

---

## Psychosocial correlates of physical activity in children and adolescents in a rural community setting

KELLY CRIMI†, LARRY D. HENSLEY‡, and KEVIN J. FINN‡

University of Northern Iowa, Cedar Falls, IA , USA

†Denotes graduate student author, ‡denotes professional author

---

### ABSTRACT

*Int J Exerc Sci* 2(4): 230-242, 2009. The purpose of this study was to evaluate the relationships between selected psychosocial factors and the physical activity behaviors of children (grade 4-8) and adolescents (grades 9-12) in a rural community setting. The Children's Physical Activity Scale (CPAC) was used to measure the psychosocial factors of physical activity, The Physical Activity Questionnaire-Children (PAQ-C), and Physical Activity Questionnaire-Adolescents (PAQ-A) were used to measure the physical activity behaviors of the 167 participants. Results indicated that male and female physical activity behaviors were not significantly different. However, physical activity declined with age [ $F(8,147) = 5.44, p < 0.05, ES = 0.23$ ]. All psychosocial factors were significantly correlated with physical activity in youth with the single highest correlation for males being "liking of exercise" ( $r = .61$ ) and the highest correlation for females was "liking of games and sports" ( $r = .44$ ). Stepwise regression analyses identified three subscales (liking of games and sport, liking of exercise, and parental support) in a significant prediction model of physical activity in both genders. The results indicate that children's physical activity is associated with a variety of psychosocial variables that represent import predisposing and reinforcing factors.

KEY WORDS: Youth, exercise, determinants, influencing factors

### INTRODUCTION

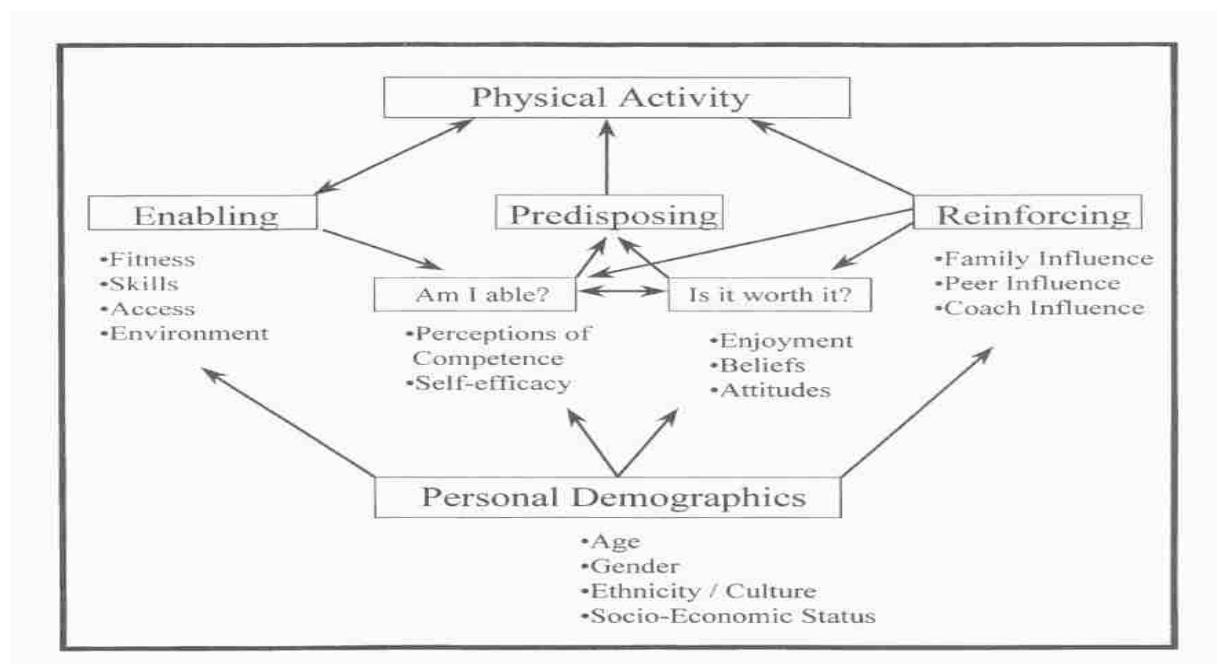
According to the Centers for Disease Control and Prevention (3), nearly 50% of youths between the ages of 12 and 21 are not physically active on a regular basis, while about 14% were reported not to participate in physical activity at all. The relatively low physical activity in youth is a growing concern in America today as obesity becomes a significant public health problem (8, 18). Despite the modest success of a few intervention programs and the availability of materials designed to enhance professional practice and promote physical activity, there is little indication

that programs intended to enhance youth physical activity are having the desired effect overall. Identifying the factors associated with physical activity might provide a better understanding of why children are engaging in sedentary behaviors and lead to more effective interventions promoting physical activity. This may be especially important in rural communities where the infrastructure, environmental conditions, lifestyle, and economy create unique conditions that affect the availability of health care and the practice of health-enhancing behaviors such as regular physical activity.

## CORRELATES OF PHYSICAL ACTIVITY IN CHILDREN

There are several direct and indirect factors that have been shown to have some connection as to why individuals choose to be physically active. There are the obvious sedentary behaviors, such as television viewing, computer use, and playing video games, that are increasingly popular with children. Children are also influenced by their parents, peers, and siblings, as well as their environment. For children, their attitudes towards physical activity, opinion of their own physical competence, and their perception of parental support may all be factors as to why children choose to partake in a physically active lifestyle or a sedentary one. The Youth Physical Activity Promotion (YPAP) model, proposed by Welk (19), is a theoretical model that was created to help better understand the factors that influence children's physical activity behaviors. This model is one of the few that have been designed specifically to explain the influences on children's physical activity. The YPAP model is shown in Figure 1.

The YPAP model suggests that different predisposing, reinforcing, and enabling factors can directly influence children's physical activity. The model was constructed based on a variety of studies that found significant correlations between these broad areas of influence. The predisposing factors of the YPAP model are the variables that have a strong influence on the likelihood that a child will be physically active. These variables include the child's self-efficacy, their attitudes and beliefs regarding physical activity, his or her perception of their own physical competence, and the enjoyment derived from physical activity. Reinforcing factors are a little different, since they are conditions that support a child's physical activity behaviors. This includes supportive influences and variables such as family, peer, and teacher/coach influence. Enabling factors of the YPAP model include the child's physical skills, his or her access to facilities, and physical fitness. Personal demographics can also have an indirect effect on each of the factors. Demographic



## CORRELATES OF PHYSICAL ACTIVITY IN CHILDREN

factors such as age and gender have been shown to have an effect on the physical activity of children. In general, males tend to be more active than females (14) and physical activity decreases as age increases, particularly during the adolescent years (7). The YPAP model serves as the theoretical basis for this study. More research is needed to test this model on children, particularly regarding the predisposing and reinforcing factors. With an improved understanding of the factors that influence children's physical activity behaviors in a rural setting, practitioners can better plan for future interventions designed to promote physical activity in children. Therefore, the purpose of this study was to evaluate the relationships between selected psychosocial factors and the physical activity behaviors of children and adolescents in a rural community setting. Specific factors to be investigated include liking of games and sports, fun of physical exertion, liking of exercise, importance of exercise, perceived competence, peer acceptance, self-esteem, parental role modeling, perceptions of parental support, and perceptions of parental encouragement.

### METHOD

#### *Participants*

Students in grades 4-12 that were enrolled in physical education classes during the Spring 2007 term at a small rural school in the upper Midwest section of the United States constituted the target population. The specific school system was purposively selected because of local interest in health promotion initiatives and the support of community leaders. Located more than 120 kilometers from the nearest city and 300 kilometers from the nearest metropolitan

area, the community had a population slightly less than 2,500 residents. The total enrollment in the K-12 school system which included students from all over the county was approximately 800, with about 90% of the students being non-Hispanic white. The study sample included 90 girls and 77 boys, ranging in age from 9 to 18 years. Recruitment of participants followed approval by the University of Northern Iowa Institutional Review Board (IRB). Parental permission and child assent were obtained for all participants.

#### *Measures*

Physical activity for children in grades 4 - 8 was measured using the Physical Activity Questionnaire - Children (PAQ-C) (12) whereas the Physical Activity Questionnaire - Adolescents (PAQ-A) (13) was used to measure physical activity levels for children in grades 9 - 12. The PAQ-A and PAQ-C are used to assess the physical activity behaviors of the participants at different times and places (i.e., during school, after school, recess, weekend, etc.) during the previous seven days. Scoring is based on a 5-point Likert-type scale, with an overall physical activity score derived from the mean of each scored item. Greater levels of physical activity are indicated by higher scores and vice versa. The PAQ-C and PAQ-A have been tested and re-tested and results have shown that the instruments are reliable and valid measures of physical activity for children and adolescents during the school year. Kowalski, Crocker, and Faulkner (12) reported moderately high validity coefficients for the PAQ-C when compared to a variety of criterion measures, including activity ratings, recall questionnaires, and activity monitors ( $r = .39$  to  $.63$ ). The test-retest reliability for the PAQ-C ranged from

## CORRELATES OF PHYSICAL ACTIVITY IN CHILDREN

$r = 0.75$  to  $0.82$  and internal consistency reliability values (coefficient alpha) ranged from  $0.81$  to  $0.86$  (5). Convergent validity of the PAQ-A was reported as being moderately high, with correlations ranging from  $r = 0.33$  to  $0.73$ , while generalizability reliability coefficients were uniformly high,  $G = .85$  to  $G = .90$  (13). Both instruments are widely used in research in order to assess physical activity of large and small populations at low cost (11).

The Children's Physical Activity Correlates (CPAC) questionnaire (20) was used to measure a variety of different psychosocial factors. The 44-item questionnaire contains 10 subscales (liking of games and sports, fun of physical exertion, liking of exercise, importance of exercise, peer acceptance, perceived competence, self-esteem, parental role modeling, parental support, and parental encouragement). The items are based on a structured-alternative format and are scored on a four-point scale (1 - 4) with higher scores reflecting more favorable responses towards physical activity. Subscale scores were computed by averaging each of the survey items that measured the respective psychosocial factor. The alpha reliability for the CPAC instrument in previous studies has ranged from  $.70$  to  $.74$  (20).

### *Protocol*

Students in grades 4 - 12 that were enrolled in a physical education class were given a packet of materials to take home that included information about the project, an endorsement letter from the school superintendent, parental permission forms, and two surveys used to collect physical activity information about the parents (for a concurrent study on parental influence). Parents were then given about two weeks

to return the required information. The researchers sought to acquire additional parental permissions by having extra parental permission forms available at a booth during a community picnic.

Researchers met with eligible students during their physical education class for the purpose of administering the student surveys. First, researchers explained the purpose of the study, handed out assent forms, answered any questions, and explained to the students that the surveys were voluntary and they did not need to answer any questions that they did not feel comfortable answering. For some of the lower grades, researchers read the surveys out loud. Most students, though, completed the survey at their own pace. This process took anywhere from 30 minutes to one hour depending on grade level. Completed surveys were obtained from 167 students.

### *Statistical Analyses*

Following data collection, questionnaires were reviewed for completeness before data entry into SPSS version 11.0 (SPSS Inc., Chicago, IL). Surveys with incomplete information (i.e., did not respond to a certain question) were still included in the statistical analysis if the missing data did not affect the calculation of subscale scores. Alpha reliabilities reflecting the internal consistency of the CPAC were calculated for each gender sub-group. The reliability coefficients for the girls and boys were  $0.94$  and  $0.93$  respectively, suggesting good internal consistency. Subscale scores were determined for all variables of interest and descriptive statistics were used to determine means and standard deviations. A two-way (gender by grade) analysis of variance (ANOVA) was performed for each

## CORRELATES OF PHYSICAL ACTIVITY IN CHILDREN

of the variables of interest to test for any gender or grade effect. Bonferroni's post hoc procedure was used following a significant F-value to determine the location of the differences across grade level. Effect size (ES) was calculated for each of the significant main effects. Alpha was set at .05 for all statistical testing. The bivariate relationship between the selected psychosocial factors and physical activity was determined using Pearson product-moment correlations. In addition, stepwise multiple regression techniques were used to identify which of the possible psychosocial predictor variables were most important in predicting children's physical activity scores. These analyses were performed for the entire study sample as well as for each gender group.

### RESULTS

Data were collected on 167 4<sup>th</sup> - 12<sup>th</sup> grade students enrolled in the participating school in the Spring of 2007. The sample included 90 girls and 77 boys. Descriptive statistics for the demographic characteristics of the study sample can be found in table 1.

Table 1. Demographic Characteristics.

Variables	Boys	Girls	p-value
	M ± SD	M ± SD	
Age (yrs)	13.44 ± 2.18	13.14 ± 2.64	.427
Height (in)	65.72 ± 6.09	62.97 ± 5.46	.004
Weight (lbs)	136.65 ± 43.29	129.48 ± 45.49	.327
BMI kg/m <sup>2</sup>	21.89 ± 4.83	22.39 ± 5.45	.425

Physical activity scores for each gender and grade grouping are shown in table 2. The

results of the two-way ANOVA indicated that the gender by grade interaction effect for the physical activity score was non-significant [ $F(8,147) = 0.88, p > .05$ ]. Furthermore, there was no significant difference in physical activity between males and females [ $F(1,147) = 0.45, p > .05$ ]. However, physical activity significantly declined with grade [ $F(8,147) = 5.44, p < 0.05, ES = 0.23$ ]. The results of Bonferroni's post hoc comparisons indicate that, in general, students in the lower grades were more active than students in the higher grades. Table 3 provides the results of the post hoc comparisons across grade levels.

Table 2. Means and Standard Deviations for Physical Activity Score by Grade Level.

Grade	Girls	Boys	Total
	M ± SD (n)	M ± SD (n)	M ± SD (n)
4	3.67 ± .55 (13)	3.43 ± .65 (7)	3.58 ± .58 (20)
5	3.38 ± .67 (18)	3.31 ± .62 (8)	3.36 ± .65 (26)
6	3.03 ± .62 (11)	3.01 ± .60 (11)	3.02 ± .59 (22)
7	3.44 ± .13 (5)	3.51 ± .36 (16)	3.49 ± .32 (21)
8	2.95 ± .58 (11)	3.48 ± .40 (12)	3.23 ± .56 (23)
9	2.80 ± .40 (10)	3.15 ± .18 (3)	2.88 ± .39 (13)
10	2.66 ± .56 (10)	2.70 ± .74 (12)	2.68 ± .65 (22)
11	3.01 ± .27 (3)	2.80 ± .84 (3)	2.90 ± .57 (6)
12	2.61 ± .56 (8)	2.77 ± .25 (4)	2.66 ± .48 (12)

Psychosocial values for each gender group are shown in table 4. The results of the ANOVA indicate no interaction between grade and gender for any of the psychosocial factors. Peer acceptance

## CORRELATES OF PHYSICAL ACTIVITY IN CHILDREN

Table 3. Post hoc (Bonferroni) Significant Differences in Physical Activity by Grade Level.

Grade	12	11	10	9	8	7	6	5	4
12	**	*							
11									
10	**	**	**	*					
9	*								
8					*				
7					**	**			
6	*								
5					**	*			
4			*		*	**	**		
	4	5	6	7	8	9	10	11	12

Note. Asterisk indicates significant difference in mean physical activity score between corresponding grades; \* p < 0.05; \*\* p < 0.01

Table 4. Mean and Standard Deviation for Psychosocial Subscales by Gender.

Subscale	Boys	Girls	p-value
	M ± SD	M ± SD	
Liking games/sports	3.63 ± .57	3.26 ± .75	.003
Fun physical exertion	3.44 ± .66	3.15 ± .56	.008
Liking exercise	3.51 ± .57	3.41 ± .62	.437
Importance exercise	3.59 ± .53	3.61 ± .49	.999
Peer acceptance	3.25 ± .71	2.96 ± .80	.229
Perceived competence	3.38 ± .50	2.88 ± .68	.001
Self-esteem	3.43 ± .64	3.07 ± .75	.010
Parental Role-modeling	2.82 ± .64	2.96 ± .68	.053
Parental support	3.12 ± .51	3.05 ± .53	.516
Parental encouragement	3.44 ± .45	3.40 ± .46	.707

## CORRELATES OF PHYSICAL ACTIVITY IN CHILDREN

Table 5. Correlations Between Psychosocial Variables and Physical Activity Scores.

\*  $p < 0.05$ ; \*\*  $p < 0.01$

<u>Psychosocial Variables</u>	<u>Boys</u>	<u>Girls</u>
LIKES GAMES/SPORTS	.38(**)	.44(**)
FUN of PHYSICAL EXERTION	.37(**)	.25(*)
LIKES EXERCISE	.61(**)	.41(**)
IMPORTANCE OF EXERCISE	.42(**)	.41(**)
PEER ACCEPTANCE	.41(**)	.28(**)
PERCEIVED COMPETENCE	.50(**)	.41(**)
SELF ESTEEM	.31(**)	.28(**)
PARENT ROLE MODELING	.27(*)	.23(*)
PARENT SUPPORT	.39(**)	.32(**)
PARENT ENCOURAGEMENT	.45(**)	.31(**)

CORRELATES OF PHYSICAL ACTIVITY IN CHILDREN

Table 6. Summary of Stepwise Regression Models

Total Sample	Predictor	<i>B</i>	<i>SE B</i>	$\beta$	<i>p</i>
Step 1	Like exercise	.52	.07	.49	<.001
Step 2	Like exercise	.41	.07	.39	<.001
	Perceived competence	.29	.07	.30	<.001
Step 3	Like exercise	.40	.07	.38	<.001
	Perceived competence	.22	.07	.23	.002
	Parental support	.23	.09	.19	.007

Note.  $R^2_{adj}$  = .24 for Step 1;  $R^2_{adj}$  = .32 for Step 2;  $R^2_{adj}$  = .34 for Step 3.

Girls Only	Predictor	<i>B</i>	<i>SE B</i>	$\beta$	<i>p</i>
Step 1	Like games/sports	.38	.08	.44	<.001
Step 2	Like games/sports	.28	.09	.33	.002
	Like exercise	.28	.11	.27	.012

Note.  $R^2_{adj}$  = .18 for Step 1;  $R^2_{adj}$  = .23 for Step 2.

Boys Only	Predictor	<i>B</i>	<i>SE B</i>	$\beta$	<i>p</i>
Step 1	Like exercise	.65	.10	.61	<.001
Step 2	Like exercise	.54	.10	.50	<.001
	Perceived competence	.45	.11	.30	<.001

Note.  $R^2_{adj}$  = .36 for Step 1;  $R^2_{adj}$  = .47 for Step 2.

Note. *B* = Unstandardized regression coefficient; *SE B* = Standard Error of *B*;  $\beta$  = Standardized Beta coefficient



## CORRELATES OF PHYSICAL ACTIVITY IN CHILDREN

[ $F(8,143) = 2.20, p < 0.05, ES = 0.11$ ], parental encouragement [ $F(8,143) = 2.39, p < 0.05, ES = 0.12$ ] and perceived competence [ $F(8,143) = 2.16, p < 0.05, ES = 0.11$ ] were significantly different across grades. The post hoc test results indicated that the significant differences across grade levels were as follows: parental encouragement was higher in 7<sup>th</sup> graders as compared to 10<sup>th</sup> graders; peer acceptance in 7<sup>th</sup> graders was higher than in 6<sup>th</sup> graders; and perceived competence was higher in 7<sup>th</sup> graders than for both 9<sup>th</sup> and 10<sup>th</sup> graders.

Perceived competence [ $F(1,143) = 24.09, p < 0.05, ES = 0.14$ ], liking of games [ $F(1,143) = 9.34, p < .05, ES = 0.06$ ], fun of exertion [ $F(1,143) = 7.23, p < 0.05, ES = 0.05$ ], and self-esteem [ $F(1,143) = 6.88, p < 0.05, ES = .01$ ] were significantly different between genders. For all of these factors, the mean scores for boys were significantly higher than girls, although effect size values would be considered small for each. The results of the two-way ANOVA did not produce a significant main effect for parental support, parental role modeling, importance of exercise, liking of exercise, fun of exertion, and liking of games and sports. There was no significant difference between gender groups for parental encouragement, peer acceptance, liking exercise, importance of exercise, parental role modeling, and parental support. There was, however, a trend across grades for self-esteem [ $F(8,143) = 1.88, p = 0.07$ ], with 7<sup>th</sup> graders slightly higher than 10<sup>th</sup> graders.

Correlational analyses indicated that all ten psychosocial variables were significantly related to physical activity (see table 5). The subscale with the single highest correlation for boys was "liking of exercise" with an  $r = 0.61$ , whereas "liking of games

or sports" had the highest correlation for girls with  $r = 0.44$ . In addition, the inter-relationships among the ten psychosocial variables were low to moderate, ranging from 0.28 to 0.66. Since the relationships among the psychosocial variables were relatively low, multicollinearity was not considered a problem and all ten subscale scores were entered as prospective predictor variables in the multiple regression analysis. Results of a forward stepwise multiple regression analysis performed on the entire study sample identified an overall model of three psychosocial variables (liking exercise, perceived competence, and parental support) that significantly predicted children's physical activity [ $R^2 = .36, R^2_{adj} = .34, F(3,157) = 28.80, p < 0.001$ ]. This model explained 34% of the variance associated with children's physical activity. The results of the multiple regression analysis for the girls identified a model consisting of two psychosocial variables (liking of games/sports and liking exercise) as significant [ $R^2 = .25, R^2_{adj} = .23, F(2,84) = 14.11, p < 0.001$ ]. This model explained 23% of the variance associated with girls' physical activity. Regression analysis results for the boys yielded a model consisting of two psychosocial variables (liking exercise and perceived competence) that significantly predicted physical activity [ $R^2 = .49, R^2_{adj} = .47, F(2,71) = 33.64, p < 0.001$ ]. This model explained 47% of the variance associated with boys' physical activity. A summary of the regression models is shown in table 6.

## DISCUSSION

The findings of the present study support the fact that psychosocial factors are an

## CORRELATES OF PHYSICAL ACTIVITY IN CHILDREN

important factor related to physical activity of children and adolescents. The magnitude of the associated correlations suggested a moderate, yet meaningful relationship to children's physical activity. It was also noted that the relationship of the various psychosocial factors to physical activity was generally higher among the boys compared to the girls.

Similar results were reported by Brustad (2), Schaben et al. (16), and Welk et al. (20) in studies that cited the importance of children's perceived physical competence, attraction to physical activity, as well as parental influence. Interestingly, the relationship of parental role modeling to physical activity for both boys and girls in the present study was relatively low, a finding that agrees with other studies using a similar design and measures (2, 20).

The results of the stepwise regression analysis produced a model composed of three predictor variables (liking exercise, perceived competence, and parental support) that explained 34% of the variance of physical activity for the combined sample of boys and girls. Thus, two predisposing factors (liking exercise, perceived competence) and one reinforcing factor (parental support) in the YPAP model accounted for a third of the variability in physical activity. These psychosocial factors have been consistently identified as important correlates to youth physical activity (15, 16, 20, 21).

When separated into gender groups, prediction models for both boys and girls included only two predictor variables. Parental support was excluded from the regression model for both boys and girls, while liking of games and sports became an

important predictor for girls, replacing perceived competence. The fact that parental support (or any other parental factor) did not emerge as a significant predictor of physical activity in either gender-specific regression model was surprising and contrary to other studies investigating parental influence on children's physical activity (1, 2). The explanation for this finding is unknown, although it is possible that the smaller sample size for the gender groups could result in fewer variables having significant semi-partial correlations with the dependent variable, thus failing to meet the entry criteria for the stepwise regression model. In addition, the true relationship with the dependent variable could be masked due to suppressor effects of one or more predictor variables. In this regard, Field (6) points out that a forward stepwise regression method, as used in this study, is more susceptible to suppressor effects than a backward elimination method.

Sallis, Prochaska, Taylor, Hill, and Geraci (15) provided a review of correlates of physical activity of children and adolescents that showed the strongest predictor of physical activity varied according to gender and grade level. Although the present study did not examine variations according to grade level, our findings did show that the best predictors of physical activity varied according to gender. It is noteworthy to point out that the two-factor regression model for boys accounted for approximately twice the variance (47%) in physical activity than the comparable model for girls (23%). This agrees with the findings of Welk and colleagues (20) who reported psychosocial measures accounted

## CORRELATES OF PHYSICAL ACTIVITY IN CHILDREN

for a greater percent of the physical activity variance among boys compared to girls. Interestingly, no difference was observed between boys and girls in reported physical activity; however significant differences were noted across grade level. In general, as grade level increased, physical activity decreased. The finding that there was no gender difference in physical activity contradicts most other reports that indicate boys are more active than girls (3, 4, 14, 17). Although the reason for this discrepancy is unknown, it may be that local school or community programs better serve girls or it may be simply due to the lifestyle and nature of living in a remote, rural community. The decline in physical activity with age (i.e., across grade levels) is consistent with other existing literature (3, 4, 9, 17).

Significant main effects for gender and grade were observed for a few, but not all, of the psychosocial factors investigated. Significant gender differences were observed for perceived competence, liking of games and sports, fun of physical exertion, and self-esteem. In all cases, the values were significantly higher for boys compared to girls, although the effect sizes were uniformly low. These findings are consistent with other studies that have used the same instrument to measure these psychosocial factors among children (16, 20). It is noted, however, that these studies reported values for attraction to physical activity, which is a composite variable that includes scales for "liking of games and sports" and "fun of physical exertion" rather than the specific subscale scores. In addition, grade level differences were observed for peer acceptance, parental encouragement, and perceived competence, but again the effect sizes were low.

Students in the seventh grade reported the highest values on these variables, results that support similar findings by Schaben and colleagues who reported higher values among middle school students (16).

A few limitations need to be considered when interpreting these results. Research participants were a convenience sample of youth in a single, rural community in the upper Midwest region of the United States. Thus, the findings may not generalize to youth in other communities, particularly those in more urban settings. Inasmuch as participation was voluntary, self-selection bias could have resulted in a sample that was not representative of the similar aged youth. Given the nature of the study, it is more likely that students and parents predisposed to a physically active lifestyle would consent to participation. The use of a subjective (self-report) physical activity measure might be a source of error as compared to more objective measures like direct observation or motion sensor devices. The ability to accurately recall specific behaviors is difficult for children, particularly those in the lower grades. More objective methods of measuring physical activity would likely have resulted in more accurate values. The time of year (early May) the study was performed may have affected the results. While weather conditions were favorable for outside activity, the approach of end of semester examinations and project completion dates may have curtailed some activity time and affected children's perspective of parental influence as well as ratings on other psychosocial factors. Future investigations should explore seasonal variations in activity patterns.

Based on the findings and taking into consideration the limitations of the current study, it is concluded that children's physical activity is associated with a variety of psychosocial variables that represent important predisposing and reinforcing factors. While the results of the present study generally support the YPAP model, it is clear that there are additional factors not investigated that are related to youth physical activity. In general, the present results are consistent with the extant literature concerning factors related to youth physical activity. Although differences in research designs and measuring instruments make it difficult to generalize the findings from individual studies to other populations, it is promising to see some of the same variables consistently associated with physical activity. At the same time, reasons for inconsistency across studies need to be explored. Researchers agree, though, that there are a plethora of variables that influence the physical activity behaviors of children, both directly and indirectly.

Although this study provides additional information concerning factors associated with youth physical activity, more research needs to be done in this area. There is a noticeable absence of studies based on longitudinal research designs examining changes in children's attitudes and behaviors over time. Further investigations are particularly needed to examine differences in activity behaviors and associated correlates of activity based on level of urbanization. Conducting a qualitative study to explore what it is that makes physical activity fun and enjoyable would give insight to the feelings that children have when deciding whether or not to participate in physical activity.

## REFERENCES

1. Brustad RJ. Who will go out and play? Parental and psychological influences on children's attraction to physical activity. *Pediatr Exerc Sci* 5: 210-223, 1993.
2. Brustad RJ. Attraction to physical activity in urban schoolchildren: Parental socialization and gender influences. *Res Q Exerc Sport* 67: 316-323, 1996.
3. Centers for Disease Control and Prevention [CDC]. Physical activity and health: A report of the Surgeon General. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health promotion. 1996.
4. Centers for Disease Control and Prevention [CDC]. Physical activity levels among children aged 9-13 years - United States, 2002. *MMWR* 52: 785-788, 2003.
5. Crocker PRE, Bailey DA, Faulkner RA, Kowalski KC, McGrath, R. Measuring general levels of physical activity: Preliminary evidence for the physical activity questionnaire for older children. *Med Sci Sports Exerc* 29: 1344-1349, 1997.
6. Field A. *Discovering statistics using SPSS*. Sage Publications, London. 2005.
7. Gordon-Larsen P, McMurray R, Popkin P. Determinants of physical activity and inactivity patterns. *Pediatrics* 105(6): 83-90, 2000.
8. Kibbe D, Offner R. *Childhood Obesity Advancing Effective Prevention and Treatment: An Overview for Health Professionals*. National Institute for Health Care Management Research Educational Foundation. NIHCM Foundation, Washington D.C. 2003.
9. Kimm SYS, Glynn NW, Kriska AM, Fitzgerald SL, Aaron DJ, Similo SL et al. Longitudinal changes in physical activity in a biracial cohort during adolescence. *Med Sci Sports Exerc* 32: 1445-1454, 2000.
10. Kimm SYS, Glynn NW, McMahon RP, Vorrhees CC, Striegel-Moore RH, Daniels SR. Self-Perceived barriers to activity participation among sedentary

## CORRELATES OF PHYSICAL ACTIVITY IN CHILDREN

adolescent girls. *Med Sci Sports Exerc* 38: 534-540, 2006.

11. Kowalski KC, Crocker PRE, Donen RMD. The physical activity questionnaire for older children (PAQ-C )and adolescents (PAQ-A) manual. Retrieved on April 10, 2007 from <http://www.hkin.educ.ubc.ca/behavioural/PAQ%20manual.pdf>. 2004.

12. Kowalski KC, Crocker PRE, Faulkner RA. Validation of the physical activity questionnaire for older children. *Pediatr Exerc Sci* 9: 174-186, 1997.

13. Kowalski KC, Crocker PRE, Kowalski NP. Convergent validity of the physical activity questionnaire for adolescents. *Pediatr Exerc Sci* 9: 342-352, 1997.

14. Sallis JF. Epidemiology of physical activity and fitness in children and adolescents. *Crit Rev Food Sci Nutr* 33: 403-408, 1993.

15. Sallis JF, Prochaska JJ, Taylor WC, Hill JO, Geraci JC. Correlates of physical activity in a national sample of girls and boys in grades 4 through 12. *Health Psychol* 18: 410-5, 1999.

16. Schaben JA, Welk GJ, Joens-Matre R, Hensley L. The predictive utility of the Children's Physical Activity Correlates (CPAC) scale across multiple grade levels. *J Physical Activity Health* 3: 59-69, 2006.

17. Trost SG, Pate RR, Sallis JF, Freedson PS, Taylor WC, Dowda M, Sirard J. Age and gender differences in objectively measured physical activity in youth. *Med Sci Sports Exerc* 34: 350-355, 2002.

18. U.S. Department of Health and Human Services [USDHHS]. The Surgeon General's call to action to prevent and decrease overweight and obesity. US Department of Health and Human Services, Public Health Service, Office of the Surgeon General, Rockville, MD. 2001.

19. Welk GJ. The youth physical activity model: a conceptual bridge between theory and practice. *Quest* 51(1): 5-23, 1999.

20. Welk GJ, Wood K, Morss G. Parental influences on physical activity in children: An exploration of

potential mechanisms. *Pediatr Exerc Sci* 15: 19-33, 2003.

21. Welk GJ, Schaben JA. Psychosocial correlates of physical activity in children - a study of relationships when children have similar opportunities to be active. *Meas Physical Educ Exerc Sci* 8(2): 63-81, 2004.