

FITNESS

Relationship of Enjoyment, Perceived Competence, and Cardiorespiratory Fitness to Physical Activity Levels of Elementary School Children

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Abstract

Because of the continued increase in obesity rates and decrease in children's physical activity and fitness levels, this study investigated the relationship between habitual physical activity and perceived competence, enjoyment of physical activity, and cardiorespiratory fitness among upper elementary school children. This study used the FitnessGram PACER test to measure children's cardiorespiratory fitness, the Children's Physical Activity Correlates (CPAC) to measure perceived competence and enjoyment of physical activity, and the Physical Activity Questionnaire–Children (PAQ-C) to measure habitual physical activity. Results of a forced-entry multiple regression demonstrated that each predictor variable significantly predicted physical activity. The results of bivariate correlations also exhibited significant results. Enjoyment, perceived competence, and cardiorespiratory fitness were positively correlated with physical activity. These results support previous research and have many implications on

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elementary students. This study demonstrates that enjoyment is a significant variable in getting children to engage and persist in physical activity, providing support for the youth physical activity promotion model. These results provide support that school physical education programs need to be restructured to promote enjoyment and physical activity more effectively, ultimately to improve overall physical fitness in today's youth.

The health status of children in the United States is facing a dilemma with the increasing rate of obesity. One of the goals of Healthy People 2010 (U.S. Department of Health and Human Services, 2000) was to decrease childhood obesity, yet childhood obesity continues to steadily increase, now affecting 1 in 5 youth aged 6 to 19 (Centers for Disease Control and Prevention [CDC], 2017). The CDC (2017) reported that the number of children who are overweight (i.e., BMI > 95th percentile for age and gender) has more than tripled since the 1970s. A 2014 CDC report said that obesity affected 17% of children aged 2 to 19 (CDC, 2016). These findings from the CDC may predict another generation of overweight adults who may be at risk for weight-related health conditions.

Physical activity (PA) may be a solution for combating obesity, yet research exhibits a rapid decline in PA during adolescence (Kemper, Post, Twisk, & Van Mechelen, 1999). Multimedia-based inactive behaviors, such as watching television and playing video games, are increasingly replacing children's active behaviors (Tremblay, Barnes, & Copeland, 2005). Research demonstrates further inverse relationships between PA and obesity (Dencker et al., 2006; Johnson et al., 2000) and suggests that overall youth fitness levels have decreased (Stratton et al., 2007). In attempting to reverse this trend, researchers recommend that youth engage in at least 30 to 60 min of daily PA (Strong et al., 2005), which has been associated with increased aerobic fitness, lower blood pressure, higher levels of self-esteem, and lower levels of anxiety and stress (Dietz, 1998).

Explaining Factors Influencing Youth Physical Activity

To foster these aforementioned benefits, one must gain more understanding of the factors that influence PA. Sallis, Prochaska,

and Taylor (2000) reviewed such factors in children and adolescents and uncovered a multitude of determinants of PA levels (e.g., gender, previous PA, parental influence). Further and more recent research supported Sallis et al.'s findings of factors relating to PA in children and adolescents (Van Der Horst, Paw, Twisk, & Van Mechelen, 2007). Attempting to uphold and explain research demonstrating the association between many factors and youth PA, scholars have begun to propose various empirically supported theoretical models, including the expectancy-value model, self-efficacy theory, and youth PA promotion model.

Expectancy-Value Model

The expectancy-value model proposes that individuals' beliefs regarding their success in and value of the activity explain their activity choices, persistence, and performance (Atkinson, 1957; Spence, 1983; Wigfield, 1994; Wigfield & Eccles, 1992). These expectancies and values are presumed to be influenced by task-specific beliefs (e.g., ability beliefs, perceived difficulty of tasks; Wigfield & Eccles, 2000), which are influenced by individuals' perceptions of their previous experiences and social influences (Spence, 1983; Wigfield & Eccles, 1992). This model also uses achievement value components (e.g., attainment value/importance, intrinsic value, cost; Spence, 1983; Wigfield & Eccles, 1992) to explain PA behavior in youth. Ultimately, individuals' ability and expectancy beliefs are the foundation of the expectancy-value model and help explain motivation in youth (Wigfield & Eccles, 2000).

Self-Efficacy Theory

Self-efficacy theory focuses on different aspects of self-knowledge and individuals' conceptions of their personal effectiveness that predict their thought patterns, behaviors, and motivation (Bandura, 1977, 1986). Self-efficacy theory also proposes that judgments are based on what individuals can do with the skills they possess (Chase, 2001), which produces their efficacy levels, which predict effort and persistence (Chase, 2001). Research emphasizes the importance of educators and coaches encouraging children to attribute their failures to lack of effort or preparation (Schunk, 1994) and view ability as a malleable trait as opposed to innate (Bandura, 1990). Evidence has suggested a positive relationship between self-efficacy and moti-

vation (Chase, 2001) when motivation is defined as malleable. Thus, if youth are taught that level of PA is a developed characteristic, they may develop more intrinsic motivation, which may result in many beneficial outcomes.

Youth Physical Activity Promotion Model

The youth PA promotion model describes the conceptualization of how children's unique developmental, psychological, and behavioral characteristics promote PA (Welk, 1999). This model was developed specifically to cater to children. It provides a conceptual framework from a social-cognitive perspective for understanding the factors that may predispose (i.e., enjoyment, competence; Welk, Schaben, & Shelley, 2004), enable (i.e., motor skills, physical fitness; Gallahue & Ozmun, 1998), and reinforce (i.e., support; Welk et al., 2004) a child to be physically active (Bandura, 1986). This model also suggests interactions among these variables and supports multiple dimensions of influence (i.e., intrapersonal, sociocultural, environmental; Welk, 1999) that can directly and indirectly affect behavior. Moreover, research demonstrates that the PA promotion model is advantageous and practical, identifying the importance of outside support on children's levels of PA and providing ways to integrate such influences from different avenues (Welk, 1999).

Physical Fitness and Physical Activity

Physical fitness is closely related to PA such that physical fitness is largely determined by recent PA patterns (Blair, Cheng, & Holder, 2001). For example, individuals who increase their level of PA also likely experience improvements in physical fitness, which demonstrates a reciprocal relationship. Cardiorespiratory fitness, also known as aerobic fitness, is arguably the most important component of physical fitness. This element is widely used in the management of obesity (Epstein & Goldfield, 1999) and is the focus of the most frequent type of assessment conducted in early school physical education (Gao, 2008). Strong evidence indicates that higher levels of cardiorespiratory fitness in childhood and adolescence are associated with healthier cardiovascular profiles later in life (Ruiz, 2009). Experts recognize this association and recommend that intervention programs such as school physical education programs and

after-school PA programs emphasize health-related fitness (e.g., cardiorespiratory fitness; Payne & Isaacs, 2007; Wanless et al., 2014). Strong et al. (2005) found that increasing the level of habitual moderate to vigorous PA (MVPA) for youth to at least 60 min/day promotes overall health and disease prevention. Recent research supports this recommendation and has detected positive relationships between health-related physical fitness, self-reported PA, and various psychosocial factors (e.g., attitudes, perceived behavioral control; Gao, 2008; Shen, McCaughtry, & Martin, 2007).

Purpose of the Study

Students' motivation beliefs are key antecedents to PA participation and cardiorespiratory fitness performance (Parish & Treasure, 2003; Planinsec & Fosnaric, 2005; Shen et al., 2007). Because of the growing concern about obesity rates among children in the United States and decreasing children's PA and fitness levels, this study investigated the relationship between habitual PA and perceived competence, enjoyment of PA, and cardiorespiratory fitness in upper elementary school children.

Method

Participants

Participants for this study included students in the fifth grade from an elementary school located in a rural community in the Midwestern United States. The school was purposefully selected because of its semiannual fitness testing (spring and fall) during physical education class and its accessibility to the investigators. The institutional review board at the University of Northern Iowa approved the study. Prior to data collection, a parent or guardian gave written permission, and student participants completed a minor assent form.

Instruments

The student participants performed the FitnessGram PACER (Progressive Aerobic Cardiovascular Endurance Run), a test developed by the Cooper Institute (2005) to measure children's cardiorespiratory fitness. The test consists of a 20-m multistage shuttle

run during which students must run at increasingly higher levels of intensity. Students listened to a standardized CD with instructions and pacing cadences while performing the test on a measured course in the school gymnasium. The total number of 20-m segments that students satisfactorily completed in accordance with the prescribed pace (cadence) during the test represented students' scores (Cooper Institute, 2005). The PACER test has been reported as reliable and valid in measuring cardiorespiratory fitness in children (McClain, Welk, Ihmels, & Schaben, 2006; Morrow, Jackson, Disch, & Mood, 2000) and has shown acceptable concurrent validity and criterion-referenced validity when compared with measured VO_2 max (Morrow et al., 2000). Additionally, equivalent reliability scores indicate that the PACER test correctly measures cardiorespiratory fitness in most individuals (Gao, 2008; Plowman & Yan-Shu, 1999).

Selected scales from the Children's Physical Activity Correlates (CPAC) questionnaire measured perceived competence and enjoyment of PA (Schaben, Welk, Joens-Matre, & Hensley, 2006). The CPAC questionnaire was originally developed to assess the predisposing and reinforcing factors described in the youth PA promotion model, although only predisposing factors were of interest in this study. The predisposing factors focused on key social cognitive theory constructs underlying the youth PA promotion model, namely, outcome expectations and efficacy expectations (Schaben et al., 2006). The psychological scales on the CPAC questionnaire were derived from the Children's Attraction to Physical Activity (CAPA) scale developed by Brustad in 1993. This scale was initially created to assess the extent of children's interest in PA and was based on the concept that children's motivation to participate in PA depends on their affective reactions to various dimensions of involvement. These dimensions of involvement include children's liking of exercise (Likeexer), liking of games and sports (Likegame), and fun of physical exertion (Funexert), which together represent children's attraction (or enjoyment) to PA (Brustad, 1993, 1996). Perceived competence (Percomp) was measured using a six-item scale from the CPAC questionnaire that was derived from Harter's original Perceived Athletic Competence Scale (Schaben et al., 2006). The items on each scale were worded with a structured alternative format and scored on a 4-point scale with higher scores representing

more positive responses. After the various subscales were combined, the resultant questionnaire used in this study consisted of 14 questions that measured the constructs of (1) enjoyment (attraction) of PA, which consisted of liking of games and sports (Likegame), liking of exercise (Likeexer), fun of physical exertion (Funexert), and (2) perceived competence (Percomp). Welk, Wood, and Morss (2003) reported alpha reliabilities of $r = .82$ for the composite attraction scale and $r = .71$ for the perceived competence scale.

Habitual PA was measured using the Physical Activity Questionnaire–Children (PAQ-C), a validated self-report instrument designed to assess PA behaviors during the previous 7 days (Kowalski, Crocker, & Faulkner, 1997; Moore et al., 2007). The instrument was designed to measure levels of moderate to vigorous PA (MVPA) in children aged 9 to 15 years (Kowalski et al., 1997). The questionnaire was developed as a way of helping researchers overcome the limitations of using adult-version self-report measures when studying children (Paxton, Estabrooks, & Dziewaltowski, 2004), namely, that young children are not cognitively able to determine intensity and duration (Welk, Corbin, & Dale, 2000). The instrument used nine questions to assess a child's PA participation in a variety of situations and times, including during school, at recess, after school, in the evening, and on the weekend (Kowalski et al., 1997). Each question was scored on a 5-point Likert-type scale, with higher scores reflecting a greater level of PA. A composite PA score (PA Index) was then computed as the mean of the nine items and could range from 1 to 5. The first question on the instrument listed activities for which respondents indicated how frequently they participated in that activity during the previous 7 weeks. The score for the first question was then calculated as the average score across all items (activities). For Questions 2 to 9, participants responded to questions involving their activity during school, after school, during lunch, at recess, and on the weekend. Responses to these items included indicators of type of activity (e.g., sitting, standing, walking, riding a bike, running, and playing hard) and frequency of participation during the specified times.

The PAQ-C has been shown to have acceptable levels of construct validity and to be moderately related to objectively measured PA, as well as other self-report measures ($r = .39$ to $r = .63$; Kowalski et al.,

1997). In a follow-up study, test-retest reliability was reported to be acceptable for males ($r = .75$) and females ($r = .82$; Crocker, Bailey, Faulkner, Kowalski, & McGrath, 1997). Janz, Lutuchy, and Wenthe (2008) found standardized Cronbach's alphas ranging from 0.72 to 0.82 for the PAQ-C, which suggests good internal consistency.

Procedures

Students were administered the FitnessGram PACER test during a regularly scheduled physical education class. At a subsequent physical education class 1 week later, both paper-and-pencil questionnaires were administered at the beginning of the class. Students were spread throughout the gymnasium, provided the various surveys to complete individually, and given as much time as needed to answer the questions. To accommodate all students' reading ability, the investigator read each question aloud. Completed questionnaires were collected, checked for accuracy, and then matched with PACER test results prior to data entry and subsequent statistical analyses using SPSS (version 21.0). Independent-samples t tests were conducted on all variables and examined the role of gender on test results. Correlational techniques determined associations among the variables of interest. An alpha level of .05 was set for all statistical tests.

Results

Participants in the study included 42 Caucasian students (25 boys, 17 girls) aged 10 to 11 years in the fifth grade at the selected school. Participants' height ranged from 53 to 63 in., with an average of 58 in. Their weight ranged from 61 to 156 lb, with a mean of 98 lb. Body mass index (BMI) varied from 15.1 to 29.9, with an average of 20.4. The variables measured in the study included PA (PA Index), cardiorespiratory fitness (PACER score), perceived competence (Percomp), and measures of enjoyment (Likeexer, Likegame, and Funexert). Table 1 shows the results of the independent-samples t tests, which determined any differences between males and females for the variables of interest.

Table 1
Descriptive Statistics for Measured Variables

Variable by gender	<i>n</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>p</i>
PACER				0.05	0.96
M	25	37.28	19.13		
F	16	37.06	10.33		
PA Index				0.60	0.55
M	25	3.08	0.80		
F	17	2.96	0.42		
Likegame				0.11	0.92
M	24	3.42	0.81		
F	17	3.39	0.65		
Funexert				0.77	0.45
M	24	3.17	0.81		
F	17	2.98	0.73		
Likeexer				-0.09	0.93
M	24	3.15	1.04		
F	17	3.18	0.68		
Percomp				-1.24	0.22
M	24	2.85	0.91		
F	17	3.16	0.71		

All *p* values for differences in gender were greater than 0.22, which indicated no significant differences in the mean scores for males and females on the variables of interest. Therefore, the gender groups were combined for subsequent correlational analyses.

After finding that gender was not significant, the researchers calculated Pearson product-moment correlations between all variables of interest in the study. Table 2 shows the intercorrelations among all variables, revealing that all correlations were positive and moderately high. All variables were significantly related to self-reported PA (PA Index), and the variable with the highest simple correlation was the PACER test score ($r = .60$).

Table 2

Correlations Between Psychosocial Variables, Cardiorespiratory Fitness, and Physical Activity

Variable	PA Index	PACER	Likegame	Funexert	Likeexer	Percomp
PA Index						
PACER	0.60**					
Likegame	0.54**	0.42**				
Funexert	0.43**	0.36*	0.45**			
Likeexer	0.45**	0.56**	0.64**	0.57**		
Percomp	0.51**	0.53**	0.73**	0.39*	0.65**	

**Correlation significant at the 0.01 level (two-tailed). *Significant at 0.05 level (two-tailed).

A forced-entry multiple regression analysis predicted PA (PA Index) from the other variables in the study. The overall regression model using five predictor variables was significant: $F(5, 36) = 18.83$, $p < .05$ with $R = .72$ and $R^2 = .52$. Table 3 shows the model summary. The results of the analysis demonstrated that all significant standardized beta coefficients in the full model (i.e., Likegame, Funexert, PACER) were positively related to PA: each of these predictor variables made a significant contribution to the prediction of PA. The beta coefficients for the remaining variables, Likeexer and Percomp, exhibited a negative relationship with PA. These coefficients were not significant, yet still demonstrated an interesting and worth-noting trend. Residual analysis was also conducted with the results, showing that the residual values were normally distributed with no significant outliers.

Table 3*Multiple Regression Analysis Results: Coefficients and Collinearity Statistics*

Model	Unstandardized coefficients		Standardized coefficients			Collinearity statistics	
	B	SE	Beta	t	Sig.	Tolerance	VIF
CONSTANT	0.79	0.42		1.87	0.07		
Likegame	0.41	0.18	0.46	2.34	0.03	0.37	2.69
Funexert	0.27	0.13	0.31	2.03	0.05	0.62	1.60
Likeexer	-0.20	0.14	-0.27	-1.36	0.18	0.36	2.75
Percomp	-0.03	0.16	-0.04	-0.19	0.85	0.36	2.76
PACER Score	0.02	0.01	0.44	2.97	0.01	0.63	1.58

Note. Dependent variable is physical activity (PA Index).

The variance inflation factor (VIF) shown in Table 3 was calculated and addressed the concern of multicollinearity among the predictor variables, as demonstrated by the significant correlations reported in Table 2. Although there are no specific guidelines about what value of VIF should be a cause for concern, Myers (1990) suggests that a value of 10 or greater may be this mark of concern. Furthermore, Montgomery, Peck, and Vining (2001) later suggest that if any of the VIFs exceed 5 or 10, the regression coefficients appear to be poorly estimated because of multicollinearity. Thus, because the highest VIF was 2.76, it is likely that multicollinearity is not a major problem in this study and that the significant variables (i.e., Likegame, Funexert, and PACER) are good predictors of PA. Overall, the model accounted for approximately 52% of the variance associated with PA. Using the standardized beta coefficients as the basis for determining the relative importance of the predictor variables, the researchers identified Likegame as the most important predictor variable in the model, followed closely by PACER score and then Funexert.

Discussion

This study investigated the relationships between PA of elementary school children and their enjoyment, perceived competence, and cardiorespiratory fitness. These relationships were examined within the framework of Welk's (1999) youth PA promotion model, which sought to explain youth PA behavior through a social-ecological model. The model categorizes the numerous correlates that influence children's PA into predisposing, enabling, and reinforcing factors. Considering predisposing factors represent the overall tendency of a child to be active, the model identifies two fundamental questions that aim to explain youth PA behavior: "Is it worth it?" and "Am I able?" These factors were of interest in this study and were operationalized in the model as enjoyment and perception of competence.

The results of this study indicated no differences between boys and girls in terms of PA level, cardiorespiratory fitness, and measures of enjoyment and perceived competence. These findings are contrary to those in previous studies that report boys engage in more PA than girls (Beighle, Morgan, Masurier, & Pangrazi, 2006; Riddoch et al., 2004; Sallis et al., 2000), boys exhibit higher levels of cardiorespiratory fitness than girls (Laudsepp, Libik, & Hannus, 2002), boys find more enjoyment in PA than girls do (Brustad, 1993, 1996; Laudsepp et al., 2002), and boys' perception of their physical competence is greater than girls' (Brustad, 1993, 1996; Eccles & Harold, 1991). Although there is not a specific explanation for this lack of significance, gender-related differences may not be fully manifested within the age range of this study sample, or the unique setting from which the sample was obtained may not be subject to the differences found in previous literature. In this sample, students were enrolled in a daily physical education program that emphasizes cardiorespiratory endurance and implements heart rate monitors to promote awareness of cardiorespiratory fitness levels. Moreover, the application of these monitors in the sample's physical education program may promote higher levels of PA for all students, and these higher levels of PA may dilute the differences suggested in previous literature. It also is worth noting that the participants in this study reported a substantially higher mean on the PA scale ($M = 3.08$ out of 5) than participants in a study of similarly aged children from a similarly rural demographic ($M = 1.83$ out of 5; Paxton et al., 2004),

which further demonstrates the unique results of this sample and potentially explains the lack of empirical support.

Brustad (1993) specifically examined the interaction between attraction and perceived competence in elementary school students. The findings of this study support Brustad's findings that children's perceived physical competence is an important influence on their attraction to PA. The findings of this study also indicate that when considered separately, each variable also positively correlates with PA.

Research with children and adolescents has found that physical self-perceptions are significant correlates of PA and fitness (Laudsepp et al., 2002). According to Welk (1999), youth who are physically fit and skilled are more likely to seek out opportunities to be active and will most likely persist in their chosen activities. Thus, it is a sensible prediction that students from this study likely have higher physical self-perceptions because of their generally higher PA and cardiorespiratory fitness levels.

When looking at the results of this study through a multivariate lens (i.e., the results of the regression analysis), one may find that liking games and fun of exercise (i.e., components of enjoyment as an outcome expectation) and cardiorespiratory fitness become important predictors of PA behavior. These results demonstrate the importance of enjoyment in the PA and perceived competence relationship in that once enjoyment is controlled for, that relationship is significantly reduced, which is consistent with results reported by Paxton et al. (2004).

PA courses have been recognized as an optimal vehicle for influencing PA habits in youth (Welk, 1999); they provide an organized structure and present opportunities for most school-age children to participate in meaningful PA experiences that improve their overall health and allow them to develop healthy exercise practices. With the rise of obesity and the decline of PA, the current model of physical education in most schools seems to be lacking in properly equipping students with the knowledge and skills needed to lead a healthy, active lifestyle. Implementing an effective physical education program is an important step in providing students with the understanding and experience to possess these lifelong skills. Designing an appropriate curriculum, choosing activities and games that

students enjoy, and delivering the curriculum in a manner that fosters enjoyment and competence for PA participation are important implications derived from this study. Ultimately, children must first enjoy the activity before they can feel competent and subsequently persist in participating in it.

Limitations

Limited research has been conducted on the effects of the ability of school-based programs to increase PA levels of elementary-age participants. This study shares similarities with other studies on the topic (Wanless et al., 2014). First, the small sample size, from a single school in a rural Midwestern setting, limits variability and results in low statistical power. Second, because of foreseen (e.g., socio-economic status and access to resources) and unforeseen variable differences among the populations, the geographical restrictions of the sample may also limit aspects of the generalizability. Finally, recruitment of elementary-age participants is often difficult given the need to obtain parental/guardian consent and the extra steps required to do so.

The use of self-report measures represents an additional limitation based on the innate idea that self-reports may not accurately represent the participants' disposition. The validity of various scales, particularly those measuring enjoyment, serves as a limitation of this study. In this study, enjoyment was not measured directly as a variable in its entirety. Instead, each subscale was tested individually. This approach was consistent with Brustad's (1993) original conceptualization of the constructs, but previous literature has developed and used a multidimensional construct identified as attraction to PA, which was not implemented in this study (Schaben et al., 2006; Welk et al., 2003).

Conclusions

The findings in this study add support for the validity of the youth PA promotion model. Positive attitudes toward the outcome of participation in PA (operationalized as enjoyment in this study) and positive self-perceptions of ability to engage in PA are key factors for determining children's PA behaviors. Moreover, it appears that enjoyment mediates the relationship between PA and perceived competence. Physical fitness, namely, cardiorespiratory

fitness, was also strongly linked to children's PA, which thus reinforces the notion that physical status is important to children's PA behavior. However, the numerous determinants of children's PA need to be more fully explained, and continued research is necessary. A better understanding of the factors influencing children's PA will facilitate the development of intervention programs designed to increase PA levels among children and reduce the rate of childhood obesity. Addressing the underlying behavioral and psychological mechanisms leading to the rising obesity trajectories is a vital step to solving the problem (Wanless et al., 2014).

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