

【Original Article】

Validation of a Web-based Physical Activity Measurement System Using a Tri-axial Accelerometer

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Abstract

Objective: We used a behavior recording method to develop a self-reported physical activity measurement system. The purpose of this study was to compare the results from this system against objective data provided by a 3-axis accelerometer, so as to understand the strengths and weaknesses of the new measurement system.

Methods: A total of 75 subjects (20–22 years of age) participated. The subjects entered behavior data using their personal computers just before bedtime for 7 days, which delivered intensity data to a web server every 15 minutes. Subjects also wore a 3-axis accelerometer over the same days. The three measures of intensity were: total energy expenditure (TEE), activity-related energy expenditure (AEE), and physical activity level (PAL).

Results: The Pearson correlations for TEE, AEE, and PAL between the two methods were all positive and significant: $r=0.875$ ($p<0.01$), $r=0.773$ ($p<0.01$), and $r=0.715$ ($p<0.01$). Time comparisons for each type of intensity data of the system compared to the 3-axis accelerometer showed an overestimate above 3 METs, while there was an underestimate in the range of 1.6-2.9 METs. Correlation of the time for each type of intensity data of the system compared to the 3-axis accelerometer was $r=0.495$ ($p<0.01$) above 3 METs, while there was no significant correlation in the range of 1.6-2.9 METs and over 4 METs.

Conclusion: The physical activity measurement system produces data of high overall validity, although users of this system should note that the accuracy of the system at various levels of intensity requires further study.

Key words: physical activity, web system, accelerometer, behavior recording, self-report

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