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Evidence for the validity of the Children's Attraction to Physical Activity
Questionnaire (CAPA) with young children

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with young children

Running Head: Validity of CAPA

Abstract

Attraction to physical activity is important to an individual's intrinsic motivation to engage in play, games and sports. While there are instruments designed to measure attraction to physical activity in middle childhood years, the lack of authentic measures in young children has impeded research in this area. In this study we sought to address the validity of a scale to tap young children's attraction to physical activity. Evidence for validity was based on internal consistency, content analysis, and factor structure. Australian school children (180 boys and 154 girls) from school year two, aged six to eight years, were individually administered a modified version of the Children's Attraction to Physical Activity Scale (CAPA; [1, 2]). The results indicated that internal consistency was acceptable for most of the subscales when negative statements were excluded from the analyses. Factor analysis revealed that the liking of games and sports, liking of physical exertion and exercise, and the importance of exercise subscales were more robust. Second order factor analysis indicated that the overall construct of attraction to physical activity was viable in this age group. With some modifications, the scale appears to provide an acceptable approach to the measurement of attraction to physical activity in young children.

Keywords: children, measurement of attraction to physical activity,

Introduction

Attraction to physical activity refers to an individual's desire to participate in a task involving physical exertion or movement, through play, games or sport. According to Brustad [1] both cognitive and emotive states contribute to the formation of a child's attraction to physical activity. Motivational theorists [3,4] propose that children who are attracted to physical activity by challenge, mastery, and enjoyment, as well as support from significant others, are more likely to engage in physical play, games and sports than children who do not experience these cognitions and emotions. Thus attraction to physical activity, in childhood provides a basis for enjoyment and participation in games, play and sports for later in life. For example O'Brien Cousins [5] found that older women's enjoyment and engagement in physical activity later in life were reflective of both level of engagement and enjoyment of physical activity level as children. In their longitudinal study Thompson, Humbert, and Mirwaldt [6] revealed that the tendency to be physically active (or inactive) as an adult was reflected by the quality of childhood and adolescent physical activity experiences. Their findings provide support for the view that specific relationships, circumstances, and attitudes formed in childhood and adolescence influence adult physical activity attitudes and behaviours. It is also evident from an early age that enjoyment is a very salient feature of this overall attraction. Whilst Brustad [1] developed the Children's Attraction to Physical Activity scale (CAPA) for upper primary school children (10- to 12-years-old) there is considerable support for the importance of exploring what attracts lower primary school children (six- to eight-year-olds) to physical activity. However little is known of the authentic means by which attraction to physical activity can be measured in young children. In spite of advances in the measurement of self-perceptions [7] and self-descriptions [8] many questions remain that highlight the need for a more thorough investigation of the validity of measures when adapting scales for use with younger children.

When developing the CAPA scale, Brustad [1] identified different aspects of attraction to physical activity, stressing the importance of a multi-dimensional approach that incorporated

cognitive and affective dimensions. The CAPA differs considerably from earlier measures tapping attraction to physical activity. The items focus on “children’s feelings about their physical activity involvement along dimensions that children themselves have identified as being salient features of the physical activity experience” [1; p. 221]. The CAPA comprises five subscales; (a) liking of games and sport, (b) liking of physical exertion and exercise, (c) liking of vigorous physical activity (d) peer acceptance in games and sports, and (e) importance of exercise. The three liking subscales and the peer acceptance subscale relate to the enjoyment and fun element of children’s attraction to physical activity. The importance of exercise subscale focuses on the thoughts related to children’s attraction to physical activity for health benefits. The CAPA scale was validated with a North American sample from school grades four to seven, ranging in age from nine to twelve years [1,2]. Although preliminary studies were encouraging, Brustad [1,2] noted that there was clear need for further examination of the psychometric properties of the CAPA, particularly with different populations, to ensure that the CAPA was suitable for more widespread use.

There also are administration considerations when adapting scales to suit younger children. For example Harter and Pike [9] and Marsh, Craven, and Debus [8], reported the difficulties faced by young children in answering questionnaires formatted for older children. Young children are less able to differentiate among some domains such as physical appearance and interpersonal relationships [3,8,10]. Consequently it is important to consider the developmental level of children as well as the manner in which questionnaires are formatted and administered [3,8-10]. Reports with previous questionnaires that used a structured alternative format [8, 10, 11] indicate that children younger than eight years are not yet able to answer accurately and do not understand how to respond in this format. Young children are better able to respond to questions presented verbally and on an individual basis. They also have difficulty with negatively worded items [8].

Our purpose in this study was to examine (a) internal consistency reliability, (b) subscale

structure and (c) the overall construct validity of a modified version of the CAPA with younger Australian children aged six to eight years

Method

Participants

Participants were Australian school children (180 boys and 154 girls) from year two classes in 28 schools with a mean age of ($M = 6.7$, $SD = .74$) years. The selected schools were representative of high to low socio-economic status and were of equivalent size. Approval to carry out the research was granted by the ethics committee of the University of Notre Dame, Australia. Data were collected on a school basis, with passive parent consent.

Instrument

The CAPA [1,2] includes 25 items to measure the extent of children's interest in physical activity. There are five subscales; a) liking of games and sports, b) liking of physical exertion and exercise, c) liking of vigorous physical activity, d) peer acceptance in sports and games, and e) importance of exercise. Each of the CAPA subscales included five items. All items were scored from one (low) to four (high) using Harter's [7] structured alternative format that is designed to reduce socially desirable responses (Figure One). The original questionnaire was designed for group administration with North American children with a mean age of 10 years and structured in an alternative question format.

For this study, the CAPA was modified. The structured alternate format was replaced with a Likert format (Figure One). The responses to statements from each of the items were scored from one to four. A sample item from the liking of physical exertion and exercise subscale from the modified version of the CAPA is presented in Figure One. This change was approved by the author (Brustad, personal communication, January 2005). The CAPA is generally administered in written form but in this study, because the children were younger, administration was conducted on an individual basis with verbal questioning by the researcher and verbal responses from the child.

Procedures

Six assistants participated in two days training by an experienced research officer on strategies to ensure strict adherence to protocol regarding the behaviour, language and techniques when interviewing to ensure the reliability of data collection. The research officer had extensive experience in the administration of the questionnaire and maintained protocol consistency through regular team meetings. Each child completed the 20 minute questionnaire in their regular school time in a quiet area, away from teachers and peers. Prior to the administration of the CAPA scale, the researcher explained that the questions were related only to themselves and no one else would know these answers. Each child also was informed that the procedure was not a test and that there were no right or wrong answers. Each child completed a practice question to clarify any difficulties in understanding. Following the practice questions the children responded to the questions from the main questionnaire.

In the first instance, each child answered the statement with a yes or no answer. The child was then asked to respond with “no always” or “no sometimes” or “yes sometimes” or “yes always” (see Figure One), yielding a score ranging from one (low) to 4 (high). The researcher circled the response on the questionnaire once the participant gave an answer. If the child had difficulty responding, the researcher repeated the statement and checked for understanding.

Statistical Analyses

Internal consistency reliabilities of the subscales were obtained using Cronbach's alpha with a level of acceptability $>.60$ [12]. First order factor analyses, using principal components analysis with promax rotation, provided evidence of the subscale structure. Second order factor analyses obtained from promax rotation and regression coefficients were used to test for a common underlying structure representing 'attraction to physical activity'. The loading of items onto factors were examined with respect to the subscales in the original CAPA scale. We chose to retain all items with loadings above 0.3 and eigenvalues above 1 [13]. SPSS version 15 was used for all analyses.

Results

Internal Consistency Reliability

Internal consistency reliabilities for the subscales used in this study were acceptable for three of the dimensions [$> .60$, 12]; importance of exercise, liking of games and sports, and liking physical exertion and exercise. The internal consistency reliabilities of the remaining two subscales, liking of vigorous activity and peer acceptance were low to moderate in their initial form, however removal of negatively worded items resulted in higher reliability coefficients for liking of vigorous physical activity but peer acceptance remained moderate (.55). Comparisons of internal consistency reliabilities reported by Brustad [2] and for this study are presented in Table One.

[Insert Table One about here]

Subscale Structure

The initial exploratory factor analysis provided evidence of sampling adequacy (Kaiser-Meyer-Olkin measure = .907; Bartlett's Test of Sphericity = $p < .001$). Principal Components Analysis of the 25 items of the CAPA scale revealed the presence of 6 factors with eigenvalues exceeding 1 [13], explaining 29.1%, 6.5%, 6.2%, 5.4%, 4.5% and 4.3% of the variance respectively (Table Two). While two of these factors were fairly consistent with the subscales in the original CAPA, the remaining factors were not. The 1st factor was dominated by items from liking of games and sports but also included two items from the subscale for the liking of vigorous activity. The 2nd factor was dominated by items concerning importance of exercise. The remaining factors contained items from different subscales with the exception of the 5th factor which consisted of just two negatively worded items from the 'peer acceptance' subscale (Item 7 and 8, Table 2). Items from the 'peer acceptance' and the 'liking of vigorous activity' subscales loaded on many of the factors. Another factor model (Table Three), eliminating the 'peer acceptance' subscale and the negatively worded item from the 'liking of vigorous activity' subscale (Item 6, Table 2) yielded four components which together explained 58.8% of the

variance. Two of the four original subscales, liking of games and sports and the importance of exercise, were more cohesive using this model. While the remaining subscales, liking of physical exertion and exercise and liking of vigorous physical activity tended to load together on the third factor.

[Insert Tables Two and Table Three about here]

Construct Validity

Two second order factor models explored the overall characteristics of the scale (Tables Four & Five). When all 25 items were included, the second order analysis yielded two factors, one based on the three negatively worded items and the other on the remaining 22 items which explained 57.9% of the variance. Component 1 contributed 39.03% and Component 2 contributed 18.89%. The second analysis which excluded the peer acceptance items and the negative item from the liking of vigorous activity subscale yielded just one common factor which we called 'Attraction to Physical Activity'. This solution explained 52.7% of the variance and supports the removal of the negatively worded items and those relating to peer acceptance with this age group.

[Insert Tables Four and Table Five about here]

Discussion

The results present some evidence for the validity of the CAPA with this young age group based on internal consistency within the subscales, subscale evidence based on factor analyses and construct evidence based on second order factor analyses. Four of the five subscales had acceptable internal consistency reliability. The factor analyses revealed that there were two clear subscales. The evidence for use of the subscales was less compelling with this age group than

found with the older children using the original CAPA scale [1]. The second order factor analysis, based on four subscales provided better support for the construct of 'Attraction to Physical Activity'.

With the young children in this study, internal consistency reliability was acceptable for four of the subscales, 'liking of games and sports', 'liking of physical exertion and exercise', 'liking of vigorous activity' and 'importance of exercise'. With the age group in this study, negatively worded questions reduced the internal consistency of two of the subscales, peer acceptance in sports and games, and liking of vigorous physical exercise. When the negative items were removed the Cronbach's alpha increased from .64 to .74 for the liking of vigorous physical exercise, and from .30 to .55 for the peer acceptance subscale. It is not surprising that the negatively worded items did not work well as Marsh [14] has reported that young children are unable to respond reliably to negatively worded items.

It is interesting to note that Brustad [2] reported low internal consistency reliability for the importance of exercise subscale with his older sample. This scale performed relatively well with the younger children in this study with a Cronbach's alpha of .72. A possible explanation for the differences might relate to the heightened community awareness about the importance of physical activity for health since the early study by Brustad around 15 years ago. In Australia, children in this age bracket are also exposed to physical activity related health messages at school (For example <http://www.det.wa.edu.au/education/physicalactivity/advocacy.html>).

In contrast to our study, the peer acceptance in sports and games subscale had higher internal consistency reliability for the older sample involved in Brustad's [2] validation study. This was due in part to the inclusion of two negatively worded items. We also need to consider the greater influence of parental feedback on younger children's participation in physical activity [15].

Further support for the removal of the peer acceptance subscale with the younger age group was provided by the initial factor analysis. Peer acceptance items loaded across all six

factors. With the removal of the items measuring 'peer acceptance in games and sport' in the second factor analysis there was good evidence for two subscales (liking of games and sport and importance of exercise). Children in this study were able to differentiate between liking of games and sport and importance of exercise. However they were unable to distinguish between physical exertion and exercise and vigorous activity as these items generally loaded together or across several factors. This is not surprising considering that the items on each scale are very similar, using words such as sweaty, out of breath, play hard and burning energy. Similarly, it was of interest to note that the item 'I enjoy exercise a lot' from the 'liking of vigorous activity' subscale, loaded with 'liking of games' suggesting that young children don't distinguish between the concepts of liking and enjoyment. This too could be explained by similar words such as 'like playing' and 'look forward to'. Given that young children have difficulty differentiating between some of the concepts, caution must be used in interpreting the subscale data.

The second order factor analysis provided evidence for the construct of 'attraction to physical activity' for this age group. Although the initial second order analysis yielded two factors, one was based on factors one to four which contained most of the items, while the other was based on factors five and six which were dominated by negatively worded items. Removing the 'peer acceptance' subscale and the negatively worded items resulted in better evidence for a single underlying construct.

Our study has several strengths. Firstly, few studies choose to investigate self perceptions in young children as it is difficult to gather authentic and valid data from children this age. Our data were collected individually by a trained researcher in a quiet corner of the child's classroom, a safe and familiar setting. We were able to check for understanding and minimise the tendency for young children to respond in the way they perceive the researcher would wish. Our sample was large for studies of this type. We interviewed 334 children attending 28 schools representing a broad spectrum of socio-economic status. A limitation of the study relates to challenge of modifying a scale designed for 10- to 12-year-old children to a younger age group.

Young children are less able to discriminate subtle differences in the meaning of some words such as 'liking' and 'enjoyment' and therefore are less able to differentiate among a range of domains than older children. This may necessitate even further modification of both the questionnaire structure and wording, as well as reducing the number of subscales for use with young children. Further research involving qualitative methods is likely to provide a more in depth understanding of children's perceptions.

In keeping with other studies with older children [16], we recommend that an overall score representing attraction to physical activity can be reported with these 2nd grade children. However we further recommend that measurement of the overall construct with young children does not include negatively worded items. Despite the difficulty of interpreting the subscales with this age group, we recommend that the overall CAPA score is a useful measure to represent attractiveness to physical activity among six to eight-year-old children.

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Table One

A Comparison of Internal Consistency Reliability for Brustad (1996) (age range: 10-12 years) and the Present Study (age range: 6-8 years).

Subscales	Present Study	Brustad (1996)
	α	α
Peer acceptance in sports and games	.55 (.30)	.72
Importance of exercise	.72	.44
Liking of games and sport	.75	.70
Liking of physical exertion and exercise	.67	.74
Liking of vigorous physical activity	.74 (.64)	.74

Note. Number in the bracket is the internal consistency reliability prior to the removal of the negatively worded questions.

Table Two. Six Factor Solution using a Principal Components Analysis based on the 5 Subscales (25 Items) of the CAPA

CAPA Items	Factors					
	1	2	3	4	5	6
1. I like playing outdoor games and sport	.905					
20. I look forward to playing games and sports	.690					
5. I am told that I m good at games and sports	.580	-.327				
3. I have more fun playing games and sports than anything else	.510		.453			
11. I enjoy exercise a lot	.463	.308				
13. I wish I could play more games and sports	.362		.306			
4. I like to exercise lots	.353					
19. I think exercise is very important for my health		.881				
22. I think that exercise is the most important thing for good health		.696				
9. I think that the more exercise you get, the better.		.622				
23. I really like to exercise	.329	.567				
21. I like to burn lots of energy by playing hard		.325	.621			
24. I feel good when I run hard			.595			
15. I don't mind getting out of breath after I play hard			.582			
10. I make a lot of friends when I play games and sports			.493			
14. I think that I will feel really good after I play hard			.377			
18. I really like to run a lot				.750		
25. I am popular when I play games and sports				.652		
2. I like getting sweaty when I exercise or play hard			.329	.596		
17. Playing games and sports is my favourite thing	.335			.588		
16. I think it is very important to always be in good shape				.538		.308
8 reversed. I get teased by other kids when I play					.793	

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games and sports			
7 reversed. I get nervous and tired about playing games and sports		.763	-.360
6 reversed. I feel really tired after I play games and sports			-.850
12. I try to stay in good shape	.402		.419

Table 3. Four Factor Solution Using a Principal Components Analysis Based on 4 Subscales (19 Items) of the CAPA.

CAPA Items	Factors			
	1	2	3	4
1. I like playing outdoor games and sport	.867			
20. I look forward to playing games and sports	.789			
3. I have more fun playing games and sports than anything else	.715			
13. I wish I could play more games and sports	.504			
11. I enjoy exercise a lot	.504			
19. I think exercise is very important for my health		.860		
22. I think that exercise is the most important thing for good health		.736		
9. I think that the more exercise you get, the better.		.628		
23. I really like to exercise		.527		
12. I try to stay in good shape		.391	-.361	.331
4. I like to exercise lots				
24. I feel good when I run hard			.636	
2. I like getting sweaty when I exercise or play hard			.610	.472
15. I don't mind getting out of breath after I play hard			.595	
21. I like to burn lots of energy by playing hard		.317	.540	
14. I think that I will feel really good after I play hard		.316	.329	
18. I really like to run a lot				.727
17. Playing games and sports is my favourite thing	.391			.579
16. I think it is very important to always be in good shape		.362		.567

Table 4: Second Order Factor Solution Based on Total CAPA Scale

	Component	
	1	2
REGR factor score 1	.772	
REGR factor score 4	.747	
REGR factor score 2	.730	
REGR factor score 3	.715	-.318
REGR factor score 5		.833
REGR factor score 6		.590

Table Five: Second Order Factor Component Based on 4 CAPA Subscales

	Component
	1
REGR factor score 1	.818
REGR factor score 2	.783
REGR factor score 4	.665
REGR factor score 3	.621

Really true for me	Sort of true for me		BUT		Sort of true for me	Really true for me
		Some kids don't like getting sweaty when they exercise or play hard		Other kids don't mind getting sweaty when they exercise or play hard		

I like getting sweaty when I exercise

No always	No sometimes	Yes sometimes	Yes always

Figure 1. The top item is a sample from the original CAPA scale (Brustad, 1993) using a structured alternative format. The bottom item is a sample from the modified CAPA scale using a Likert format. In each case, from left to right, the scores range from 1 (low) to 4 (high).