

# Differences in Physical Activity Between Black and White Girls Living in Rural and Urban Areas

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**ABSTRACT:** *This study examined the relationship of race and rural/urban setting to physical, behavioral, psychosocial, and environmental factors associated with physical activity. Subjects included 1,668 eighth-grade girls from 31 middle schools: 933 from urban settings, and 735 from rural settings. Forty-six percent of urban girls and 59% of rural girls were Black. One-way and two-way ANOVAs with school as a covariate were used to analyze the data. Results indicated that most differences were associated with race rather than setting. Black girls were less active than White girls, reporting significantly fewer 30-minute blocks of both vigorous and moderate-to-vigorous physical activity. Black girls also spent more time watching television, and had higher BMIs and greater prevalence of overweight than White girls. However, enjoyment of physical education and family involvement in physical activity were greater among Black girls than White girls. Rural White girls and urban Black girls had more favorable attitudes toward physical activity. Access to sports equipment, perceived safety of neighborhood, and physical activity self-efficacy were higher in White girls than Black girls. (J Sch Health. 2002;72(6):250-255)*

Physical inactivity represents a well-established risk factor for many chronic health problems, including cardiovascular disease, type 2 diabetes, obesity, and some cancers, and it is a major public health problem in the United States.<sup>1</sup> National surveys indicate that fewer than two-thirds of youth report participating in vigorous physical activity on three or more days per week. Physical activity by high school students declines steadily with age, particularly among girls.<sup>2</sup> In the 1999 Youth Risk Behavior Survey the percentage of girls reporting vigorous physical activity on three or more days per week declined from 68% in 9th grade to 52% in 12th grade.<sup>3</sup>

A study by the Centers for Disease Control and Prevention found that physical inactivity was highest in rural areas (37%) and lowest in metropolitan areas (27%).<sup>4</sup> People living in rural areas have fewer educational and economic opportunities, less access to health care, and greater transportation problems than do people living in urban areas.<sup>5</sup> Despite these discrepancies, and the fact that an estimated 25% of the US population live in rural areas, physical activity research on youth has focused primarily on urban samples.<sup>6</sup> Physical activity levels also vary by race, with Blacks generally reporting significantly less physical activity than Whites. Black women are at particularly high risk for inactivity. Identification of rural/urban and race/ethnicity differences in physical activity among girls represents an important first step toward developing interventions to increase physical activity among girls and women.

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Schools are particularly well-suited to provide the types of programs that can help all students – rural and urban, Black and White, male and female – become more physically active. Schools have the physical education and health education professionals and the facilities needed to create programs that can help students develop the habit of life-long physical activity. Understanding the factors that influence physical activity behavior, and how these factors vary by setting, race, and gender, can help schools match physical activity programs to the needs and interests of specific groups of students.

This study examined differences in physical, behavioral, psychosocial, and environmental factors associated with physical activity among Black and White adolescent girls living in rural and urban areas. The study also examined the television viewing habits of adolescent girls, because several studies reported a positive association between hours of television viewing and physical inactivity and increased body weight (BMI).<sup>7,8</sup>

## METHODS

### Participants and Setting

Participants were Black and White eighth-grade girls recruited from 31 public middle schools in South Carolina to participate in a high school-based intervention to increase physical activity. Participants were categorized as rural or urban/suburban residents using the South Carolina Department of Education designations as defined by the US Census Bureau. Pre-intervention measures were obtained from two cohorts in spring 1998 and 1999. The sample consisted of 1,668 girls with a mean age of 13.4 years (SD = 0.6). The original sample included 2,064 girls from 31 middle schools; 68% (n = 1,405) of students lived in urban areas and 51% (n = 1,044) were Black. Because of missing data on one or more variables, only 1,668 girls were included in the study. Chi-square tests indicated the study sample was similar to the original sample. Of the 1,668 girls, 56% (n = 933) lived in urban areas. Forty-six percent of urban girls and 59% of rural girls were Black.

### Conceptual Model

The study was guided by an ecological approach focusing on rural/urban settings, Social Cognitive Theory (SCT),

and the Theory of Reasoned Action (TRA). SCT is based on the premise that personal factors, including cognition, and the environment are reciprocal, interactive determinants of behavior. Self-efficacy is a major construct of SCT.<sup>9</sup> According to TRA, a given behavior is determined by an individual's intention to perform the behavior. Intention is based on the individual's attitude toward the behavior and the influence of the individual's social environment or subjective norms.<sup>10</sup> These theories suggest that physical and behavioral factors (race, BMI, and television viewing), psychosocial factors (self-efficacy, attitudes toward physi-

cal activity, subjective norms, intentions to be active, and enjoyment of physical education), and interpersonal and physical environmental factors (family characteristics and resources) may influence a range of behaviors, including physical activity.

### Instruments

Measures of physical activity, physical activity self-efficacy, attitudes toward physical activity, subjective norms, intentions to be physically active, enjoyment of physical education, and environmental factors, including interpersonal (family) and physical environmental factors, were modified from previously published instruments or developed for this study.<sup>11,12</sup> Measures were pilot tested to ensure the reading level and response format were appropriate for eighth graders. Cronbach's alpha reliability coefficients and stability coefficients were derived from pilot tests of samples of 45 to 75 participants (Table 1).

### Physical Measures

Height was measured to the nearest 0.5 cm with a portable stadiometer, and weight was measured to the nearest 0.1 kg with a calibrated digital scale (BeFour, Inc.). Body mass index (BMI) was calculated as body weight divided by height in meters squared (kg/m<sup>2</sup>). Subjects were classified as normal or overweight depending on whether their BMI was equal to or greater than age- and sex-specific 85th percentiles using CDC growth charts.<sup>13</sup>

### Behavioral Measures

Physical activity was measured using the self-report, 3-Day Physical Activity Recall (3DPAR), an extension of the Previous Day Physical Activity Recall.<sup>14</sup> The 3DPAR is organized into 34, 30-minute blocks, from 7:00 am until 12:00 am. Fifty-five common activities are listed on the form, and respondents enter the main activity performed and its intensity during each of the 30-minute periods over the previous three days (Monday, Tuesday, Sunday). Based on the physical activity and intensity selected, each activity is assigned a literature-based MET value.<sup>15</sup> Data are reduced to the number of 30-minute blocks per day in which the main activity is rated at six METs or more — vigorous physical activity and three METs or more — moderate to vigorous physical activity. Television viewing time was estimated by the number of 30-minute blocks of time in which watching television/playing videos was identified as the primary activity on the 3DPAR.

### Psychosocial Measures

Measures of physical activity self-efficacy, attitudes, subjective norms, intentions, and enjoyment of physical activity were completed by all participants. Confirmatory factor analysis was performed on each of the five-point Likert-type scales, and results were reported elsewhere.<sup>11</sup> The Self-Efficacy scale measures one's confidence in the ability to be physically active and is anchored by 1 (disagree a lot) and 5 (agree a lot). The Attitude scale measures beliefs about consequences of being physically active and includes a corresponding evaluation of those consequences. Beliefs about consequences are anchored by 1 (disagree a lot) and 5 (agree a lot). Evaluation statements also are rated on a five-point scale ranging from 1 (very

Table 1  
Instrument Reliability Coefficients\*

Variable	Number of Items	Test-Retest Reliability	Cronbach's Alpha
Self-efficacy (eg, I can be physically active during my free time...)	8	.57	.81
Attitudes (eg, If I were to be physically active it would be fun...)	7	.72	.72
Subjective norms (eg, My mother/father/best friend thinks I should be active during my free time)	8	.58	.73
Intentions	1	.63	-
Family encourages you to do PA	3	.71	.68
Family did PA/sports with you	3	.76	.66
Family provided transportation for PA	3	.75	.60
Family watched you participate in PA	3	.66	.72
Family told PA is good for your health	3	.75	.72
Sports equipment	1	.89	-
Access to parks/gym	1	.95	-
Safe to walk/jog in neighborhood	1	.90	-
Difficult to walk/jog in neighborhood	1	.59	-
Enjoy PE	1	.83	-

\* Sample sizes ranged from 45 to 75 for reliability testing.

bad) to 5 (very good). Scores are derived by multiplying each belief statement score by its corresponding evaluation score and summing the products.

The Subjective Norms scale includes eight items on beliefs about the expectations of others toward physical activity, and eight corresponding items on motivation to comply with these expectations. Scores are derived by multiplying the expectation item score by its corresponding motivation to comply score, then summing the products of all items. Behavioral Intention to be physically active was measured by one item on a five-point scale. Enjoyment of Physical Education was measured by one item with five response options ranging from 1 (very unenjoyable) to 5 (very enjoyable) (Table 1).

### Environmental Measures

Participants completed a series of five family (interpersonal) environmental scales. Each scale contained three, four-point Likert-type items anchored by 0 (none) to 4 (daily). These scales were designed to measure family members' (adult male, adult female, and siblings) involvement with the participant in physical activities during a typical week. For example, respondents were asked,

"During a typical week, how often has a member of your family encouraged you to do physical activity or sports?" Respondents provided three separate scores, one for the adult male family member, one for the adult female family member, and one for siblings in the family. A total score for "family encouragement" is derived by summing across the ratings of the three family members. The physical environment was measured by four individual five-point Likert-type items with response options ranging from 1 (disagree a lot) to 5 (agree a lot). Table 1 contains reliability estimates for environmental measures.

### Procedures

Study procedures were approved by the University of South Carolina Institutional Review Board. All volunteer participants and their parent or guardian provided written informed consent prior to participating in the study. Measures were administered in small group settings (6 to 10 girls) in the schools by trained data collectors using standardized procedures.

### Data Analysis

Separate one-way analysis of variance models

Table 2  
Results of One-Way ANOVAs: Covarying Rural and Urban Settings on Physical Activity and Covarying Race Group on Physical Activity While Controlling for School, Demographic, Psychosocial, and Environmental Variables

Variable	Rural Mean (SE)	Urban Mean (SE)	F-Statistic p-value	Black Mean (SE)	White Mean (SE)	F-Statistic p-value
<b>Physical Measures</b>						
30-minute blocks VPA	1.1 (.11)	1.2 (.09)	.52	0.9 (.07)	1.4 (.07)	<.001
30-minute blocks MVPA	3.5 (.21)	3.5 (.17)	.86	2.9 (.13)	4.1 (.13)	<.001
30-minute blocks TV	3.7 (.23)	4.0 (.19)	.35	4.6 (.15)	3.1 (.16)	<.001
BMI	23.1 (.32)	23.0 (.27)	.70	23.8 (.23)	22.2 (.23)	<.001
% overweight	38.6	37.9	.84	45.2	31.0	<.001
<b>Demographic</b>						
Age	13.5 (.03)	13.5 (.02)	.24	13.5 (.02)	13.5 (.02)	.15
<b>Psychosocial</b>						
Self-efficacy	3.8 (.05)	3.8 (.04)	.43	3.7 (.03)	3.9 (.03)	<.001
Attitudes	17.6 (.18)	17.8 (.15)	.53	17.3 (.12)	18.1 (.13)	<.001
Subjective norms	12.1 (.20)	11.2 (.18)	.002	11.1 (.20)	12.1 (.20)	<.001
Intentions	1.2 (.05)	1.1 (.04)	.15	1.0 (.04)	1.3 (.04)	<.001
Enjoy PE	3.9 (.10)	3.7 (.08)	.29	3.9 (.07)	3.6 (.07)	<.001
<b>Family Environment</b>						
Encourage	1.8 (.06)	1.7 (.05)	.03	1.8 (.05)	1.7 (.05)	.54
Played with you	1.8 (.06)	1.6 (.05)	.01	1.8 (.05)	1.5 (.05)	<.001
Transportation	1.7 (.08)	1.6 (.06)	.19	1.6 (.06)	1.7 (.06)	.49
Watched you	1.8 (.08)	1.6 (.07)	.10	1.7 (.06)	1.7 (.06)	.48
Said PA good	1.9 (.08)	1.8 (.06)	.37	1.9 (.06)	1.8 (.06)	.02
<b>Physical Environment</b>						
Sports equipment	4.3 (.05)	4.3 (.04)	.81	4.2 (.04)	4.5 (.04)	<.001
Parks/gym	3.3 (.13)	3.6 (.11)	.09	3.6 (.10)	3.4 (.10)	.11
Safe to walk	3.9 (.07)	4.0 (.06)	.20	3.8 (.05)	4.1 (.05)	<.001
Not difficult to walk	3.8 (.05)	3.9 (.05)	.13	3.7 (.05)	4.1 (.05)	<.001

(ANOVAs) were used to determine if differences existed between rural and urban settings and between race groups for physical, behavioral, psychosocial, and environmental factors. Two-way ANOVAs with both race and setting, and their interaction in the models, then were used to examine the relationships with the study variables. Because girls from the same schools share both physical and social connections, PROC MIXED was used in all analyses with school as a random effect.

## RESULTS

Results of one-way ANOVAs and two-way ANOVAs are reported in Tables 2 and 3, respectively. For the most part, the results for race and setting were the same for both analyses.

### Physical and Behavioral Factors

Results of one-way ANOVAs indicate Black girls were less active than White girls, both for vigorous and moderate-to-vigorous physical activity. An interaction between

race and setting ( $p = .05$ ) for vigorous activity (Table 3) indicates that, among Black girls, those in rural areas were more vigorously active than those in urban areas. Among White girls, those in urban areas were more vigorously active than those in rural areas. In addition, Black girls watched more television than White girls and had higher BMIs and greater prevalence of overweight.

### Psychosocial Factors

Rural girls had higher subjective norms than urban girls. Black girls reported greater enjoyment of physical education, while White girls reported higher self-efficacy, subjective norms, and intentions to be physically active. A significant interaction was found between race and setting for attitudes ( $p = .02$ ). Among Black girls, those in urban settings had more positive attitudes about physical activity than those in rural settings, while among White girls, those in rural settings had more positive attitudes than those in urban settings. Also, after controlling for race, rural girls had higher intentions to be physically active than girls in urban settings ( $p = .04$ ).

Table 3  
Two-Way ANOVAs (Race x Setting) for Physical Activity,  
Demographic, Psychosocial, and Environmental Variables Controlling for School

Variables	Black		White		Setting	p-value	
	Rural N = 430	Urban N = 426	Rural N = 305	Urban N = 507		Race	Interaction
<b>Physical Activity</b>							
30-minute blocks VPA	0.9 ± 0.10	0.8 ± 0.09	1.3 ± 0.11	1.5 ± 0.09	.76	<.001	.05
30-minute blocks MVPA	3.1 ± 0.19	2.8 ± 0.17	4.1 ± 0.21	4.1 ± 0.17	.43	<.001	.23
30-minute blocks TV	4.2 ± 0.23	4.9 ± 0.20	2.9 ± 0.24	3.2 ± 0.19	.10	<.001	.17
BMI	23.6 ± 0.33	24.0 ± 0.31	22.5 ± 0.38	22.1 ± 0.30	.98	<.001	.15
% overweight	43.6	46.7	31.7	30.5	.72	<.001	.37
<b>Demographic</b>							
Age	13.5 ± 0.03	13.5 ± 0.03	13.5 ± 0.03	13.5 ± 0.03	.31	.13	.21
<b>Psychosocial</b>							
Self-efficacy	3.7 ± 0.05	3.6 ± 0.04	4.0 ± 0.05	3.9 ± 0.04	.11	<.001	.61
Subjective norms	11.5 ± 0.25	10.7 ± 0.25	12.9 ± 0.29	11.7 ± 0.23	<.001	<.001	.45
Attitudes	17.1 ± 0.19	17.5 ± 0.18	18.4 ± 0.21	18.0 ± 0.17	.95	<.001	.02
Intentions	1.1 ± 0.05	1.0 ± 0.05	1.3 ± 0.06	1.2 ± 0.05	.04	<.001	.90
Enjoy PE	3.97 ± 0.11	3.9 ± 0.09	3.8 ± 0.11	3.6 ± 0.09	.39	<.001	.35
<b>Family Environment</b>							
Family members:							
Encourage	1.9 ± 0.07	1.7 ± 0.06	1.8 ± 0.08	1.7 ± 0.06	.04	.68	.92
Played with you	1.9 ± 0.07	1.7 ± 0.06	1.6 ± 0.08	1.5 ± 0.06	.02	<.001	.50
Transportation	1.7 ± 0.09	1.6 ± 0.08	1.8 ± 0.09	1.6 ± 0.07	.16	.37	.33
Watched you	1.8 ± 0.09	1.6 ± 0.08	1.8 ± 0.10	1.6 ± 0.08	.11	.56	.99
Said PA good	2.0 ± 0.09	1.9 ± 0.08	1.8 ± 0.10	1.8 ± 0.08	.49	.03	.84
<b>Physical Environment</b>							
Sports equipment	4.2 ± 0.06	4.2 ± 0.05	4.5 ± 0.05	4.5 ± 0.05	.42	<.001	.70
Parks/gym	3.4 ± 0.14	3.7 ± 0.12	3.2 ± 0.15	3.5 ± 0.12	.07	.09	.80
Safe to walk	3.8 ± 0.07	3.8 ± 0.07	4.0 ± 0.08	4.2 ± 0.06	.17	<.001	.05
Not difficult to walk	3.7 ± 0.07	3.7 ± 0.07	4.0 ± 0.08	4.1 ± 0.06	.38	<.001	.44

### Family Environmental Factors

Black girls reported a higher frequency of family members participating in physical activity or sports with them, and of family members telling them that physical activity was good for them, than did White girls ( $p < .05$ ). Rural girls reported higher values for family encouragement and that family members more often participated in physical activity or sports with them than did girls in urban settings ( $p < .05$ ). These findings were the same for both one-way and two-way ANOVAs.

### Physical Environmental Factors

White girls reported more sports equipment in their homes, and reported more often that it was safe to walk or jog alone in their neighborhoods ( $p < .001$ ), than did Black girls. They also reported less difficulty walking in their neighborhoods due to, for example, too much traffic or lack of sidewalks. An interaction occurred between race and setting ( $p = .05$ ) for perception of whether it was safe to walk or jog alone in their neighborhood. Among Black girls no differences occurred between girls in rural and urban settings, while among White girls those in urban areas perceived that it was easier to walk or jog than did girls in rural areas.

## DISCUSSION

This study provides important information about physical activity among Black and White girls living in urban and rural areas. Though the one-way ANOVAs indicate some differences between girls who live in urban areas and those who live in rural areas, most differences observed occurred between Black girls and White girls. Black girls reported significantly lower levels of physical activity and significantly higher levels of watching television. They also had significantly higher BMIs. White girls generally scored significantly higher on measures of psychosocial correlates of physical activity. Many of the factors that appear to affect physical activity levels in girls – Black and White, rural and urban – can be influenced by schools, most of which possess the staff and facilities to create enjoyable, girl-friendly physical education classes and after-school physical activity programs.

Amount of time spent in vigorous physical activity was greater for White girls in urban areas than for White girls in rural areas, while the opposite was true among Black girls. Both White and Black girls reported low levels of vigorous physical activity, but Black girls were substantially lower. White girls spent an additional 30-minute block of time each day in moderate-to-vigorous physical activity compared to Black girls. These findings mirror the racial differences observed in national studies, where White girls report statistically higher levels of moderate and vigorous activity.<sup>3</sup> These findings suggest that both Black and White girls are more likely to respond to programs aimed at increasing participation in moderate-to-vigorous, rather than vigorous activity. The findings also suggest that physical educators and other school health professionals should particularly encourage Black girls to become involved in physical activity programs.

This study found racial differences in the amount of time spent watching television, with Black girls reporting significantly more 30-minute blocks per day. Nationwide, 43% of

students watch television more than two hours on an average school day; 74% of Black students and 35% of White students watch television more than two hours per day.<sup>3</sup> A previous study found television watching correlate with low physical activity among rural early adolescents.<sup>16</sup> Though the relationship between television viewing and physical activity was not examined in this study, both the school and the home can influence these behaviors. Schools that provide opportunities for girls to be active after school, and parents who limit time spent watching television, can increase time spent in physical activity.

Thirty-eight percent of girls in this study were overweight, and the percentage did not differ by setting. This finding conflicts with findings of McMurray et al,<sup>17</sup> who found that relative risk for obesity was 50% greater in rural children, even when adjusted for gender, race, family income, and physical activity. We did observe race differences, however, with a significantly higher percentage of Black girls being overweight. The high percentage of all girls who were overweight suggests that physical educators, health educators, and school nurses should examine dietary patterns and physical activity patterns of girls, and develop programs that promote a healthy diet and increase physical activity.

These findings showed that Black girls rated physical education as more enjoyable than did White girls. However, on average, both groups rated physical education as only “somewhat enjoyable.” A study that used focus groups with Black and Hispanic adolescent girls revealed that “almost without exception” girls did not like physical education because it was unenjoyable and it discouraged those who were interested in physical activity.<sup>18</sup> Participation in quality physical education classes during every school day represents a key to increasing lifelong physical activity,<sup>19</sup> so schools that want to help girls become more active must consider girls’ needs and interests in planning physical education programs. Girls prefer lifelong and cooperative physical activities over team sports and competitive activities, and schools should consider these preferences when planning physical education programs.

Previous studies documented the importance of family environment (support) on individual participation in physical activity.<sup>20,21</sup> An important finding of this study was that Black girls perceived more “family participation in play” and “positive family beliefs of benefits of physical activity” than White girls. In this study, the family environment for rural girls was stronger and more supportive of physical activity than for urban girls. In general, family involvement constitutes an untapped resource to promote a positive attitude, self-efficacy, and physical activity competence in girls.<sup>20</sup>

In this study, White girls generally had greater access to sports equipment than Black girls, and they lived in neighborhoods that made walking or jogging easier (free of traffic, dogs, gangs, etc.). Of the four groups, urban White girls perceived their neighborhood as the safest. However, girls in all groups and settings recorded low scores on availability of “play grounds, parks, and gyms close to home.” Environments with resources for physical activity, such as sidewalks, parks, and YMCAs and other recreation facilities, are associated with the likelihood of engaging in moderate to vigorous activity.<sup>22</sup> Opportunity, convenience, and access to facilities and equipment relate to participation

in physical activity.<sup>18,23-25</sup> One study found that school environmental characteristics explained 42% of variance in the proportion of physically active school girls.<sup>26</sup> Community leaders, school officials, teachers, and practitioners often overlook the lack of accessible, safe environments where adolescent girls can be physically active. Moreover, few programs have used partnerships to develop integrative approaches to enhance family, school, and community environments to promote physical activity.

Findings from this report are subject to limitations. First, staff relied on self-report data in which there are potential biases. For example, physical environmental data were based on participants' perceptions, without quantification of the various characteristics of the physical environment. Second, the study did not control for socioeconomic differences. Third, while the sample represents the state's public school population and was racially diverse, the urban areas were relatively small. This fact may reduce generalizability of the findings to large urban areas. Finally, because multiple statistical comparisons were performed, a small percentage of observed significant associations may have occurred due to chance.

## CONCLUSION

This study provides insight about factors previously associated with physical activity that may prove influential in promoting physical activity among Black and White adolescent girls living in rural and urban areas. Most of the differences found in the factors examined can be attributed to race rather than to location of residence. Teachers and school-based health professionals can promote changes in the school environment and design physical education and health programs sensitive to race and to individual needs. School personnel can help change attitudes and norms to promote physical activity among young Black and White girls. Encouraging and increasing family and community interest in promoting and participating in physical activity can yield extraordinary outcomes. ■

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