Original Article

Validation of the Physical Activity Questionnaire for Older Children (PAQ-C) among Chinese Children*

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Abstract

Objective This study initially validates the Chinese version of the Physical Activity Questionnaire for Older Children (PAQ-C), which has been identified as a potentially valid instrument to assess moderate-to-vigorous physical activity (MVPA) in children among diverse racial groups.

Methods The psychometric properties of the PAQ-C with 742 Hong Kong Chinese children were assessed with the scale's internal consistency, reliability, test-retest reliability, confirmatory factory analysis (CFA) in the overall sample, and multistep invariance tests across gender groups as well as convergent validity with body mass index (BMI), and an accelerometry-based MVPA.

Results The Cronbach alpha coefficient (α=0.79), composite reliability value (ρ=0.81), and the intraclass correlation coefficient (α=0.82) indicate the satisfactory reliability of the PAQ-C score. The CFA indicated data fit a single factor model, suggesting that the PAQ-C measures only one construct, on MVPA over the previous 7 days. The multiple-group CFAs suggested that the factor loadings and variances and covariances of the PAQ-C measurement model were invariant across gender groups. The PAQ-C score was related to accelerometry-based MVPA (r=0.33) and inversely related to BMI (r=-0.18).

Conclusion This study demonstrates the reliability and validity of the PAQ-C in Chinese children.

Key words: Physical activity; Measurement; Children; Reliability; Validity

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INTRODUCTION

There is conclusive evidence that regular physical activity (PA) is positively related to cardiovascular fitness, muscle strength, and lower risk of obesity and diabetes[1]. The World Health Organization (WHO) has identified physical inactivity as the fourth leading risk factor for global mortality causing an estimated 3.2 million or 6% deaths globally[2]. PA and physical fitness track from childhood and adolescence into and throughout the adulthood[3]. The level of PA in childhood has been regarded as one of the best predictors for PA in later life[4]. Clearly, valid assessment is crucial to determine the relationships between PA and specific health benefits and to evaluate PA interventions for children and adolescents.

However, the accuracy of PA assessment is

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inversely related to practicality. The most accurate measures of PA (e.g., indirect calorimetry) are considered invasive and impractical for field-based studies. Accelerometry-based assessments are accurate, but expensive for use in larger populations, and encounter adherence issues (e.g. uncomfortable to wear, forgetting to wear the device, social embarrassment), especially among children[5]. Self-report questionnaires remain the most widely accepted and utilized methods in large populations as they provide low cost to investigators and low burden to participants. Moreover, contextual items on questionnaires provide information regarding various types of activities which is not available through objective measurement[6].

Validated self-report PA measures for use in Chinese pediatric populations are limited. A Chinese 7-day physical activity recall questionnaire, tested among 92 4-6th grade children in Beijing, demonstrated acceptable test-retest reliability (kappa value ranged from 0.46 to 0.79) but moderate validity only among boys (r was 0.46, 0.38 for different activities)[7]. A modified Chinese version of the Children's Leisure Activities Study Survey (CLASS) determined reliable estimates of PA patterns among Hong Kong Chinese children aged 9 to 12 years[8]. However, the correlation with the accelerometer measure was non-significant for boys. In both these questionnaires reports of frequency (times) and duration (min) were required. However, children may have trouble recalling the frequency of activities and have limited ability to accurately report the duration of specific activities[9]. The memory and estimation biases in PA questionnaires have to be reduced to acceptable level for children[10].

The Physical Activity Questionnaire for Older Children (PAQ-C) has been identified as a potentially valid instrument for use with children and adolescents[11]. The PAQ-C is a self-administered, 7-day recall questionnaire for children aged 8 to 14 years consisting of ten items, nine of which are structured to discern moderate-to-vigorous PA (MVPA). The scale uses a 5-point Likert scale with higher scores indicating higher PA levels[12]. The PAQ-C has been tested among several English speaking populations i.e. British, African American, European American, and Canadian[13-15]. Good internal consistency (Cronbach's α=0.76 to 0.84) and test-retest reliability (r=0.75 to 0.82) have been documented. The construct validity of the PAQ-C has been tested against other questionnaires, as well as convergent validity which has been tested against aspects of cardiovascular fitness[12,16]. Inconsistent validation findings suggest the PAQ-C requires refinement before use with diverse racial groups[15]. Language and cultural differences may also affect English language questionnaires when translated into Chinese[17]. Although the Chinese version of the PAQ-C has been applied to measure self-reported PA in China[18], no existing studies have assessed the reliability and validity of the Chinese version.

The purpose of this current research was to provide reliability and validity for the Chinese version of the PAQ-C. We examined the general score psychometrics, the validity of the factor structure using confirmatory factor analysis (CFA), and convergent validity with body mass index (BMI) and an objective accelerometer measure of PA.

METHODS

Participants

Six Hong Kong primary schools that approved to participate in the study were included. The schools were located in two Hong Kong districts (New Territories and Hong Kong Island), which varied in student socio-economic status (SES). A total of 798 students (445 boys and 353 girls) aged 8 to 13 years who provided written informed consent were recruited from Grades 4-6 from May 2014 to February 2015. A subsample of 463 children (256 boys and 207 girls) participated in the 7-day accelerometer protocol. The study was approved by the Hong Kong Baptist University Committee on the Use of Human and Animal Subjects in Teaching and Research.

Measures

Physical Activity Measured by the PAQ-C PA was assessed using the PAQ-C, which consists of nine computable items. The tenth item identifies whether sickness or other events may prevent the child from participating in regular PA and is not included in the calculation of activity scores. Of the nine computable PAQ-C items, the first provides a checklist of 22 common leisure and sport activities, followed by two supplemental blank spaces for participants to enter other activities not included in the list. The mean of all activities ('no' activity being 1, '7 times or more' being 5) on the activity checklist is calculated to form a composite score for item 1. The remaining eight questions assess activities conducted at particular