validation is needed in older populations.