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Quantification of Moderate to Vigorous Physical Activity Time in Physical Education via Pedometry

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ABSTRACT

The purpose of this research was to determine criterion step/minute (SPM) cut points that accurately quantify ten minutes of moderate to vigorous physical activity (MVPA) within first- through fourth-grade physical education. Research objectives were to: (a) correlate physical activity measures of pedometry, tri-axial accelerometry, and systematic observation; and (b) determine the validity of pedometer SPM and accelerometer vector magnitude (VM) cut points that quantify ten minutes of MVPA.

A total of 300 participants from the mid-western and southwestern U.S. were grouped into two data pools, first- and second-grade ($n=135$), and third- and fourth-grade ($n=165$). Percent of and actual class time engaged in MVPA, as assessed by observation, were the criterion measures (C-SOFIT, Keating et al., 1999); accelerometry VM (Stayhealthy RT3) was the comparison criterion and predictor measure, and pedometry (Yamax SW-651) SPM was the predictor measure. Data were collected from 16 first- and second-grade lessons, and 24 third- and fourth-grade lessons that averaged 31.29 ± 1.68 and 33.04 ± 6.53 minutes, respectively. Pearson r coefficients were computed for correlation analyses with alpha set at .01. Linear regression analyses were used to generate a set of SPM and VM cut points to be tested using the Criterion Test Model (Safrit, 1989).

In the first- and second-grade data pool, SPM was strongly correlated with %MVPA, MVPA time, and VM. Also, VM was strongly correlated with %MVPA, and MVPA time. In the third- and fourth-grade data pool, SPM was strongly correlated with %MVPA and VM, and moderately correlated with MVPA time. Moderate correlations were found between VM, %MVPA, and MVPA time for third- and fourth-graders. Based on correlation findings, cut points for SPM will only be presented with systematic observation as the criterion measure. The optimal SPM cut points for quantifying ten minutes of MVPA ranged from 59 to 63 for the first- and second-grade, and 50 to 54 for the third- and fourth-grade.

In conclusion: (a) a stronger relationship was found between pedometry and systematic observation than that between tri-axial accelerometry and systematic observation, (b) pedometry SPM values were a valid indicator of the 10-minute MVPA criterion, and (c) pedometry demonstrates to be an effective and practical assessment tool for physical activity surveillance within the health promotion target area of physical education.