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Original article

Correlates of subjectively and objectively measured physical activity in young adolescents

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Abstract

Background: Many studies examining individual-level correlates in youth utilize self-report rather than objective measures of physical activity (PA). This utilization of self-report may result in associations that are not present when examining objectively measured PA. The present study investigates the relationship between hypothesized correlates of PA with objectively and subjectively measured PA.
Methods: Participating children (n = 232, 101 males, mean age = 12.3 years) provided a minimum of four monitored days of PA (via accelerometer) and completed a survey assessing moderate-to-vigorous physical activity (MVPA), sport competence, appearance, enjoyment, and self-efficacy. Height and weight were measured and body mass index (BMI) was calculated.
Results: Hierarchical regression models controlling for sex, race, and BMI Z-score showed that only sex and BMI Z-score were significant correlates of objective MVPA while only sex was a significant correlate of objective total PA. However, in a separate model examining the relationship with subjective MVPA, enjoyment of PA and self-efficacy for PA were the only significant correlates of self-reported PA.
Conclusion: Measuring MVPA via self-report versus accelerometry produces considerably different results in a sample of young adolescents. Future studies should use caution when selecting outcome measures if the intent is to identify modifiable correlates of MVPA in youth.

Keywords: Accelerometry; Enjoyment; Self-efficacy; Youth

1. Introduction

Current research indicates that most children are not meeting the recommended 60 min of moderate-to-vigorous physical activity (MVPA) per day,[1] and physical activity (PA) levels have shown to decrease with age.[2] In hopes of discovering modifiable targets for intervention, many studies have been conducted to identify correlates of PA in youth. Unfortunately, many of these studies rely heavily on self-report measures of PA,[3,4] which are often not well validated.[5] Self-report measures are susceptible to biases related to social desirability, which have been shown to be of particular concern in school-aged children.[6] With the lack of validated measures being used, along with the significant amount of self-report taking place, correlates related to objective MVPA are not well understood.

A number of correlates related to PA in youth have been previously identified. The first is perceived sport competence, which achievement goal theory indicates is a behavioral determinant,[7] and has shown to have a bi-directional relationship with PA. Another is PA enjoyment, which studies suggest is the most salient predictor of PA levels in youth.[8,9] The third correlate is self-efficacy for PA, which is derived

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from Bandura's social cognitive theory (SCT).[10] Although SCT identifies self-efficacy as a behavioral construct that largely influences an individual's ability to control their motivation, the literature indicates mixed outcomes with relation to PA.[3,4] Sallis et al.[3] showed indeterminate associations, while a more recent review by van der Horst et al.[4] indicated that self-efficacy was positively correlated to PA in adolescents. The fourth correlate is perceived appearance, which is how a person views his or her own body composition and personal aesthetics. Crocker et al.[11] found this variable is significantly and moderately correlated with PA in Canadian school children (aged 10−14 years); however, studies suggested that the relationship between perceived appearance and youth PA is still unclear.[4] A combination of these correlates has been previously studied in regard to both objectively measured total PA and MVPA by Fisher et al.,[12] yet that study employed a younger sample (aged 7−9 years) and did not compare their results to subjective measures. For both total PA and MVPA, the findings suggested there were no significant psychosocial correlations for girls and only a significant association for self-efficacy in boys.[12] Research has shown that attitudes toward physical education (PE) become more negative with age in youth (aged 10−14 years),[13] but it is unclear as to whether the same trend is generalizable to PA more broadly. Therefore, it would be valuable to examine how these four correlates might differ in older youth, how they are associated with MVPA in this age group, and how any such relationships may differ depending on the way PA is measured. Thus, the present study seeks to investigate the relationship between self-perceptional variables and MVPA in older youth, highlighting the importance of using both objective and subjective MVPA measures within the same population.

2. Materials and methods

2.1. Participant information

A total of 232 students (101 boys and 131 girls) completed the questionnaires, did not indicate that they were sick in the previous week, and provided a minimum of 4 days of accelerometry data (53%). Participants from three middle schools, located in eastern North Carolina were recruited to participate in a study examining PA in rural and urban youth.[14] Institutional review board (IRB) approval was granted and children enrolled in PE, health, or elective courses during either the 2006−2007 or 2007−2008 school years were asked to participate. Research assistants presented the study, its purpose, and incentives (a combination of monogrammed school uniform clothing) to children during classroom hours. Interested participants received parental consent forms to take home and return. In total, approximately 1773 students were eligible and 481 received parental consent. Of these, 441 were present for data collection and assented to participate (25%). Participants were not significantly different in terms of sex or age from the student population, but were more likely to be African-American (57% African-American in student population *vs.* 49% in the sample). Participants were pulled out in small groups from their respective classrooms during school hours to complete a questionnaire and an anthropometric assessment. Students who indicated that something prevented them from doing normal activities in the past week on the questionnaire were excluded from the study. Baseline descriptive statistics for participants are shown in Table 1.

2.2. Instruments

The self-perception profile for children (SPPC) is a 36-item, 5-scale instrument used to measure factors related to self-esteem, including scholastic competence, sport competence, physical appearance, social acceptance, and behavioral conduct, as well as a 6th-subscale for global self-worth.[15,16] Each question pairs two items with polar opposite descriptions (e.g., "Some kids wish their body was different" but "Other kids like their body the way it is"). Children are asked to self-identify the statement that best describes them, and then choose if this is "really true" or "sort of true" for them. Items are scored on a 4-point scale, with higher scores indicating a more positive view of oneself. The current study used the sport competence (14 items; e.g., "Some kids do very well at all kinds of sports") and appearance (22 items; e.g., "Some kids are happy with the way they look") subscales of the SPPC to assess youth's self-perceptions of their athletic abilities and physical appearance, respectively. The SPPC scales have demonstrated good internal consistency (coefficient $\alpha = 0.73-0.81$) and test-retest reliability (all intraclass correlation coefficients ≥ 0.84) in youth aged 8−14 years.[16] The athletic competence and appearance subscales also demonstrated acceptable internal consistencies in the present study (coefficient $\alpha = 0.81$, $\alpha = 0.86$, respectively).

Table 1
Descriptive statistics for the participants (mean ± SD).

	Boy (n = 101)	Girl (n = 131)
Age (year)	12.47 ± 1.13	12.13 ± 1.00
Race[a]		
Black	45 (45)	69 (53)
White	31 (31)	38 (29)
Other race	25 (24)	24 (18)
BMI	21.82 ± 4.70	22.83 ± 5.97
BMI Z-score	0.85 ± 0.96	0.91 ± 1.02
Minutes of MVPA/day[b]	40.10 ± 19.14	22.91 ± 12.79
Minutes of total PA/day[b]	316.81 ± 78.09	291.53 ± 68.46
Subjective MVPA[c]	3.01 ± 0.64	2.80 ± 0.62
Sport competence (range 1.33−4.00)	2.96 ± 0.59	2.73 ± 0.62
Appearance (range 1.00−4.00)	2.94 ± 0.69	2.82 ± 0.73
PA enjoyment (range 1.94−5.00)	4.28 ± 0.50	4.10 ± 0.53
PA self-efficacy (range 1.00−5.00)	3.44 ± 0.84	3.49 ± 0.81

[a] perimeters presented as n (%);
[b] measured by accelerometer;
[c] measured by physical activity questionnaire for older children.
Abbreviations: BMI = body mass index; MVPA = moderate-to-vigorous physical activity; PA = physical activity.