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Social Cognitive Beliefs Predicting Children's Physical Activity and Cardiovascular Fitness in Physical Education

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Abstract

Purpose: This study examined the predictive utility of children's self-efficacy, outcome expectancy, and satisfaction on their perceived persistence/effort, physical activity (PA) levels, and cardiovascular fitness.

Method: Participants were 307 sixth through eighth grade students enrolled in a 90-minute physical education class on alternate days. Participants completed questionnaires assessing self-efficacy, outcome expectancy, satisfaction, and perceived persistence/effort during the second to last week of the school year. During the last week of school the Progressive Aerobic Cardiovascular Endurance Run (PACER) test was administered and in-class PA levels were measured via pedometers (Yamax Digi-Walker SW-701). Multiple regression analyses were used to determine how self-efficacy, outcome expectancy, and satisfaction predicted children's persistence/effort, PA levels, and cardiovascular fitness.

Results: Correlation analysis indicated all variables were significantly associated with one another (rs = .17 to .59, ps < .01) while regression analyses showed outcome expectancy (ß = .36, p <.01) and satisfaction (ß = .34, p <.01) were significant predictors for persistence/effort, accounting for 25.48% and 9.54% of the variance, respectively. Further, children's self-efficacy (ß = .28, p <.01), satisfaction (ß = .18, p <.01), and outcome expectancy (ß = .13, p <.05) significantly predicted their in-class PA levels, and explained 20.14%, 2.72% and 1.00% of the variance, respectively. Finally, self-efficacy (ß = .35, p <.01) was the only significant predictor for cardiovascular fitness accounting for 12.16% of the variance.

Conclusion: Results indicate that children who perceive the benefits of physical education, enjoy the sense of satisfaction physical education provides, and have higher self-efficacy persist and put forth greater effort during class while also displaying higher in-class PA levels and better cardiovascular fitness.

Keywords: Middle school; Outcome expectancy; Persistence/effort; Satisfaction; Self-efficacy

Introduction

Due to environmental and social changes in last few decades (e.g. increased technological innovation, more sedentary activity), overweight and obesity have become serious threats to public health and the nation's economy. Research has indicated that schools have the potential to help battle rising rates of overweight and obesity and have prioritized physical fitness as a primary goal of physical education curriculum [1,2]. However, many children and youth are still not attaining the recommended levels of physical activity (PA) while getting children more active has proven challenging due to decreased motivation among students toward PA beginning around the time of middle school attendance [3,4]. However, the middle school years are important in regard to PA as these years of development have an impact on PA engagement into adulthood [5].

Social cognitive theory asserts that certain social cognitive variables may influence individuals' PA through self-regulation of target behaviors [6,7]. Based on the theory, self-efficacy, outcome expectancy, and satisfaction can influence and predict individuals' behavior and persistence in said behavior [8]. Several studies have revealed that higher self-efficacy leads to greater persistence and better performance than lower self-efficacy in elementary physical education settings [9-12]. Moreover, Molt et al. [12] found that self-efficacy was positively related to adolescent girls' moderate to vigorous physical activity.

Recent research has also indicated that self-efficacy can influence outcome expectancy as it pertains to health behaviors [9]. Outcome expectancy concerns an individual's beliefs concerning the value of and outcomes resulting from engagement in certain behaviors [10,13,14] in contrast to self-efficacy which focuses solely on the behavioral performance [8]. Several studies have suggested that self-efficacy might mediate outcome expectancies related to PA participation in elementary school settings [15-17]. Examining the joint effect of self-efficacy and other social cognitive variables such as outcome expectancy and satisfaction will increase our understanding of the influence and predictive value of these variables as they relate to PA.

Regarding satisfaction, self-determination theory proposes that satisfaction refers to the fulfillment of the psychological needs of

autonomy, competency, and relatedness [18]. Moreno et al. [19] reported increased student satisfaction within a PA environment as a result of meeting the three aforementioned needs led to greater perceptions of PA importance and greater motivation for PA participation. Additionally, in physical education settings where students possess greater PA enjoyment, greater importance is given to physical education than to similar activities [21] while students who feel more acceptance among their peers and more support from teachers will be more likely to participate in PA [21]. Despite the fact the psychosocial variables reviewed to this point have been studied in relation to the promotion of PA, limited research has investigated the joint predictive utility of middle school students' satisfaction, outcome expectancy, and self-efficacy on perceived persistence/effort, daily PA levels, and cardiovascular fitness. This study was designed to address this issue.

The purpose of the study was to examine the predictive utility of middle school children's self-efficacy, outcome expectancy, and satisfaction on their perceived persistence/effort, daily PA levels, and cardiovascular fitness. The hypothesis of the study was that middle school children's self-efficacy, outcome expectancy, and satisfaction would (1) significantly predict their perceived persistence/effort, (2) significantly contribute to the daily PA levels, and (3) significantly contribute to the cardiovascular fitness performance in the classes.

Method

Participants

Three-hundred and seven middle school students participated in the study (149 boys, 158 girls). These students ranged in age from 12 to 15 years and consisted of sixth (n=101), seventh (n=96), and eighth (n=110) grade students enrolled in a public school in the southern United States. The ethnic and racial backgrounds of the participants consisted of 83.1% Caucasian, 12.1% African-American, and 2% Hispanic American. The participants resided in middle and higher class families.

Procedures

Participants were enrolled in a 90-minute PE class on alternate days. Three veteran instructors, all with master's degrees in physical education and an average of ten years teaching experience among them, co-taught the class. General teaching protocol included taking attendance after which warm up activities were performed. The instructors valued skill acquisition and organized learning activities and game play based on the skills introduced at the onset of each class. At the end of class, the instructors provided a five minute recap of skills and games learned during class time. Before the start of the study, permission was obtained from the university institutional review board after which parental consent and child assent were obtained.

Data collection began in the second to last week of the school year, at which time participants completed questionnaires assessing their self-efficacy, outcome expectancy, and perceived persistence/effort [22]. Students answered the questionnaires confidentially and were required to complete the questionnaires before leaving the class. After the completion of the questionnaires, and during the final week of school, participants took the Progressive Aerobic Cardiovascular Endurance Run (PACER) test while in-class PA levels were measured via pedometers (Yamax Digi-Walker SW-701). Prior to the PACER test, the instructors introduced the test to the students and provided demonstrations. Students' performances were recorded on the PACER score sheets by the instructors. The students were required to reset the pedometers to zero before the warm-up activities and handed them in at the end of the class.

Instruments

Self-Efficacy: The mean score of a six-item questionnaire was used to assess the participants' self-efficacy [11]. The items were used with a 5-point Likert-type scale (1 = strongly disagree, 5 = strongly agree). The participants were asked: "With regard to this week's physical education class, I have confidence in..." The sample answers were: (a) my ability to do well in physical education class; and (b) my ability to learn skills in physical education class. This measure has demonstrated acceptable validity and internal consistency in measuring self-efficacy [11].

Outcome Expectancy: The outcome expectancy instrument was borrowed from Goudas & Dermtizaki et al. [23] study. The instrument indicated acceptable scale validity and internal consistency (a=.81) with middle school students [23]. In this study, outcome expectancy was assessed via the interaction of outcome likelihood and outcome values. The product of outcome likelihood and outcome value was calculated for each specific outcome expectancy, and the mean of these 10 outcome expectancies was then used as an overall indication of general outcome expectancy. To measure students' perception of outcome likelihood, students rated the likely occurrence of 10 different possible outcomes of participating in the fitness unit on a 7-point Likert-type scale (1 = very unlikely, 7 = very likely). Sample outcomes included learning how to exercise after finishing school, exercise to improve health, learn cooperation, and to develop a nice body and/or physically condition oneself. To measure students' perception of outcome values, students rated each of the outcomes in terms of its value for them on 7-point Likert-type scale (1 = very unimportant, 7 = very important).

Satisfaction: This measure was from an assessment instrument used in a study by Xiang et al. [24] in a physical education setting. Four items were used to assess students' satisfaction in physical education with students responding on a 5-point Likert scale (1 = not like me, 5 = very much like me). The four items were: (a) I have lots of fun in physical education classes; (b) I enjoy participating in physical education classes; (c) I feel bored in physical education classes; and (d) I daydream instead of thinking about what I'm doing in physical education classes. The last two items were reverse-scored. The mean of these items represented students' perceived satisfaction in physical education. This measure has achieved acceptable internal consistency ($\alpha = .70$) [24].

Persistence/effort: The measure of students' perceived effort/persistence to perform or learn in physical education classes was adopted from Guan et al. [22] and was assessed via eight items. Students rated each item on a 7-point scale, ranging from 1 (not at all true for me) to 7 (very true for me). The stem for these items was "In this fitness (soccer) class...". One sample item was: "When I have trouble performing some skills, I go back and practice." The scale previously demonstrated acceptable reliability (Cronbach's coefficient=.90) and validity among secondary students [22].

Physical Activity Levels: Participants' average steps during class time were used to represent their PA levels. Specifically, total pedometer steps were divided by the total class time in minutes. The total steps were collected by Ymax Digi-Walker SW-701 pedometers, one of the most accurate and popular measures of individual's steps in an

authentic setting [25,26]. The validity of the measurement was achieved by a calibration of the instrument. Prior to the data collection, all the pedometers were shaken 100 times and the error for all pedometers was less than 5%.

Cardiovascular Fitness: Cardiovascular fitness was assessed via the Progressive Aerobic Cardiovascular Endurance Run (PACER), a measure developed to evaluate children's cardiovascular fitness [27]. The PACER has proven to be valid and reliable in the assessment of children's cardiovascular fitness [28]. The PACER requires participants to perform a 20-meter multi-stage shuttle run: the 20-meter distance was measured accurately and marked with tape on each side. Approximately 20 students were measured at one time. The pace was set by an audio CD which elicits a beeping noise which starts with wide intervals between consecutive beeps and slowly decreases the interval (i.e., beeps become closer in succession) between beeps each minute. When the test begins, students run from one tape line 20 meters to the other tape line touching the boundary line with their foot by the time the beep sounds. When students hear the next beep, they ran back to the original start position. The test continues in this manner until the student fails to make it to the tape line opposite to them two successive times. Students' scores were recorded as the number of repetitions they completed during the shuttle run.

Data analysis

First, descriptive statistics and Pearson product-moment correlations were employed to describe the sample and evaluate correlations. Cronbach's alpha coefficients were also computed to determine the internal consistency of the self-report measures. Second, multiple regression analyses were employed to calculate the contributive strengths of the self-efficacy, outcome expectancy, and satisfaction for children's persistence/effort, PA levels, and cardiovascular fitness.

Results

Descriptive and Correlation Analyses: means, standard deviations, and Cronbach's alpha coefficients for the measures are listed in Table 1. Correlation analysis indicated that all the social cognitive variables and physical activity and fitness variables were significantly associated with one another (rs = .17 to .59, ps < .01). In general, participants demonstrated relatively high levels of self-efficacy, outcome expectancy, and satisfaction as all means of the variables were above the midpoint of the measures (i.e. 2.5).

Variable	1	2	3	4	5	6
Self-efficacy	-					
Outcome expectancy	0.59**	-				
Satisfaction	0.56**	0.43**	-			
Perceived persistence/effort	0.44**	0.50**	0.50**	-		
PA levels	0.44**	0.36**	0.39**	0.44**	-	
Cardiovascular fitness	0.35**	0.19*	0.22**	0.18*	0.17*	
Cronbach's alpha Coefficient	.71	.75	.74	.75	.77	.81
Mean	4.02	34.89	3.63	4.91	60.17	37.67
Standard Deviation	0.64	10.69	0.92	1.36	14.21	15.86
Note: *p<.01, ** p<.001						

Table 1: Internal Consistency and Correlations among Variables (N=302)

Regression analyses indicated outcome expectancy (ß = .36, p <.01) and satisfaction (ß = .34, p <.01) to be significant predictors for persistence/effort, accounting for 25.48% and 9.54% of the variance, respectively. Participants' self-efficacy (ß = .28, p <.01), satisfaction (ß = .18, p <.01), and outcome expectancy (ß = .13, p <.05) significantly predicted their in-class PA levels, and explained 20.14%, 2.72% and 1.00% of the variance, respectively. Self-efficacy (ß = .35, p <.01) was the only significant predictor for cardiovascular fitness accounting for 12.16% of the variance.

Dependent Variable	Independent variable	B	R^2 Change	t Value
Persistence/effort				
	Outcome expectancy	.36*	0.25	47.92
	Satisfaction	.34*	0.10	43.45
PA level				
	Self-efficacy	.28*	0.20	15.86
	Outcome expectancy	.13*	0.03	3.90
	Satisfaction	.18*	0 .01	8.51
Cardiovascular fitness				
	Self-efficacy	.35*	0.12	41.25
Note: *p<.01				

Table 2: Regression Analyses Results

Discussion

The present study aimed to consider the predictive utility of middle school children's self-efficacy, outcome expectancy, and satisfaction on their perceived persistence/effort, PA levels, and cardiovascular fitness. Prior to the main analyses, the internal consistency and validity of the measures was provided for this study. Taken together, the results substantiate the positive relationships between the social cognitive variables and physical activity participation. The findings provide empirical evidence for the optimal relationship among these variables in middle school (6-8th grade) physical education settings.

The first hypothesis stated that the middle school students' self-efficacy, outcome expectancy, and satisfaction would significantly predict their perceived persistence/effort. Findings indicate that students' perception of competence, expectations of the results of exercise, and interest in the exercises being performed were significant contributors of effort put forth in physical education. As such, this result supports the hypothesis of the current study. Moreover, the results are in agreement with previous literature which demonstrates middle school students who perceive benefits as a result of engagement in physical education and/or enjoy the sense of satisfaction provided by physical education are more likely to persist and put forth more effort during PA participation [13,29,30].

The second hypothesis proposed that the three social cognitive variables would significantly contribute to students' PA levels. Results indicate that children with greater self-efficacy, better perceptions of the benefit of physical education, and high satisfaction displayed higher in-class PA levels. This research result echoes previous studies reporting the significant association between PE engagement due to increased self-efficacy [9,17,25], outcome expectancy [13,30] and satisfaction [19] for physical activity.

The last hypothesis was that the aforementioned variables would significantly contribute to the cardiovascular fitness test performance in the classes. Findings from the current study indicate that middle school students possessed better cardiovascular fitness levels when self-efficacy was higher for physical education. Children with higher competence beliefs also performed better on cardiovascular fitness test. These findings are consistent with previous research showing students' expectancy-related beliefs predicted running performance in physical education [31,32].

Overall, the findings suggest that physical educators should consider the effects of different psychosocial factors on children's achievement-related cognitions and behaviors. The findings might have useful implications for practice in physical education. Physical education teachers can help students maintain relatively accurate but high competence beliefs and help students develop competence beliefs through the attainment of success during PA tasks. Specifically, teachers can helps students keep tasks at a relatively challenging but realistic level of difficulty, provide accurate and specific feedback, and positively reinforce task completion, which would help students successfully complete the task [25].

Several research limitations should be noted when these findings are interpreted. First, the participants of the study came from one school site and were homogenous in terms of ethnicity, race, and socioeconomic status all of which limit the generalizability of the findings. The variables in this study should be tested with a large and more diverse sample in future research. Second, this study was cross-sectional in design, so causal effects could not be identified between the study variables. Therefore, longitudinally designed studies are recommended in future research [33-36]. Finally, the data of the four social cognitive variables collected in this study were collected through the use of surveys and, thus, are subject to participant bias. To achieve a more complete understanding of the relationships between social cognitive variables and physical activity and fitness, future research shall incorporate qualitative measures such as interviews as opposed to only subjective measures.

Conclusion

In summary, this research provides a better understanding of the predictive utility of social cognitive beliefs on perceived effort, daily PA behaviors, and cardiovascular fitness. Physical educators and administrators should consider the significant effect of social cognitive beliefs on physical activity behaviors and apply these findings to daily teaching methodology. Future research should continue to explore the relationships of the variables in different settings such as elementary school and high school. Future research also needs to further investigate the role of the social cognitive beliefs as a function of gender and race.

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