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Original Article

Motor Skill Competence and Perceived Motor Competence: Which Best Predicts Physical Activity among Girls?

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Abstract

Background: The main purpose of this study was to determine which correlate, perceived motor competence or motor skill competence, best predicts girls' physical activity behavior.

Methods: A sample of 352 girls (mean age=8.7, SD=0.3 yr) participated in this study. To assess motor skill competence and perceived motor competence, each child completed the Test of Gross Motor Development-2 and Physical Ability sub-scale of Marsh's Self-Description Questionnaire. Children's physical activity was assessed by the Physical Activity Questionnaire for Older Children. Multiple linear regression model was used to determine whether perceived motor competence or motor skill competence best predicts moderate-to- vigorous self-report physical activity.

Results: Multiple regression analysis indicated that motor skill competence and perceived motor competence predicted 21% variance in physical activity (R^2=0.21, F=48.9, *P*=0.001), and motor skill competence (R^2=0.15, β=0.33, *P*= 0.001) resulted in more variance than perceived motor competence (R^2=0.06, β=0.25, *P*=0.001) in physical activity.

Conclusion: Results revealed motor skill competence had more influence in comparison with perceived motor competence on physical activity level. We suggest interventional programs based on motor skill competence and perceived motor competence should be administered or implemented to promote physical activity in young girls.

Keywords: Motor skill competence, Perceived motor competence, Physical activity

Introduction

Unhealthy lifestyle behaviors including physical inactivity during childhood might track to adulthood, and in addition to their short-term health hazards, they might be associated with chronic diseases later in life. Sedentary lifestyle is a well-documented predisposing factor for obesity, metabolic syndrome, and non-alcoholic fatty liver disease in younger ages resulting in further chronic problems in adulthood, e.g. cardiovascular disease, diabetes mellitus, hyperlipidemia, hypertension, cancers and osteoporosis (1-3).The data clearly indicated that girls engaged in significantly less physical activity than their counterparts (4) in both childhood and adolescence (5-7). Thus, there is a critical need to pay attention to girls' physical activity patterns and influences. This is a major

concern globally and in Iran because it has been reported that Iranian girls are less physically active than boys (8).

Physical activity describes the actions or movements that one actually makes (9) and is influenced by a variety of factors (10). Lindquist, Reynolds and Goran (1999) provided a hierarchal framework that included factors that affect children's physical activity behavior at four levels - physiological factors such as motor skill competence (MSC), psychological factors such as perceived motor competence (PMC), socio-cultural factors including parents and family structure, and ecological factors such as the physical environment (11). Motor skill competence is mastery of physical skills and movement patterns that enable enjoyable participation in physical activities (12), and perceived motor competence is defined as an individual's awareness and belief of their capability to perform both gross and fine motor tasks (13).

In two separate models, both Welk (14) and Stodden et al. (15) conceptualized some influencing factors of youths' physical activity. Although considering both perceived motor competence and motor skill competence in their conceptual models, they purported different competence more influential on children's physical activity behavior. Welk in his model proposed that although direct effects of motor skill competence on children's activity behavior are possible, indirect effects of perceived motor competence are perhaps more likely (14). On the other hand, Stodden et al., in their conceptual model proposed that the motor skill competence is the primary underlying mechanism that increases children's engagement in physical activity and perceived motor competence mediates relation between motor skill competence and physical activity (15). There is no consensus on the influence of perceived motor competence and motor skill competence on children's physical activity behavior. Therefore, more research in this area is essential.

Previous researchers have studied the relation between physical activity and MSC and PMC in children separately. Evidence revealed positive association between physical self perception (16, 17), perceived competence in physical education (18), perceived athletic competence (19), perceived sport competence (20), and motor skill competence (21-24), and just one research was found which compared the influence of both PMC and MSC on children's physical activity (25). Motor skill competence, but not perceived motor competence, influenced children's physical activity behavior significantly and explained 9% variance of 9 year-olds girl's physical activity level (25).

This research was carried out to bulk out limited evidence of influence of perceived motor competence and motor skill competence on children's physical activity behavior. Therefore, this cross-sectional study aimed to investigate correlates of Iranian girls' physical activity and determine which variable best predicts third grade school girls' physical activity: perceived motor competence or motor skill competence.

Materials and Methods

Subjects

Third grade girls from a state primary school located in the urban southwestern part of Tehran Province (Shahr-e-Qods), Iran in 2012, were invited to voluntarily participate in the study. Informed parental consent was obtained for 352 girls (mean age 8.7, SD 0.3 yrs) and the Institutional Review Board of the corresponding author's university approved the present study. The sample included children in the low-moderate range of socio-economic background, with no reported history of learning difficulties or behavioral, physical, neurological or orthopedic diagnoses. Accordingly, 352 girls constituted the final sample, who completed Iranian version of Test of Gross Motor Development-2 (TGMD-2; 26), and Physical Activity Questionnaire for Older Children (PAQOC) (27), physical ability sub-scale of Self-Description Questionnaire (28) (Table 1).

Physical activity

The Physical Activity Questionnaire for Older Children (PAQ-C) was used to determine the participants' physical activity level (29). PAQ-C requests participants to respond to the physical activity behaviours for the last 7 days by asking

them to check a list of activities for frequency of participation on a scale from 'no', 1-2 times per week, 3-4, 5-6, to 7 times or more. Questions are also asked about their physical activity behaviours during physical education; recess, at lunch-time, right after school, and evenings, as well as 'the last weekend'. The PAQ-C demonstrates high test-retest reliability in a sample of 84 children in grades 4^{th} – 8^{th} and demonstrate interclass correlation coefficients of $r = 0.82$ for girls and significantly correlates with other measures of physical activity in elementary-age students (29). This questionnaire has been supported as a valid and reliable measure and Cronbach's alpha of 0.894 was measured in Iranian children (27).

Motor skill competence

Motor skill competence was assessed using the Test of Gross Motor Development-2 Edition (30). The measure is made up of locomotor (run, gallop, hop, horizontal jump, and slide) and object control (t-ball strike, stationary basketball dribble, catch, kick, over hand throw, and underhand roll) subtests, each assessing six skills. The TGMD-2 assesses the process of skill performance (skill components) rather than the outcome or product of performance (30), and has proved to be a valid and reliable method for studying Iranian children (26). Before testing each skill, participants were given a visual demonstration of skill by the researcher using the correct technique, but were not told what components of the skill were being assessed. Participants were then called individually to perform the skill twice. General encouragement but no verbal feedback on performance was given during or after the tests. All skills were video-recorded and later assessed by one trained assessor who also administered the test. After each performance the examiner recorded a score on her form corresponding to the evaluation of that particular skill component. Subtest scores were then summed to calculate each child's Gross Motor Quotient (GMQ) (30).

Perceived motor competence

The self-description questionnaire-1 (SDQ-1) was used to assess girls' perceived motor competence. The physical ability subscale of SDQ-1 includes 8 items and uses a five-point response scale, with higher scores indicating more positive perception. Scores were summed to create a total perceived motor competence score ranging from 5 to 40 (31). Previous researches support the internal consistency and construct validity of SDQ-1 scores in Iranian children (28). In this sample, the internal consistency coefficients for physical ability subscale was α=0.87.

Procedure

Prior to gathering data, participants and parents were given written information about the nature of the study. Written permission was obtained from the participants, parents, and guardians prior to their child's involvement in the study. No child had any reported history of learning difficulties or any behavioral, neurological or orthopedic problems that would qualify as exclusionary criteria for the history. All the testing took place during the school days. First, the TGMD-2 was executed in school yard within 4 weeks and inter-rater objectivity was measured 87%. The physical subscale of SDQ-1 was completed in the classroom, by all children at the same time. Latterly, Physical activity questionnaire was completed by all children at the same time at the classroom. All tests were completed in accordance with the manuals. The children were tested by the examiner and assistant who had been trained in the test protocols. All children completed the tasks.

Statistical analysis

The initial analysis was descriptive in nature (i.e., means, standard deviations). This was followed by multiple linear regression models to investigate the best predictor of girls' physical activity. Data analysis was carried out via SPSS version 16.0 for windows. Statistical significance was set at $P<0.05$.

Results

Table 1 provides an overview of descriptive statistics.

Table1: Sample characteristics and descriptive statistics (N=352)

	M	SD
Age (yr)	8.78	0.32
GMQ	76.26	9.28
PMC	34.77	4.43
PA	3.31	0.88

Note: M=mean; SD= standard deviation; GMQ= gross motor quation; PMC=perceived motor competence; PA= physical activity.

Correlates of Girls' Moderate to Vigorous Physical Activity

Pearson correlations showed significant relationships among correlates (Table 2). A stepwise regression analysis indicates that GMQ and PMC accounted for significant amounts of variance for moderate to vigorous physical activity (R^2=0.21, F=48.9, *P*=0.001). And, GMQ (R^2=0.15, *P*= 0.001) resulted in more influence on PA in comparison with PMC (R^2=0.06, *P*=0.001 (Table 3).

Table 2: Pearson's bivariate correlations among measures (N=352)

	GMQ	PMC
PA	.39**	.33**
GMQ		.22**

Note: GMQ= gross motor quation; PMC=perceived motor competence; PA= physical activity.

Table 3: Predictors of girls' moderate to vigorous physical activity (N=352)

	R^2	Change in R^2	F	df	β
GMQ	.33	.157	65.31	350	.339
PMC	.25	.062	48.96	349	.225

Note: PMC: Perceived Motor Competence; GMQ= gross motor quation.

Discussion

This study describes the influential role of both PMC and MSC on physical activity level of third grade school girls. The multiple regression models showed that both PMC and MSC are significant predictors of girls' physical activity, and of particular interest was that MSC had more influence in comparison with PMC on physical activity level. Our results suggest that having mastery of motor skills (which includes locomotor and object control skills) and high and positive perception of motor competence promote girls' physical activity participation and as a result might reduce physical inactivity behavior.

This findings support Stodden's conceptual model which shows that MSC, not PMC, is a more influential factor on physical activity level in young children (15). The model showed that MSC is underlying mechanism which influence children's physical activity participation; and in middle and later childhood (6-10 year-olds), also higher levels of MSC will offer a greater motor repertoire to engage in various physical activities, sports, and games; in fact, MSC drives physical activity levels (15). The theoretical basis explaining the mechanism of the more influential role of MSC on physical activity, as we found among girls in the current study, suggests that proficiency in movement skills provides the behavioral competency required for participation in a variety of physical activity (32), and may influence other determinants of behavior, such as perceptions of competence (20). Without the prerequisite movement competence, children may opt out of opportunities for physical activity or may have preference for more sedentary pursuits (14, 15).

The results, also, support McIntyre's longitudinal study which MSC was better predictor of children's physical activity than PMC (25). PMC was not a significant contributor to 9-year-olds girls' physical activity levels (25). However, our results along with previous studies revealed both MSC (20-23) and PMC (16-20) are significant correlates of youth's physical activity. McIntyre's study is the first longitudinal research which investigated influential roles of MSC and PMC on physical activity level jointly (25). Moreover, although PMC made significant contribution to our sample's physical activity, the variance just was 6%. More research in this area is warranted.

The video assessments of MSC using a validated, process-oriented measure, was a method that reduced measurement bias in the current study.

Moreover, large sample size is a strong point of this study. However, Physical activity assessment in this study may have been limited by the use of PAQOC. This questionnaire does not provide an estimate of caloric expenditure or specific frequency, time, and intensity information and does not discriminate between specific activity intensities (29). Also, the findings of this research should be interpreted cautiously, since physical activity was assessed during autumn/winter and the data may also have been confounded by seasonal and weather-related variations.

Conclusion

MSC is the most influential factor in girls' physical activity engagement. High competent girls in motor skill have motor repertoire to engage in various physical activities, sports, and games. This study highlights a need for intervention programs based on influential factors in order to promote children's physical activity behavior and healthy lifestyle in the future.

Ethical Considerations

Ethical issues including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc. have been taken into consideration by authors.

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