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Correlates of Physical Activity in Male and Female Youth

**Timothy Bungum, Marsha Dowda, Anne Weston,
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This study examined associations between psychosocial factors and physical activity in a group of youth ($n = 520$). Students completed the Previous Day Physical Activity Recall and a survey of potential determinants of physical activity. Regression analyses of intentions to be physically active revealed that enjoyment and self-efficacy predicted intentions for both males and females. Attitudes predicted moderate to vigorous activity (MVPA), and enjoyment and self-efficacy predicted vigorous activity (VPA) for males. Self-efficacy predicted both MVPA and VPA for females. The findings suggest that intervention programs targeted at youth should include developmentally appropriate activities that are fun and promote physical activity self-efficacy.

The health benefits associated with regular physical activity in adults are clear. Less well-established, but increasingly apparent, are the benefits that accrue to physically active youth. These include increases in cardiorespiratory fitness and muscular strength, improvements in risk factors for cardiovascular disease, increases in bone mineral density, and benefits to psychological health (10). On the weight of this evidence, researchers, public health authorities, and health care providers recommend that adolescents be physically active on a daily basis and participate in three or more sessions of continuous moderate to vigorous physical activity each week (10, 17). While studies indicate that a majority of youth do participate in adequate amounts of moderate physical activity, few meet the current guidelines for regular participation in vigorous physical activity (7).

Although the benefits of physical activity for youth are increasingly clear, the scientific literature describes few effective strategies for promoting physical activity in this population. As a starting point, researchers have attempted to identify the psychosocial and environmental factors that influence physical activity in children and adolescents. The results of these studies suggest that physical activity self-efficacy, positive outcome expectancies, parental physical activity, social sup-

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port, and access to equipment and facilities are factors associated with physical activity in adolescents (3, 8, 11). Sallis et al. (11) have hypothesized that determinants of physical activity may differ by gender and intensity of activity. Knowledge of determinants specific to gender and physical activity intensity would allow those implementing intervention programs to design specific strategies for specific populations. Experts have noted the need for research on this topic and recommend that researchers identify the multiple determinants of physical activity in children and adolescents, and test interventions that target specific determinants (11). Accordingly, the purpose of this study was (a) to examine associations between selected psychosocial factors and moderate to vigorous (MVPA) and vigorous physical activity (VPA) in youth, and (b) to determine whether the correlates of physical activity behavior differ by gender in this population.

Methods

Subjects

Subjects were students attending eight public, two private, and two parochial schools in Columbia, South Carolina. Most subjects were 9th-grade students ($n = 512$), but the sample also included some students in 8th, 10th, 11th, and 12th grades ($n = 226$). Intact classes participated, and sampling was not random; only students whose teachers expressed interest in participating in a subsequent physical activity intervention study were included. The percentage of nonwhite subjects (40%) was similar to the percentage of nonwhite students enrolled in public schools in South Carolina (44%). After deletions for missing data, 520 students' responses entered the analysis. Demographic characteristics of the sample are presented in Table 1. Surveys excluded from the analysis did not differ from included surveys on gender or grade. The subject population after exclusions, however, did include a slightly lower percentage of nonwhite subjects (34%). Procedures for administering the recall and survey and for ensuring the accuracy of the data are described in a previous paper (19). The study was approved by the University of South Carolina Institutional Review Board.

Determinants of Physical Activity

Potential determinants of physical activity were selected based on social cognitive theory (2) and the theory of reasoned action (1). The beliefs and values scales were modeled after those created by Saunders et al. (12). The sum of the products of the beliefs and values regarding physical activity items formed the attitudes item. The summed scores of three semantic scales, which asked whether participating in physical activities during free time would be unpleasant/pleasant, dull/interesting, and boring/stimulating, formed the enjoyment of physical activity scale. The self-efficacy scale was similar to one developed by Reynolds et al. for adolescents (9). Scales similar to ones created by Valois, Desharnais, and Godin (18) measured subjective norms related to physical activity. As recommended by Ajzen and Fishbein (1), a single item assessed the intention to be physically active during the next 2 weeks. All items were measured on 7-point, Likert-type scales, with -3 and $+3$ serving as endpoints and 0 serving as the null value. A subgroup of 168 students completed the determinants instrument twice, with an interval of 2 weeks, to assess its test-retest reliability. Scale items are described and test-retest coefficients and Cronbach's alpha are presented in Table 2.

Table 1 Demographics Total and After Deletions for Missing Values

Variable	Total			After deletions		
	<i>n</i>	%	Age (<i>M</i> ± <i>SD</i>)	<i>n</i>	%	Age (<i>M</i> ± <i>SD</i>)
Grade						
8	141	19.1	13.4 ± 0.6	99	19.0	13.3 ± 0.6
9	512	69.4	14.4 ± 0.7	366	70.4	14.4 ± 0.7
10	55	7.5	15.5 ± 0.7	38	7.3	15.3 ± 0.6
11	12	1.6	16.3 ± 0.5	6	1.2	16.3 ± 0.5
12	18	2.4	17.6 ± 0.6	11	2.1	17.6 ± 0.5
Gender						
Male	389	47.3		255	49.0	
Female	349	52.7		265	51.0	
Race						
White	445	60.3		344	66.2	
Black	236	32.0		139	26.7	
Other	57	7.7		37	7.1	

Table 2 Descriptions of Scales Used to Measure Psychological Variables

Name of scale	Items	Description	Test-retest	α
Subjective normative	10	Perceived strength of peers', family members', and professionals beliefs that subject should exercise.	.73	.91
Attitudes	20	Belief that exercise will result in desirable outcomes and the relative "goodness" or "badness" of these outcomes (i.e., having fun, losing weight, being embarrassed, receiving an injury).	.99	.65
Intentions	1	During free time during the next 2 weeks, intent to do active sports or vigorous physical activities.	.76	—
Enjoyment	3	Perception that exercising during free time would be unpleasant/pleasant, dull/interesting, and boring/stimulating.	.87	.87
Self-efficacy	6	Rating of confidence that subject can exercise when facing barriers such as fatigue, lack of time, other commitments, or criticism.	.74	.87

Physical Activity Measurement

Students reported physical activity during after-school hours by completing a 1-day recall instrument, the Previous Day Physical Activity Recall (PDPAR), on one occasion. The PDPAR uses a standard form organized into seventeen 30-min segments, beginning at 3:00 p.m. and ending at 11:30 p.m. Thirty-five common activities, including sedentary activities such as watching television and eating, are listed. Respondents recorded the main activity in which they participated in each of the 30-min time periods on the previous day. The main activity was defined as the activity that occupied most of the 30-min time block. Respondents then rated the intensity of each reported activity as very light, light, medium, or hard. The instrument described each level of intensity and provided cartoons that depicted activities typical of each level. The validity and procedures for administering the PDPAR are described elsewhere (19). The study measured two levels of physical activity, moderate-to-vigorous physical activity (MVPA) and vigorous physical activity (VPA). The sum of the number of 30-min time blocks reported at an intensity of ≥ 3 METs served as the indicator of MVPA, while the sum of 30-min blocks reported at an intensity of ≥ 6 METs represented VPA.

Statistical Analysis

Gender specific means and standard deviations were calculated for scores on the continuous psychosocial measures. Responses to categorical variables were summarized using percentages. Frequency counts of participation in moderate and vigorous physical activity served as dependent variables in regression equations. Gender specific multiple regression analysis identified independent predictors of MVPA and VPA. Because the distributions of both levels of physical activity were positively skewed, the physical activity variables were log transformed for statistical analysis. All data were analyzed using SAS (v. 6.08).

Results

Descriptive statistics for the physical activity and determinant variables are shown in Table 3. Males were significantly more active than females at both the MVPA and VPA levels. Males reported an average of 3.7 30-min blocks of MVPA, while females reported an average of 2.6 blocks ($p < .001$). For VPA, males and females reported an average of 2.1 and 0.9 blocks of activity, respectively ($p < .001$).

Female students held significantly stronger attitudes about exercise/physical activity than did male students. Male students reported significantly greater intentions to be physically active during the next 2 weeks than did female students. Students' responses showed no gender differences for the remaining psychosocial variables.

Pearson correlations between MVPA, VPA, and intentions and the hypothesized determinant variables are shown in Table 4. For male students, subjective norms correlated with intentions; among female students, subjective norms correlated with both VPA and intentions. For both males and females, attitudes, enjoyment, and self-efficacy correlated with MVPA, VPA, and intentions. Age was also a correlate of VPA for both males and females, and intentions was a significant correlate of MVPA and VPA.

Table 3 Responses to Psychological Scales and Differences Between Genders

Variable	Males (<i>N</i> = 255) (<i>M</i> ± <i>SD</i>)	Females (<i>N</i> = 265) (<i>M</i> ± <i>SD</i>)	<i>p</i> value
Activity			
Moderate to vigorous physical activity (MVPA)	3.73 ± 2.87	2.59 ± 2.27	<.001
Vigorous physical activity (VPA)	2.14 ± 2.52	0.92 ± 1.65	<.001
Psychosocial			
Intentions	2.04 ± 1.55	1.68 ± 1.47	.006
Enjoyment	5.4 ± 4.1	5.1 ± 3.8	.53
Subjective norms	9.8 ± 11.1	9.6 ± 10.1	.82
Attitudes	52.5 ± 30.2	61.2 ± 29.8	.001
Self-efficacy	6.4 ± 8.7	6.2 ± 8.3	.76

Table 4 Correlation Coefficients Between Log-Transformed Moderate to Vigorous (MVPA), and Vigorous Physical Activity (VPA), and Intentions and Determinants for Males and Females

Variable	Males (<i>N</i> = 255)			Females (<i>N</i> = 265)		
	MVPA	VPA	Intent	MVPA	VPA	Intent
Subjective norms	.08	.11	.24***	.11	.22***	.28***
Attitudes	.29***	.30***	.37***	.16*	.23***	.24***
Enjoyment	.25***	.29***	.38***	.14*	.25***	.36***
Self-efficacy	.28***	.35***	.51***	.22***	.33***	.54***
Age	-.06	-.16*	-.17*	-.11	-.13*	-.12*
Intentions	.44***	.37***		.24***	.37***	

p* < .05; *p* < .01; ****p* < .001.

Association With Intentions, MVPA, and VPA

Results of the regression analyses are presented in Table 5. For both males and females, enjoyment and self-efficacy predicted intentions to be active. Attitudes regarding physical activity predicted MVPA for males, while self-efficacy predicted this level of physical activity for females. Enjoyment and self-efficacy predicted VPA for males, and self-efficacy predicted VPA for females.

Discussion

The key finding of this study is that self-efficacy was significantly associated with physical activity in both male and female youth. In the regression models, self-

Table 5 Multiple Regression for Intentions, MVPA, and VPA

Variable	Intentions		MVPA (≥3 METs)		VPA (≥6 METs)	
	beta	Beta	beta	Beta	beta	Beta
Males (<i>n</i> = 252)						
Age	-.16	-.10*	-.01	-.02	-.08	-.11
Subjective norms	.004	.03	-.004	-.06	-.005	-.06
Attitudes	.005	.10	.005	.18**	.004	.13
Enjoyment	.06	.16**	.02	.12	.03	.14*
Self-efficacy	.07	.37***	.01	.14	.02	.23**
	Model <i>R</i> ² = .31; <i>F</i> = 22.0; <i>p</i> < .002.		Model <i>R</i> ² = .12; <i>F</i> = 6.68; <i>p</i> < .001.		Model <i>R</i> ² = .17; <i>F</i> = 9.95; <i>p</i> < .001.	
Females (<i>n</i> = 265)						
Age	-.13	-.08	-.07	-.10	-.07	-.10
Subjective norms	.007	.05	.0002	.005	.005	.08
Attitudes	-.004	-.08	.001	.001	.001	.06
Enjoyment	.07	.19**	.007	.02	.02	.12
Self-efficacy	.09	.48***	.01	.02	.02	.23**
	Model <i>R</i> ² = .34; <i>F</i> = 26.6; <i>p</i> < .001.		Model <i>R</i> ² = .07; <i>F</i> = 3.61; <i>p</i> < .004.		Model <i>R</i> ² = .15; <i>F</i> = 9.14; <i>p</i> < .001.	

* $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$.

efficacy was independently associated with MVPA for females and with VPA and intentions to be physically active for both males and females. Several previous studies of children and adolescents have also found self-efficacy to be a key determinant of physical activity behavior. Simons-Morton and others (13) found that higher levels of self-efficacy in elementary school students were associated with increased time spent in moderate-to-vigorous and vigorous physical activity. Other researchers have also found physical activity self-efficacy to be an independent correlate of vigorous physical activity in elementary students (6, 15, 16). Zakarian and colleagues (20) found that self-efficacy in high school students correlated with vigorous exercise outside of school for both males and females. In their multiple regression models, self-efficacy accounted for the most variance in self-reported vigorous physical activity. The current study supports the emerging consensus that efforts to promote physical activity in youth should create positive experiences, which enhance their confidence in their ability to be physically active.

The study also found that enjoyment of physical activity was a significant correlate of intention to be physically active for both males and females and of vigorous physical activity behavior for males. The correlation between enjoyment and physical activity behavior was less significant for females, although the data indicate a trend toward significance and suggest that enjoyment may be an important factor for females in this age group. Few studies have examined the influence of enjoyment on exercise intentions and behavior in children and youth. Stucky-Ropp and DiLorenzo (14) identified enjoyment of physical activity as the most salient predictor of physical activity behavior in fifth- and sixth-grade boys and girls, but not a significant predictor by the time the students reached eighth and ninth grades (4). The present study indicates that enjoyment can influence both intentions and behavior and suggests that physical activity interventions should use activities that adolescents enjoy to build self-efficacy and increase physical activity behavior.

This study also examined differences between males and females in the correlates of physical activity. In general, the correlates of physical activity did not differ significantly by gender, and self-efficacy and enjoyment were important factors for both genders. Nevertheless, we noted in the regression models that attitudes toward physical activity predicted MVPA among males but not females, although females' attitudes toward physical activity were significantly more favorable than among the males. These observations indicate that this construct is a more important determinant of physical activity in males than females. Therefore, enhancement of attitudes toward physical activity might be more effective in promoting physical activity in males than females.

These findings are consistent with those of Trost and colleagues (16), who noted several important gender differences in the determinants of physical activity in preadolescent children. In that study, beliefs about physical activity outcomes predicted physical activity behavior in boys but not girls, while enjoyment of school physical education and perception of the mother's physical activity (active vs. sedentary) predicted activity behavior in girls but not boys. Self-efficacy, as defined in this study, a global construct, predicted physical activity behavior in both genders.

Collectively, the findings highlight the need for physical educators, public health practitioners, and policy makers to consider both gender similarities and gender differences in the determinants of activity when designing and implementing physical activity intervention programs. Our findings suggest, for example,

that programs should aim to enhance self-efficacy related to physical activity in both male and female students. Our observation of a significant relationship between subjective norms and physical activity in females, however, suggests that creating a social environment that reinforces physical activity (i.e., active female adult role models, a female-friendly physical education curriculum, a focus on the social rather than competitive aspects of physical activity, and rewards and incentives that appeal to young women) may be a particularly effective strategy with adolescent females but not males. Similarly, cultivating positive attitudes toward physical activity (i.e., by focusing on the physical appearance and sports benefits of physical activity) may be an effective intervention strategy with adolescent males but not females.

Another important finding of this study is that determinants of physical activity did not differ markedly by level of physical activity intensity. The models for MVPA and VPA were similar, with enjoyment and self-efficacy emerging as significant predictors of both levels of intensity. While other studies have reported similar findings for elementary school students (6), few have addressed determinants by intensity level among adolescents. Our findings suggest that interventions designed to promote vigorous physical activity need not differ significantly from interventions to promote moderate to vigorous activity, given that virtually the same factors associate with both levels of intensity.

Several limitations of the study warrant mention. The study measured physical activity by self-report, raising the possibility of misclassification, and subjects reported physical activity only for a single day. The study sample was not random, and the results may not be generalizable to a wider population. As in previous studies (5), psychosocial factors explained only a small proportion of the variance in physical activity at both levels of intensity. Additional studies are needed to identify other influences on physical activity.

Despite these limitations, our findings provide important information on the determinants of physical activity in youth. While longitudinal studies are needed to confirm these cross-sectional findings, the findings suggest that interventions should aim to enhance both males' and females' enjoyment of physical activity and confidence in their ability to overcome barriers to physical activity. Particularly for adolescent females, whose participation in physical activity is low and decreases with age, interventions should provide positive experiences with non-competitive, lifelong activities and promote peer and family support for being physically active.

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