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Do Physical Activity Facilities near Schools Affect Physical Activity in High School Girls?

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Abstract

Objective—To investigate associations between the number of physical activity facilities within walking distance of school and physical activity behavior in 12th grade girls during after-school hours.

Methods—Girls (N=1394) from 22 schools completed a self-report to determine physical activity after 3:00 pm. The number of physical activity facilities within a 0.75-mile buffer of the school was counted with a Geographic Information System. Associations between the number of facilities and girls' physical activity were examined using linear mixed-model analysis of variance.

Results—Overall, girls who attended schools with ≥ 5 facilities within the buffer reported more physical activity per day than girls in schools with < 5 facilities. In addition, girls who attended rural schools with ≥ 5 facilities reported ~12% more physical activity per day than girls who attended rural schools with < 5 facilities. No difference existed for girls in urban/suburban schools with ≥ 5 vs. < 5 facilities.

Conclusion—When school siting decisions are made, the number of physical activity facilities surrounding the school should be considered to encourage physical activity in 12th grade girls.

Keywords

3DPAR; community environment; METs; MVPA; Geographic Information System

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Introduction

Physical inactivity in youth has become a critical public health issue due to its strong association with increased obesity, adolescent metabolic syndrome, and risk of cardiovascular disease (Kimm et al., 2005, Kasa-Vubu et al., 2005, Eisenmann et al., 2007). Specifically, youth who do not engage in regular physical activity have a greater BMI, body fat percentage, fasting insulin concentration and blood pressure, and less favorable lipid profile than those who maintain a physically-active lifestyle throughout adolescence (Freedman et al., 1999, Raitakari et al., 1994). A majority of youth do not meet the U.S. Physical Activity Guidelines, with only 4% of girls and 11% of boys aged 12–19 attaining 60 minutes per day of moderate-to-vigorous physical activity (MVPA, Troiano et al., 2008). This extremely low prevalence has led to public health efforts to alter the surrounding environment in attempt to increase physical activity behavior in youth.

The Institute of Medicine, the Transportation Research Board, and the U.S. Preventive Services Task Force recommend developing environmental and policy strategies to enhance physical activity within communities (Heath et al., 2006, Institute of Medicine, 2005). These organizations encourage public health authorities to advocate for improved community- and street-scale urban design/land use to increase access to physical activity facilities, particularly for youth (Heath et al., 2006). Indeed, Gordon-Larsen et al. (2006) demonstrated a positive association between the number of physical activity facilities within an adolescent's built environment and his or her physical activity behavior. In particular, studies have demonstrated that the number of physical activity facilities within a 0.75–1.0 mile buffer of adolescent girls' homes is positively associated with increased MVPA and vigorous physical activity (VPA) per day in girls (Pate et al., 2008, Dowda et al., 2009, Norman et al., 2006). The number of parks surrounding the home is also positively associated with total METs per day for white adolescent girls (Pate et al., 2008).

Although interventions to increase physical activity have been conducted within the school setting (Sallis et al., 2003, Pate et al., 2005, Bayne-Smith et al., 2004), a majority of opportunities for physical activity occur outside of the school setting and during non-school hours (Ross et al., 1985). However, youth may be discouraged from participating in physical activity outside of school hours because their schools are located in outlying areas away from the community due to the low cost of land in these areas (Ewing et al., 2005). For example, a simulation study performed by Ewing et al. (2005) suggested that decreasing commuting distance to one-half mile could potentially increase biking and/or walking to school from 7.9% to 21.4%.

It is essential to understand whether the built environment surrounding the school promotes physical activity in youth. The purpose of this study was to assess the relationship between the number of physical activity facilities within walking distance of girls' schools and non-work-related physical activity levels of adolescent girls during after-school hours.

Methods

Study Design and Subjects

This research involved an analysis of cross-sectional data from the 2002–2003 Lifestyle Education for Activity Program (*LEAP)* study, a large-scale intervention trial aimed at increasing physical activity in high school girls. The intervention was tested during girls' 9th grade school year, and long-term follow-up data were collected during the 12th grade. This study was based on the 12th grade data. Subjects were female students in 22 high schools in South Carolina. All 12th grade girls (N=5752) enrolled in the participating schools were invited to participate. Written informed consent (age ≥ 18 years) or parent/guardian consent with youth assent (age < 18 years; 37.1%) was obtained from 2136 girls. A total of 1609 girls completed at least a portion of the study measures, 1467 (54.6% African American, 41.4% white) completed the physical activity measures, and 1434 girls reported non-school and non-work-related physical activity after 3:00 pm (57% African American, 43.0% white). Finally, the data from girls (N = 1394) who provided information on their BMI, age, race, address, highest level of parent education, and household income estimated based on the median household income of the U.S. Census tract where a girl lived (US Census, 2000) were used for the analysis. All data were collected during the girls' 12th grade academic year (fall 2002 to summer 2003), with GIS collection during early summer 2003. Data analysis was performed in 2009–2010. The procedures were approved by the University of South Carolina Institutional Review Board.

Physical Activity

Physical activity was measured by self-report on a Wednesday during the spring semester using the 3-Day Physical Activity Recall (3DPAR, Pate et al., 2003). Girls recalled their activities from Tuesday, Monday and Sunday, completing a grid for each day. The grid was divided into 30-minute time blocks, beginning at 7 am and ending at 12 midnight. Girls reported their predominant activity in each of the 30-minute blocks. A list of 55 common activities was grouped into the following categories: sleep/bathing, eating, work, after-school/spare-time/hobbies, transportation, and physical activities/sports. Girls also indicated if the activity was performed at a light, moderate, hard, or very hard intensity. A script and graphic figures were used to explain the intensities of common activities. Light activities were described as requiring little or no movement with slow breathing, moderate activities as requiring some movement and normal breathing, hard activities as requiring moderate movement and increased breathing, and very hard activities as requiring quick movement and hard breathing.

The activities from each block of each day of the 3DPAR were assigned a metabolic equivalent (MET) value using the Compendium of Physical Activities (Ainsworth et al., 2000). Three-day averages were calculated for the number of 30-minute blocks in which girls participated in moderate-to-vigorous physical activity (MVPA, coded as 3–6 METs) and vigorous physical activity (VPA, coded as ≥ 6 METs) during after-school hours, defined as 3:00 pm to midnight. Fifty percent of girls reported some work time physical activity during the 3-day recall, and these blocks were excluded from the analysis.

Three physical activity variables were defined: 1) *Total MET-weighted blocks per day* (total metabolic equivalents of non-work, after-school physical activity averaged over 3 days); 2) *2+ blocks MVPA per day* (girls who reported 2 or more blocks of moderate-to-vigorous, non-work, after-school physical activity averaged over 3 days); and 3) *1+ blocks VPA per day* (girls who reported 1 or more blocks of vigorous, non-work, after-school physical activity averaged over 3 days). Girls who reported 1+ blocks VPA or 2+ blocks MVPA per day were considered to be consistent with the National Physical Activity Guidelines for youth.

Anthropometric Measures

Weight was measured to the nearest 0.1 kg with a digital scale (BeFour, Inc. Model PS660; Saukville, WI) and height was measured to the nearest 1.0 cm with a portable stadiometer. BMI was calculated by dividing weight in kilograms by height in meters squared.

Assessment of Physical Activity Facilities

The 22 participating high schools were located in 13 counties in South Carolina. The addresses of physical activity facilities were collected through a variety of methods, and locations were geocoded at the street address level and validated for presence of physical activity availability through phone verification and visits by USC staff. Colleges and universities (n=35) were identified using Internet search engines, and church addresses (n = 4601) were obtained using the Bell South Internet Yellow Pages. Lists of schools in the counties were obtained from the South Carolina Department of Education (public = 505, private = 254, charter = 3), and only schools with green space or playgrounds open to the public were included. To collect park information and addresses (n=765), researchers administered surveys and contacted park directors and city and municipality officials. South Carolina state parks were identified via the state parks website, and the main park entrance was used for the address. Addresses were confirmed using Internet search engines, and handheld GPS units were used at the main park entrance for geocoding when an address was not obtained. State trails were identified using Trail-o-Dex (http://www.sctrails.net/trails), and were defined as linear, multipurpose features that were used for jogging, cycling, hiking, etc, and maintained by a state, county, or municipal agency. Trails were walked by staff and recorded as polylines via GPS. Commercial facilities were identified using phonebooks, and verification was conducted by using selected search engines (www.reversedirectory.com, Smartpages, Whitepages, and Qwestdex), as well as telephone calls to each facility by research staff.

Commercial physical activity facilities were placed into three categories: 1) team facilities (athletic organizations; sports clubs—baseball/softball, basketball, and soccer—cheerleading, golf, gymnastics, hockey, paintball, and swimming facilities, n = 160); 2) individual facilities (bowling, dance, diving, martial arts, racquetball, self-defense instruction, skating, tennis, yoga, horseback riding, sky diving instruction, scuba diving, sailing, rock climbing facilities and health clubs, n = 736); and 3) multipurpose facilities (recreation centers, youth organizations, and clubs, n = 76). Overall, 91.6% of the addresses were successfully geocoded.

The school buffer zone was determined by asking girls to indicate what they perceived to be an "easy walking distance" (Colabianchi et al., 2007). The mean distance reported was 14.8 minutes (SD = 8.7); therefore, assuming a walking speed of 80 meters per minute (3 miles per hour, Perry, 1992), a 15 minute walk translates to 1184 meters or approximately 0.75 miles (Colabianchi et al., 2007). The type and total number of physical activity facilities within a 0.75-mile street network buffer around each girl's school was then counted using Geographic Information System (GIS) methods (ArcGIS version 9.1). In addition, a subset of girls (n = 1061) from the 22 schools were provided a list of 12 physical activity facilities and were asked to indicate which facilities they perceived as within "easy walking distance" from their school.

Statistical Analyses

After deletions for girls who reported race other than white or African American, or who were missing data for anthropometry, race, parent education, or median household income, 1394 girls were included in the final analyses. Descriptive statistics were calculated for the girls and for the 22 schools that they attended. Because we wanted to test the hypothesis that exposure to a high density of physical activity facilities positively influences physical activity behavior, these characteristics were then compared (using t-tests) for girls who attended low facility (LF) schools (< 5 physical activity facilities within a 0.75-mile buffer zone of their school), with girls who attended high facility (HF) schools (≥ 5 physical activity facilities within a 0.75-mile buffer zone of their school). The cut-off of 5 facilities was chosen because it represented the 75th percentile of the number of facilities within the buffer zone of the school.

Linear mixed model analysis of variance (ANOVA) was then conducted to determine whether associations existed between the number of physical activity facilities and three physical activity variables (Total MET-weighted blocks per day, 2+ blocks MVPA per day; 1+ blocks VPA per day) as the dependent variables. Fixed independent variables included race, BMI, parent education, school-level free/reduced lunch, number of physical activity facilities (dichotomized to LF schools versus HF schools), area (rural versus urban/suburban), and group (control versus intervention); the random independent variable included school. Interaction terms were tested between number of physical activity facilities and area (rural versus urban/suburban), as well as between number of physical activity facilities and race. Interaction terms that were non-significant ($p > 0.10$) were deleted from the model.

Descriptive statistics for the neighborhood characteristics of the subset of girls (n=1061) who completed questions regarding whether facilities were within easy walking distance of school were calculated for the total group and by race. Using mixed model logistic regression, availability of each PA facility ('Yes' there is the facility, versus 'No,' or 'I don't know') as the dependent variable was compared for LF schools and HF schools. Models were adjusted for race, BMI, parent education, group (control versus intervention), and school as a random variable. A p value of ≤ 0.05 was considered statistically significant for all results.

Results

Across the 1394 girls studied, 56.3% of the girls were African-American, 63.3% had a parent with a greater-than-high school education, and 34.1% received school free/reduced lunch. Mean (SD) age of the girls was 17.7 (0.6) years, and BMI was 25.2 (6.4) kg/m^2. Across the 22 high schools, 42.9% were classified as rural. The average number of total physical activity facilities within the 0.75-mile buffer of the school was 3.7 (range 0–16). Churches were the most common facilities within the buffer zone (mean ± SD: 2.36 ± 2.59), while colleges (0.05 ± 0.21) and multipurpose commercial facilities (0.05 ± 0.21) were the least common (Table 1). When the 22 schools were dichotomized into the number of HF schools (≥ 5 facilities) and LF schools (< 5 facilities) within the 0.75-mile buffer zone of each school (Table 2), statistically significant differences existed between HF schools (n = 10) and LF schools (n = 12) for percentage of schools in a rural area, percent of school-level free/reduced lunch, and girls whose parents had a greater-than-high school education. There was also a statistically significant difference between HF schools and LF schools for the number of girls who reported 1+ blocks VPA and 2+ blocks MVPA per day after 3:00 pm (Table 2).

Results of the regression analysis for the adjusted models that examined the relationships between the independent variables (with school as a random variable) and the three physical activity dependent variables are shown in Table 3. Race (African-American vs. white) and number of facilities (<5 vs. ≥ 5) were significantly associated with all three physical activity variables. The area by facilities interaction was significantly associated with Total MET-weighted blocks per day. Parent education and Area (urban/suburban vs. rural) were significantly associated with 1+blocks VPA per day. Trends existed for associations between Group (control vs. intervention school), area by facilities interaction and 1+block VPA per day, as well as between BMI and Total MET-weighted blocks per day (p=0.05). When associations were examined by facility type (churches, parks, commercial and educational), parks, educational facilities ($p = 0.01$ for both), and parks by area interaction ($p = 0.04$) were significantly associated with 2+blocks MVPA per day. No significant associations existed for the race by facilities interaction, percent free or reduced lunch, or for churches or commercial facilities for any of the models.

A significant interaction was found between girls who lived in rural vs. urban/suburban areas and HF vs. LF schools (Figure 1). Girls who lived in a rural area, and attended HF schools, had 12.4% greater number of Total MET-weighted blocks per day ($p = 0.002$, Figure 1a), 12.8% greater reported 2+ blocks of MVPA per day ($p = 0.009$; Figure 1b) and 10.7% greater reported 1+ blocks VPA per day ($p = 0.01$, Figure 1c) than girls who lived in a rural area and attended LF schools. No difference existed between girls who lived in an urban/suburban area and attended HF schools vs. LF schools for any of the physical activity variables ($P > 0.05$).

Table 4 shows data from a subset of girls (1061) who reported whether they perceived a facility within “easy walking distance” of their school. For 8 of the 12 facility types, more girls in HF schools compared to girls in LF schools reported these facilities were located within easy walking distance of their schools. Recreation center and basketball court reached statistical significance, with girls in HF schools being 2.96 and 1.6 times more likely to report recreation centers and basketball courts, respectively, within “easy walking distance” of their school ($p < 0.05$). In contrast, girls in HF schools were 2.5 times less likely to report a track within “easy walking distance” of their school ($p= 0.03$).

Discussion

To our knowledge, this is the first study to examine the association between the number of physical activity facilities surrounding the school and after-school, non-work-related physical activity levels of 12th grade girls. The major findings of the study were that 12th grade girls who attended high schools with ≥ 5 physical activity facilities in the buffer zone of the school had greater reported physical activity than girls who attended schools with < 5 facilities. Schools with larger enrollments of lower income and lower-educated families, and schools that were located in rural areas, had fewer physical activity facilities within the buffer zone. However, rural schools with ≥ 5 physical activity facilities in the buffer zone were significantly associated with greater Total MET-weighted blocks per day, and greater numbers of 2+ blocks MVPA and 1+ blocks VPA per day, whereas rural areas with < 5 facilities were not. These findings suggest that the built environment surrounding high schools is an important factor in promoting non-work, after-school physical activity in 12th grade girls.

The dichotomous category of ≥5 vs. < 5 facilities was used because we felt that the 75th percentile for the number of facilities within the school buffer zone was the appropriate cut-point to test our hypothesis that that exposure to a high density of physical activity facilities positively influences physical activity behavior. We divided number of facilities within the buffer into quartiles and chose the 75th percentile to determine differences in categorical variables instead of the 50th percentile (number of facilities ≥3 vs. < 3, in this case) because the median does not give much information regarding differences between high vs. low categorical variables. Modeling the number of facilities as a continuous variable was not the appropriate method to use to convey our primary purpose, however it was also examined. Using the continuous model, although a trend was suggested for total MET and blocks of VPA, it was not statistically significant. Blocks of MVPA was significant, but it didn’t give us any more information than categorizing into ≥5 vs. < 5 facilities. Therefore, we felt using the 75th percentile was the best method to test our hypothesis.

The positive associations between number of physical activity facilities surrounding the high school, as well as type of physical activity facilities (parks and educational), and non-work-related physical activity levels of adolescent girls during after-school hours in adolescent girls is similar to other studies examining physical activity facilities close to adolescent girls’ residences. Pate et al. (2008) observed that the number and type of physical activity facilities within a 0.75-mile buffer surrounding the home were associated with greater total METs per day (for college facilities) and number of blocks of leisure-time VPA per day (for churches, parks, and commercial facilities) in 12th grade girls. Norman et al. (2006) also found that the number of recreational facilities and parks within a 1-mile buffer of 11–15 year-old girls' homes correlates positively with physical activity. Although Scott et al. (2007) noted that some facilities within 0.5–1.0 miles of middle-school girls' homes were not associated with MET-weighted MVPA, they did find that each additional basketball court within the first 0.5 miles was associated with a 3% increase in MET-weighted MVPA. Therefore, evidence exists to suggest that increasing the number of physical activity facilities in an adolescent girls' environment may promote positive physical activity behavior.

Rural girls who attended HF schools were more active than rural girls who attended LF schools, while no difference was found for urban/suburban girls. There are several differences between rural and urban locations that may affect health, including availability of facilities and physical activity programs in rural versus urban areas (Moore et al., 2010), and even number and types businesses selling food (Strum, 2008). Springer et al. (2009) reported that 8th and 11th grade students in urban areas of Texas reported lower prevalence of physical activity than did students in rural and suburban areas. A similar finding was reported by Liu et al. (2008) in a national data set, where they found a higher prevalence of overweight in rural areas. Since there may be fewer places to be active in rural areas, or they may be harder to access, when physical activity facilities are available close to schools, youth may be more likely to utilize them.

Data from the subset of girls reporting the facilities located within perceived "easy walking distance" generally confirmed the recognized density of the school area facilities. Girls in HF schools reported 8 out of the 12 listed physical activity facilities within "easy walking distance," with recreation centers and basketball courts reaching statistical significance. In contrast, a higher percentage of girls in LF schools reported a track to be within "easy walking distance." It is possible that the negative association found with a track is due to the fact that most high schools have a track on campus and subsequently the girls were more aware of the track. Also, girls who do not have access to other facilities may notice a track more than girls who have additional options. While the other differences between HF schools and LF schools were not statistically significant, most were positively associated, showing that girls' awareness of facilities were consistent with the HF schools or LF schools group. Similar results examining perception of easy access to facilities for middle-school girls found that the number of facilities within the first half mile of the girls' homes strongly predicted whether the girls would perceive these facilities to be easily accessible (Scott et al., 2007). Indeed, in contrast to objectively-measured facilities, Scott et al. (2007) found that for each additional facility girls perceived to be within easy access, a 22-minute increase in non-school MW-MVPA was observed. Therefore, to encourage greater physical activity in adolescent girls after school hours, it may be beneficial for administrators to make a school-wide advertisement of the physical activities available within "easy walking distance" of their schools.

Churches were the densest of all the facilities within the 0.75-mile buffer zone of the girls' schools. These results corroborate our previous investigation that the presence of churches around schools, not just homes, is related to physical activity. When racial/ethnic and rural vs. urban 12th grade girls were examined separately, Pfeiffer et al. (In press) found that African-American, white, and rural girls who had more churches within a 0.75-mile buffer of their home were significantly more likely to report 2+ blocks of leisure-time MVPA per day, while rural girls with more churches near home were significantly more likely to report higher total METs per day. Data in children and adolescents are limited, but in adults (specifically African American women), PA programs at church were a significant correlate of activity in a cross-sectional investigation (Bopp et al., 2007). Beyond this, interventions such as *GoGirls!* provide evidence that adolescent girls enjoy physical activity programs offered in religious settings (Resnicow et al., 2005). Church attendance can provide a type of social identity; therefore, churches may hold special significance in the social lives of participants in our investigation, which may not be the case in areas where church attendance is less common.

The importance of physical activity facilities around the school setting is evident and has been emphasized internationally. Data from 16,471 students in Norway indicated that boys and girls were nearly three times more likely to be active at secondary schools that had larger numbers of outdoor facilities (Haug et al., 2010). Even in areas with colder climates, outdoor facilities such as soccer fields, hopscotch/jump rope areas, and even sledding hills, were found to be associated with increased physical activity in secondary school students. Similar results were noted in a study of 7638 Canadian students in grades 6–10 (Nichol et al., 2009). These adolescents were more active, both during and after school, in school settings with the greater number of recreational facilities. Boys benefitted most during school, while girls benefited during after school free time.

The strengths of this study include a diverse sample of girls with an almost equal proportion of African American and white girls, which allowed for tests for interactions across ethnicities. An additional strength of the study was the diverse geographical locations of the schools across 13 counties, which included rural and urban/suburban areas that allowed for a test for an interaction between the number of facilities and girls who displayed non-work, after-school physical activity behavior in rural vs. urban/suburban areas. Finally, comprehensive GIS data was collected and analyzed, which provided an innovative component of measuring physical activity facilities.

Some limitations also must be considered. Since school-site physical activity facilities were not audited, it is not possible to determine whether the school itself was considered a physical activity facility. Also, the 0.75-mile school buffer zone may not have provided a complete picture of the physical activity facilities accessible to 12^{th} grade girls, who may have access to automobiles. Over-reporting of physical activity is always possible with physical activity self-report instruments; however, the 3DPAR has been validated against objectively-measured physical activity (McMurray et al., 2004, Pate et al., 2003). Although the number of facilities within the 0.75-mile buffer of school was associated with physical activity, it is not known whether the girls actually used the facilities within this buffer zone. While a causal relationship between the number of physical activity facilities surrounding a school and physical activity behavior cannot be determined, the relationship is beneficial for understanding associations.

Regarding GIS limitations, while there is no validation available for address completeness of phone books, it should be noted that using all potential commercial physical activity facilities listed in phone books would have resulted in the inclusion of many locations that, in reality, had no physical activity availability. Therefore, the most recent phone books were acquired for each of the study areas, and all potential facilities listed were screened by USC staff via telephone and retained or eliminated accordingly. Similarly, all parks and schools were visited by USC staff and surveyed for the presence or absence of physical activity equipment. Finally, when using GIS, researchers need to be cognizant of some of the issues associated with the temporal completeness and accuracy of the data as well as the spatial accuracy of the address information.

In conclusion, for 12th grade girls, the physical activity facilities available around their schools may be important for participation in health-promoting physical activity. As the population of school-age youth increases (United States Environmental Protection Agency, 2003) and as communities plan for new school facilities, policy makers and school leaders need information on environmental factors that may contribute to increased physical activity behavior in youth. Communities across the United States will, in the next few decades, need to accommodate substantial new student enrollment, and thousands of schools will need to be built or renovated in order to respond to the predicted increase in school age children (United States Environmental Protection Agency, 2003). With the increased building of schools, the association between number of physical activity facilities surrounding a school and physical activity behavior in youth should be considered when school siting decisions are made. Our results add strength to arguments for locating schools in mixed use areas that contain parks or other recreational facilities (McDonald, 2010), and to placing schools adjacent to physical activity facilities to promote physical activity in youth. In addition, advocating for neighborhood schools should be considered so that a proportion of the school population is encouraged to walk or bike to school. Future studies should examine issues of disparity and the built environment, as well as potential infrastructures that have co-use facilities within the community, in order to support physical activity behaviors that contribute to healthy living.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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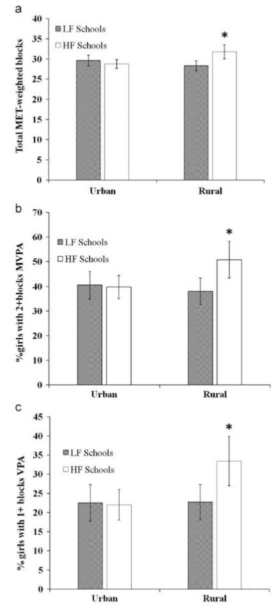

Figure 1.

Number of Physical Activity Facilities by Area Interaction. Values are means with Confidence Intervals (CI). *Significant Group × Treatment interaction ($p < 0.05$).

Table 1

Number and type of physical activity facilities within a 0.75-mile radius of 22 schools

Variable	Mean (SD)	Range
Church	2.36 (2.59)	0–11
Individual $^{\Psi}$	0.45 (0.60)	0–2
Multiple $^{\Psi}$	0.05 (0.21)	0–1
Team $^{\Psi}$	0.09 (0.43)	0–2
Parks	0.68 (1.17)	0–4
Colleges	0.05 (0.21)	0–1
Private Schools	0.36 (0.73)	0–2
Public Schools	0.50 (0.74)	0–2

$^{\Psi}$Commercial Facilities

Table 2

Characteristics of schools$^{\Psi}$ and girls with high or low number of facilities within a 0.75 radius of the school

Variable	LF schools (<5, n=12) Mean (SD) or percent (n=697 girls)	HF schools (≥5, n=10) Mean (SD) or percent (n=505 girls)	p-value (t-test or Chi-square)
Percent free/reduced lunch$^{\Psi}$	37.6 (14.2)	29.3 (12.4)	<0.001
Rural$^{\Psi}$	52.1%	31.7%	<0.001
BMI	25.4 (6.8)	24.8 (5.9)	0.05
Percent Black	58.1%	53.9%	0.11
Parent > HS education	58.6%	69.7%	<0.001
Total MET-weighted blocks, after 3	28.7 (10.0)	29.7 (10.0)	0.07
2+ blocks of MVPA, after 3	37.6%	43.3%	0.03
1+ block of VPA, after 3	20.8%	26.9%	0.01

Note: 5 facilities is the 75th percentile of number of facilities

$^{\Psi}$at the school level (the remainder are at the girl level)

With school as a random variable

Table 3

Mixed model ANOVA coefficients, standard error, and p-values for independent variables

	Total MET-weighted blocks		2+ blocks MVPA*		1+ block VPA*	
	b	**p**	**b**	**p**	**b**	**p**
Group (Control versus Intervention†)	1.30 (0.67)	0.07	0.18 (0.13)	0.16	0.35 (0.15)	0.03
Race (African American, White†)	−2.27 (0.57)	<0.001	−0.60 (0.12)	<0.001	−0.74 (0.14)	<0.001
BMI	−0.08 (0.04)	0.05	0.003 (.01)	0.72	−0.02 (0.01)	0.08
Parent education (HS, >HS†)	−0.78 (0.57)	0.17	−0.10 (0.12)	0.41	−0.33 (0.15)	0.02
% School free/reduced lunch	0.01 (0.03)	0.70	0.002 (0.005)	0.72	−0.01 (0.01)	0.10
Area (urban/suburban versus Rural†)	−3.01 (1.02)	0.004	−0.41 (0.20)	0.16	−0.68 (0.22)	0.002
Facilities (<5 versus ≥5†)	−3.49 (1.13)	0.002	−0.47 (0.19)	0.01	−0.66 (0.24)	0.01
Area by facilities interaction	4.31 (1.45)	0.003	0.57 (0.27)	0.03	0.72 (0.31)	0.02

*Logistic regression

†Referent group

School was a random variable in all models