Research Quarterly for Exercise and Sport

Vol. 68, No. 3, pp. 241–248

Correlates of Physical Activity Behavior in Rural Youth

Russell R. Pate, Stewart G. Trost, Gwen M. Felton, Dianne S. Ward, Marsha Dowda, and Ruth Saunders

The purpose of this study was to identify correlates of physical activity behavior in a sample of rural, predominantly African American youth. Three hundred sixty-one fifth-grade students from two rural counties in South Carolina (69% African American, median age = 11 years) completed a questionnaire designed to measure beliefs and social influences regarding physical activity, physical activity self-efficacy, perceived physical activity habits of family members and friends, and access to exercise and fitness equipment at home. After school physical activity and television watching were assessed using the Previous Day Physical Activity Recall (PDPAR). Students were classified as physically active according to a moderate physical activity standard: two or more 30-min blocks at an intensity of 3 METs (metabolic equivalents) or greater, and a vigorous physical activity standard: one or more 30-min blocks at an intensity of 6 METs or greater. According to the moderate physical activity standard, 34.9% of students were classified as low-active. Multivariate analysis revealed age, gender, television watching, and exercise equipment at home to be significant correlates of low activity status. According to the vigorous physical activity standard, 32.1% of the students were classified as low-active. Multivariate analysis revealed age, gender, television watching, and self-efficacy with respect to seeking support for physical activity to be significant correlates of low activity status. In summary, gender and the amount of television watching were found to be the most important correlates of physical activity in rural, predominantly African American youth.

Key words: *physical activity, children, television watching, self-efficacy*

Most of the premature death and disability in the United States can be attributed to chronic diseases such as coronary heart disease, hypertension, type II diabetes, cancer, and obesity (McGinnis & Foege, 1993). Although these diseases typically do not manifest before middle adulthood, many experts recommend that efforts to prevent chronic disease be directed toward children and adolescents (Simons-Morton, O'Hara, Simons-Morton, & Parcel, 1987; U.S. Department of Health and Human Services, 1990). These recommendations have been based on the knowledge that the pathogenic processes that lead to chronic disease can begin early in life (Pate & Blair, 1978; Williams, Carter, & Wynder, 1981).

Submitted: March 4, 1996
Accepted: February 11, 1997

Russell R. Pate, Stewart G. Trost, Dianne S. Ward, Marsha Dowda, and Ruth Saunders are with the School of Public Health at the University of South Carolina. Gwen M. Felton is with the College of Nursing at the University of South Carolina.

Physical inactivity is a well established risk factor for cardiovascular disease (Fletcher et al., 1996) and epidemiological studies published over the past decade suggest that inactivity is also associated with increased risk for several other chronic diseases (Pate et al., 1995). Regular participation in physical activity has long been recognized as essential to normal development in children (American Academy of Pediatrics Committees on Sports Medicine and School Health, 1987; American College of Sports Medicine, 1988), and in recent years, promotion of physical activity in children and adolescents has become a recognized goal of public health authorities. An expert panel recently recommended that adolescent youth accumulate at least 30 min of moderate-intensity physical activity daily and complete at least three bouts of continuous, moderate-to-vigorous exercise on a weekly basis (Sallis & Patrick, 1994). These recommendations are consistent with the physical activity objectives for adolescents included in *Healthy People 2000* (U.S. Department of Health and Human Services, 1990).

National surveys conducted over the past decade have consistently observed that substantial percentages of U.S. adolescents fail to meet the aforementioned physical activity objectives (Centers for Disease Control

and Prevention, 1992; Ross & Gilbert, 1985). For example, a recent analysis of data from the Youth Risk Behavior Survey showed that 51.4% of boys and 76.3% of girls failed to achieve the recommendation for participation in vigorous physical activity (Heath, Pratt, Warren, & Kann, 1994). Such findings underscore the need for physical activity intervention programs for children and adolescents.

To maximize the effectiveness of these programs, it is important to understand the demographic, psychosocial, and environmental factors that influence physical activity behavior in youth. Analyses of national survey data as well as other studies have shown age and gender to be important determinants of physical activity behavior in youth (Pate, Long, & Heath, 1994; Sallis, 1993); however, considerably less is known about the more modifiable pyschosocial and environmental determinants of physical activity behavior. Indeed, a national consensus panel recently concluded that identifying the determinants of physical activity behavior in youth was a research priority (Sallis et al., 1992). Furthermore, because chronic disease morbidity and mortality are known to be disproportionately high among minority populations (Centers for Disease Control and Prevention, 1994), it seems particularly important to investigate the determinants of a key health behavior such as physical activity in African American youth. However, to date, much of the determinants research has been restricted to samples of predominantly white children living in urban settings. To fill this void in the research literature, the purpose of this study was to examine an array of potential demographic, psychosocial, and environmental correlates of physical activity in a group of fifth-grade students residing in rural, predominantly African American communities.

Methods

Participants

All 558 fifth-grade students in two rural counties of South Carolina were invited to participate in the study. The student population from both participating counties was approximately 70% African American and 50% male. Approximately 76% of the total population, or 422 students, volunteered to participate in the study, with a racial breakdown of 69% African American, 27% European American, and 4% unreported. Forty-nine percent were male, and the median age was 11 years (M age = 10.7 years, SD = 0.6). Sixty-five percent were eligible for the free or reduced price lunch program. Before participating in the study, written informed consent was obtained from each participant and his or her primary guardian. Missing data for the outcome or explanatory variables resulted in the exclusion of 61 volunteers (14.5%), leaving a final sample of 361 students (176 boys, 185 girls). The descriptive statistics indicated that the demographic characteristics of the sample remained unchanged by the exclusion of these participants. The study was approved by the University of South Carolina Institutional Review Board.

Correlates of Physical Activity

Students completed a questionnaire designed to measure hypothesized demographic, psychosocial, and environmental correlates of physical activity behavior. Variables were selected on the basis of Social Cognitive Theory (Bandura, 1986) and the Theory of Reasoned Action (Ajzen & Fishbein, 1980). A brief description of these measures and their psychometric properties are provided in Table 1. The survey was administered at the beginning of the school day by trained staff members who read the survey to the group using a standardized script. At each survey administration, an assistant moved about the classroom to answer any questions and check for students who had problems. Prior to the study, the instrument was extensively pilot-tested to ensure that all items were appropriate for the age and ethnicity of the study population.

Psychosocial Correlates. Psychosocial variables included measures of social influences regarding physical activity, beliefs about physical activity, and physical activity self-efficacy. The physical activity beliefs scale was based on the scale developed by the investigators while the social influences regarding physical activity was modeled on the scale developed by Reynolds et al. (1990). Two physical activity self-efficacy scales were included in the questionnaire. The first "short" scale was derived from the scale developed by Reynolds et al. (1990), while a second "long" scale was constructed based on a list of potential barriers to physical activity in children and adolescents (Tappe, Duda, & Ehrnwald, 1989).

Prior to data analysis in this study, a principal components factor analysis was performed on each scale using data from a subsample of 336 randomly selected students (171 males, 165 females). The results indicated that responses to individual items could be summarized into one factor for social influences, two factors for beliefs (physical activity outcomes, social outcomes), and three factors for self-efficacy (support seeking, overcoming barriers, competing activities). The complete results of the principal components factor analyses have been reported elsewhere (Saunders et al., 1997). Data from these 336 students were also used to calculate the internal consistency (Cronbach's alpha) of each scale-subscale. Test-retest reliability coefficients were calculated using data from 57 randomly selected students who completed the questionnaire twice within a 1-week period (see Table 1).

Environmental Correlates. Students completed a series of items designed to measure hypothesized environmental correlates of physical activity behavior, including perceived physical activity habits of parents and peers and access to sporting or fitness equipment at home (Table 1). These items were modified from measures used in the National Children and Youth Fitness Study (Ross, Pate, Caspersen, Danberg, & Svilar, 1987). Also, the Previous Day Physical Activity Recall was used to estimate the average number of 30-min blocks in which the primary activity was watching television or playing video games.

Measurement of Physical Activity

After-school physical activity was assessed using the Previous Day Physical Activity Recall (PDPAR). This self-report instrument makes use of a standardized form organized into seventeen 30-min blocks beginning at 3:00 p.m. and continuing through 11:30 p.m. Thirty-five common activities are listed on the form, and each student entered the primary activity he or she participated in during each of the 30-min time periods on the previous day. For each block, the student rated the intensity of the designated activity as either very light, light, medium, or hard. Very light activities were described as those requiring slow breathing with little or no movement. Light activities were described as those requiring normal breathing and regular movement. Medium activities were described as those requiring increased breathing and moderate movement. Hard activities were described as those requiring hard breathing and quick movement. In addition, for each level of intensity, students were provided with cartoon illustrations depicting activities typical of each intensity level. The PDPAR has established validity based on concurrent observation with both motion sensors ($r = .77$) and heart rate moni-

Table 1. Psychometric properties of scales used to measure psychosocial and environmental correlates of physical activity behavior

Scale[a]	Cronbach's alpha	Test-retest reliability	Concept-sample items
Beliefs			Beliefs about consequences of being physically active
Activity outcomes	.75	$r = .51$	If I were to be physically active most days it would:
Social outcomes	.58	$r = .69$	• Get or keep me in shape • Make me tired • Be fun
Social influences	.75	$r = .78$	Influences of family and friends on physical activity A friend or someone in my family: • Thinks I should be physically active • Encourages me to be physically active • Has been physically active with me
Self-efficacy			Confidence in ability to be active
Support seeking	.71	$r = .76$	I think I can:
Overcoming barriers	.71	$r = .82$	• Be physically active no matter how tired I may be • Be physically active even if I have a lot of homework • Ask my parent or other adult to take me to a physical activity or sport
Competing activities	.54	$r = .61$	• Be physically active most days after school
Home exercise equipment	na	$r = .86$	Number of exercise or fitness items at home: (e.g., basketball, Frisbee, jump rope etc.)
Mother's activity	na	85% agreement	Is your mother (or the woman who takes care of you the most) physically active.
Father's activity	na	88% agreement	Is your father (or the man who takes care of you the most) physically active.
Friend's activity	na	87% agreement	Is your best friend physically active

Note. Cronbach's alpha was calculated using data from a randomly selected subgroup of 336 students. Test-retest reliability was calculated using data from a subgroup of 57 randomly selected students.
[a]All items except home exercise equipment was measured on a dichotomous scale ("Yes" or "No").

tors (r = .63) and established test-retest reliability (r = .98) (Weston, Petosa, & Pate, 1997).

Classification of Students

Students completed the PDPAR instrument on three consecutive days in the classroom under the supervision of two trained data collectors. All physical activity assessments were completed within a 10-week period during the spring of 1994. Based on the responses to the PDPAR, students were classified as active or low-active according to a vigorous activity standard and a moderate activity standard. The moderate activity standard classified students as physically active if they reported two or more 30-min time blocks with physical activity at an intensity equal to or greater than 3 METs (metabolic equivalents). The vigorous activity standard classified students as physically active if they reported one or more 30-min blocks with physical activity at an intensity greater than or equal to 6 METs. The two activity standards were selected so that we could compare the hypothesized determinants of activity behavior in a group of students clearly meeting established guidelines for participation in physical activity (both vigorous and moderate and vigorous) (Sallis & Patrick, 1994), with a group that was clearly not meeting those standards. Because of the overlap in intensity levels between the two activity standards, the low-active groups were not mutually exclusive.

Statistical Analyses

T tests (continuous variables) and crude odds ratios (categorical variables)were used to assess differences between active and low-active groups. Multiple logistic regression analysis with stepwise backward elimination was used to identify significant correlates of low-activity status as defined by the moderate physical activity standard (Active = 2 x 30-min blocks at 3 METs or greater) and the vigorous physical activity standard (Active = 1 x 30-min block at 6 METs or greater). For each logistic model, the physical activity level was the dependent variable, with low-active and active as the risk and referent levels, respectively. Prior to backward elimination procedures, each model contained the variables age, gender, race, all psychosocial variables, all environmental variables, and all two-way interactions with age, gender, and race.

Results

Moderate Physical Activity Classification

Using the moderate activity standard, 126 of the 361 students (34.9%) were classified as low-active. Means and standard deviations for the active and low-active groups with respect to the continuous independent variables are shown in Table 2. Relative to their more active counterparts, low-active students were significantly younger, exhibited significantly lower scores on the self-efficacy overcoming barriers and competing activities subscales, and reported significantly fewer exercise or fitness items in the home. Table 3 shows the crude associations for the categorical independent variables and the proportion of students classified as low-active according to the moderate activity standard. Students who watched television or played video games for three or more hours in the after-school period were significantly more likely to be low-active than students who watched less than this amount. Race, gender, and perceived activity level of parents and peers were not significantly associated with moderate activity status. Results from the logistic regression analysis are shown in Table 4. After elimination of nonsignificant variables, age, gender, television watching, and number of exercise or fitness items in the home were found to be independent correlates of low activity status.

Vigorous Physical Activity Classification

Using the vigorous activity standard, 116 of the 361 students (32.1%) were classified as low-active. As shown in Table 2, students classified as low-active according to the vigorous activity standard were significantly younger and significantly less efficacious in seeking support for physical activity. Table 3 shows the crude associations for the categorical independent variables and the proportion of students classified as low-active according to the vigorous activity standard. Females were more than twice as likely as males to be classified as low-active. Race, television watching, and perceived activity level of parents and peers were not significantly associated with vigorous activity status. Results from the logistic regression analysis are shown in Table 5. After elimination of nonsignificant variables, age, gender, television watching, and self-efficacy, with respect to seeking support for physical activity, were found to be independent correlates of low activity status.

Discussion

The present study is unique in that it examined the determinants of physical activity behavior in a sample of rural, predominantly African American youth. The key overall finding of this study was that, similar to other population groups, determinants such as gender, television watching, physical activity self-efficacy, and access to equipment were associated with physical activity status in the expected direction. Other hypothesized determinants of physical activity behavior such as race, social

influences, beliefs regarding physical activity, and perceived activity level of parents and peers were not associated with physical activity status. Another unique aspect of this study was our examination of two different ranges of physical activity intensity. Parallel analyses were performed in which students were classified according to a moderate physical activity standard (Active = 2 x 30-min blocks at 3 METs or greater) and a vigorous physical activity standard (Active = 1 x 30-min block at 6 METs or greater). Although some distinctions were found between the two, the correlates of low-activity status according to the moderate activity standard were found to be similar to the correlates of low-activity status, according to the vigorous activity standard. Such overlap was expected, because 72% of the students classified as low-active according to the vigorous activity standard were also classified as low-active according to the moderate activity standard.

The results of this study indicate that approximately one third of our sample of fifth grade children were not meeting established guidelines for participation in physical activity. This was especially true for girls, of whom 57.3% failed to meet the vigorous physical activity standard. Low and declining levels of physical activity continue to be a serious public health concern for young girls, particularly among minority populations. In a review of the literature describing physical activity in youth, Sallis (1993) estimated that females, on average, are approximately 25% less active than males and that during the school-age years, activity declines at a rate of about 7.4% per year in girls compared to an annual rate of 2.7% in boys. Moreover, data from the 1990 Youth Risk Behavior Survey indicate that, among African American girls, participation in vigorous physical activity declines significantly from 21.6% in the ninth grade to an alarmingly low 9.1% by the 12th grade (Heath et al., 1994). Therefore, the results of this study reinforce the conclusions of previous investigations and indicate that there is an important need to focus on the specific physical activity needs of girls.

An important finding of the present study was the strong association between reported television-watching time and low physical activity participation. Using the moderate activity standard and the vigorous activity standard, respectively, students who watched television or played video games for 3 or more hours in the after-school period were 2.9 and 2.3 times more likely to be low-active than those who watched less than this amount.

Table 2. Means and standard deviations (in parentheses) for active and low-active students for continuous independent variables according to the moderate and vigorous physical activity standards

Independent variable	Moderate standard[a]			Vigorous standard[b]		
	Active	Low-active	*p* value[c]	Active	Low-active	*p* value[c]
Age (years)	10.8 (0.6)	10.6 (0.6)	.02	10.8 (0.6)	10.6 (0.6)	.02
Social influences[d]	4.8 (2.2)	4.0 (2.5)	.01	4.8 (2.2)	4.4 (2.4)	.11
Self-efficacy						
Support seeking[d]	6.2 (1.2)	5.8 (1.8)	.08	6.2 (1.2)	6.1 (1.5)	.35
Overcoming barriers[d]	2.6 (1.3)	2.2 (1.5)	.02	2.5 (1.3)	2.4 (1.4)	.33
Competing activities[d]	4.8 (1.3)	4.4 (1.6)	.02	4.9 (1.2)	4.6 (1.4)	.02
Beliefs						
Physical activity outcomes[d]	9.4 (1.9)	9.4 (1.9)	.78	9.4 (1.8)	9.4 (2)	.66
Social outcomes[d]	3.0 (1.4)	2.6 (1.5)	.05	2.9 (1.5)	2.9 (1.5)	.77
Home exercise equipment (# items)	7.2 (2.6)	6.5 (2.2)	.01	7.1 (2.6)	6.6 (2.3)	.09

[a]Active = two or more 30-min blocks of physical activity at an intensity of 3 METs or greater.
[b]Active = one or more 30-min blocks of physical activity at an intensity of 6 METs or greater.
[c]*p* values derived from *t* test.
[d]Unit of measure is in points.

Television watching continues to be one of the most frequently studied and controversial environmental determinants of physical activity behavior in youth. While several studies have found weak but significant inverse relationships between television watching and physical activity or fitness (DuRant, Baranowski, Johnson, & Thompson, 1994; Ross et al., 1987; Tucker, 1986), others have failed to observe any association (Robinson et al., 1993; Taras, Sallis, Patterson, Nader, & Nelson, 1989). While it is possible that some children can watch substantial amounts of television and still obtain adequate levels of physical activity at other times in the day, the strong associations observed in the present study, taken with the evidence linking television watching to obesity (Dietz & Gortmaker, 1985; Klesges, Shelton, & Klesges, 1993), suggests that parents should at least limit the number of hours their children watch television.

In support of previous studies involving adults (Godin, 1994) and high school-age adolescents (Reynolds et al., 1990; Zakarian, Hovell, Hofstetter, Sallis, & Keating, 1994), physical activity self-efficacy was identified as an independent correlate of vigorous physical activity status. Previous investigations of elementary and middle school students were unable to demonstrate a significant relationship between self-efficacy and exercise behavior (Ferguson, Yesalis, Pomrehn, & Kirk-patrick, 1989; Stuckey-Ropp & DiLorenzo, 1993). Consequently, our observation of a significant association between self-efficacy (support seeking) and participation in vigorous physical activity represents an important finding. This suggested that, compared to their low-active counterparts, students classified as vigorously active were more confident in their ability to ask significant others to provide opportunities for physical activity.

The cross-sectional nature of this study precluded drawing conclusions about causal relationships between the hypothesized determinants and concurrent physical activity behavior. Furthermore, because we measured after-school physical activity only, it is possible that some children may have exhibited different activity patterns at other times during the day and on weekends. How-

Table 3. Crude associations for the categorical independent variables and low-activity status according to moderate and vigorous physical activity standards

Independent variable	Moderate standard[a] Low-active (%)	OR (95% CI)	Vigorous standard[b] Low-active (%)	OR (95% CI)[c]
Gender				
Female	26.5	1.40	57.3	2.15
Male	20.5	(.84–2.32)	38.5	(1.39–3.31)
Race				
AA	25.7	1.53	49.4	1.11
EA	18.5	(.84–2.77)	46.7	(.69–1.80)
TV-Hours				
≥ 3 hours	27.6	2.02	50.4	12.4
< 3 hours	15.9	(1.13–3.58)	45.1	(.79–1.95)
Mother Active				
No	23.7	1.01	53.4	1.40
Yes	23.6	(.61–16.7)	45	(.91–2.15)
Father Active				
No	20.9	0.77	48.8	1.01
Yes	25.7	(.45–1.29)	48.6	(.66–1.57)
Friend Active				
No	19.2	.78	50	1.07
Yes	23.4	(.28–2.14)	48.4	(.48–2.38)

Note. OR = Odds ratio; AA = African American; EA = European American.

[a]Active = two or more 30-min blocks of physical activity at an intensity of 3 METs (metabolic equivalents_ or greater.

[B]Active = one or more 30-min blocks of physical activity at an intensity of 6 METs or greater.

[c]A 95% confidence interval (CI) that does not include 1 is statistically significant ($p < .05$).

Table 4. Significant correlates of low-activity status according to the moderate activity standard

Independent variable	Adjusted odds ratio	95% CI[a]
Age	.52	.35–.78
Gender		
Females	5.03	3.01–8.39
Males		
TV-hours		
≥ (3 hrs	2.89	1.68–4.96
< 3 hrs		
Home exercise equipment	.90	.81–.99

[a]A 95% confidence interval (CI) that does not include 1 is statistically significant ($p < .05$).

Table 5. Significant correlates of low-activity status according to the vigorous physical activity standard

Independent variable	Adjusted odds ratio	95% CI[a]
Age	.68	.45–.99
Gender		
Females	4.59	2.76–7.65
Males		
TV-Hours		
≥ (3 hrs	2.25	1.33–3.81
< 3 hrs		
Self-efficacy support seeking	.79	.67–.96

[a]A 95% confidence interval (CI) that does not include 1 is statistically significant ($p < .05$).

ever, within the limitations of our study design, the results provide some much needed guidance for targeting physical activity interventions for this group of children. Our observation that physical activity status was related to environmental variables, such as television watching and the number of exercise-related items in the home, suggests that parents and guardians can produce a home environment conducive for physical activity by monitoring the time children watch television and providing access to exercise equipment such as jump ropes, basketball hoops, and Frisbees. Furthermore, the observed link between physical activity status and self-efficacy, with respect to seeking support for physical activity, suggests that youngsters should not only be provided with opportunities for developmentally appropriate, enjoyable physical activity but should also be positively reinforced as much as possible when they actively seek outlets for physical activity (e.g., asking to be enrolled in an after-school recreational sports program).

In summary, gender and the amount of television watching were the most important correlates of physical activity behavior in our sample of predominantly African American, rural fifth-grade children. Other key variables associated with physical activity status were self-efficacy, with respect to seeking out physical activity, and the number of exercise-related items in the home.

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Author's Note

This research was supported by a grant from the National Institutes of Health R01 NR 03634. Please direct all correspondence regarding this article to Russell R. Pate, Department of Exercise Science, School of Public Health, University of South Carolina, Columbia, SC 29208.

E-mail: rpate@.sph.sc.edu