

Validity and Reliability of Step Count Measures Using a Wrist Worn Activity Tracker During Treadmill Walking

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INTRODUCTION: Wearable technology devices are becoming increasingly popular. Many of these devices offer features allowing users to monitor physical activity levels through the reporting of step-count. However, as many different types of activity monitors are widely available, it is necessary to examine the validity of each.

PURPOSE: To determine the validity of step-count measures reported by the IP65 activity tracker compared to direct observation.

METHODS: Eighteen subjects (25.2±3.8 years) volunteered to participate in this study. Anthropometric measures (height, weight) were recorded on each subject. Each subject was fitted with an IP65 activity monitor on their right wrist and instructed to complete a 5-minute warm-up on the treadmill, walking at a self-selected pace. For the testing protocol, subjects were instructed to walk on the treadmill at a self-selected moderate pace for 5-minutes. Step-count data was concurrently recorded from the IP65 activity monitor and via direct observation during the final 3-minutes of the protocol.

RESULTS: Paired sample t-test indicated a statistically significant difference between mean step counts reported by the IP65 device and via direct observation ($p=0.007$) with a mean absolute error of 12%. Pearson correlation coefficient indicated a positive moderate correlation between the measures ($r=0.52$). However, a weak concordance correlation coefficient was observed ($R_c=0.26$).

CONCLUSION: The IP65 activity tracker significantly underestimated step-count when compared to direct observation. It is possible that this resulted from the location of the device on the body; as it is worn on the wrist, step-count measures may be impacted by arm movement.