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Shared use agreements and leisure time physical activity in North Carolina public schools

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ABSTRACT

Although increasing community access to public schools through shared use agreements (SUAs) has been a recommended strategy for promoting physical activity (PA) among national, state and local organizations, empirical evidence examining the efficacy of SUAs is limited. This study examined the degree of usage and production of PA among schools with shared use, and how variation in PA output is related to characteristics of the school, type of activity, facility type, and when activity occurs. Data were collected in 20 schools across North Carolina using System for Observing Play and Recreation in Communities (SOPARC) and Structured Physical Activity Surveys (SPAS) to assess PA in school athletic facilities during out of school time. Findings indicated that although schools had a policy of shared or open use, most facilities were empty during non-school hours. Hierarchal linear regression models also showed that formal programming was positively associated with both use and PA levels. Given the abundance of empty facilities, community groups in need of space to facilitate structured PA programs should pursue avenues of sharing facilities with public schools. Furthermore, to increase the efficacy of shared use, structured physical activity programs may be needed. Future studies are encouraged to further explore the effects of the specific types of shared use programs on PA production as well other aspects of the built environment surrounding schools.

1. Introduction

Increasing access to places for leisure time physical activity (LTPA) within communities is compromised by the high cost of acquiring and developing activity-friendly environments such as playgrounds, athletic fields, and walking trails (Stein et al., 2015). Devoting land and allocating financial resources for community sport and recreation infrastructure is becoming more difficult to achieve as the demand for space continues to grow (Lafleur et al., 2013). Public schools across the United States have been identified as an important setting to facilitate greater access to opportunities for LTPA, especially in underserved and rural communities (Umstattd Meyer et al., 2016). Public schools have an established infrastructure and are inherently capable of handling a multitude of programs serving large volumes of people (Keener et al., 2009) during after-school, weekends, and summers (Filardo et al., 2010; Pate and O'Neill, 2009). School facilities are often centrally located complete with gymnasiums, playgrounds, sports fields, green spaces, tracks, and basketball courts and built using public funds. Furthermore, schools are also readily available and safe environments for active play and recreation through after school programs and youth sport organizations (Bassett et al., 2013; Pate and O'Neill, 2009; Spengler, 2012), and are located in both urban and rural environments irrespective of community demographics and socio-economic status (SES) (Young et al., 2014).

Partnerships through shared use formal (e.g., contractual, fee-based) and informal (e.g., general open use, non-fee based) agreements (SUA) between schools and community partners can create new opportunities for community-based physical activity (Kanters et al., 2014). SUAs allow groups or individuals not associated with the school the opportunity to use the campus physical activity facilities during times when they are not being utilized by the school. A growing body of evidence indicates that increasing access to safe places for physical activity (PA) represents a promising strategy to encourage activity among all age groups (Umstattd Meyer et al., 2016). While previous research has indicated school LTPA facilities are often unavailable, under-utilized, or inaccessible for public use during non-school hours (Bocarro et al., 2012; Everett-Jones and Wendell, 2015; Lee et al., 2007), more recent findings suggest that public schools may be willing to open their facilities for public use and enter into SUAs (Kanters et al., 2014). For example, Kanters et al. (2014) reported that most public school principals were willing to allow open and/or shared use of school facilities with

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community groups and organizations, and the primary reason for not sharing LTPA facilities was because outside groups had not approached the school to share their facilities. This differs from the long-standing narrative that increased legal liability and added costs are the biggest barriers to schools sharing LTPA resources with outside parties (Spengler et al., 2012).

Although increasing community accessibility to public schools through SUAs has been a recommended policy strategy for promoting LTPA, empirical evidence examining the efficacy of SUAs is limited (Stein et al., 2015). In addition, most investigations of access to school resources have predominantly focused on urban schools (Edwards et al., 2012; Giles-Corti and Donovan, 2002). For instance, SUAs within public school facilities in Los Angeles school districts showed that schools with organized programming from SUAs had higher community use than those without SUAs in place (Lafleur et al., 2013).

People living in rural areas are more likely to be economically disadvantaged, lack resources for extracurricular activity, and have less supportive environments than urbanized communities (Edwards et al., 2012). Thus, SUAs involving schools may be particularly important in rural communities (Everett-Jones and Wendell, 2015). In these cases, neighborhood schools may be the only place for people to be physically active during their leisure time (Filardo et al., 2010).

Disparities in access to adequate PA facilities among rural and urban areas have been documented (Edwards et al., 2011; Everett-Jones et al., 2003; Frost et al., 2010; Shores and West, 2010), but not in the context of shared use programming in schools. More research is needed to assess the effectiveness of shared use in increasing LTPA, particularly with public school facilities not located in urban settings (Beighle et al., 2010; Evenson and McGinn, 2010). Additionally, researchers have discussed the need to fully explore the extent of shared use, the quantity and type of programs, and the amount of PA resulting from shared use of public school facilities (Kanters et al., 2014).

Moreover, much of the research investigating SUAs is based largely on reducing the scarcity of places to be physically active (Everett-Jones and Wendell, 2015; Hodge, 2015). However, simply creating or enhancing accessible places through SUAs may not be sufficient to increase PA behavior. From a social ecological perspective, place-based PA interventions would need to consider addressing additional levels of influence like the physical and organizational environment to achieve maximum effectiveness (McLeroy et al., 1988). A comprehensive examination of the supporting practices and characteristics of schools with SUAs, rather than merely the presence of a blanket SUA itself, could provide a clearer understanding of the effectiveness of SUAs in communities. Thus, this study builds upon the limited evidence on the role that shared use and its underlying factors play in promoting PA in school facilities, especially in non-urban environments.

Using a sample of schools in predominantly rural areas with formal SUAs in place, the current study addressed several aims. Specifically it sought to (a) measure the level of athletic facility use and PA for schools with shared use and describe the characteristics of users; (b) examine how school characteristics and facility type are associated with levels of structured activity programs in athletic facilities at schools with SUAs; and (c) determine how variation in PA is related to factors measured at the school (i.e., grade level, number of community programs), facility (i.e., facility type), and observation (i.e., time of day, day of the week) levels.

2. Methods

2.1. Procedures

This study followed a cross-sectional research design involving a sample of 20 public middle and high schools across North Carolina. Schools were selected using a stratified nonrandom sampling method based on their proximity (≤25 miles) to the residence of a trained data collector and if the schools were located in a predominantly rural area. Rural was defined according to the National Center for Education Statistics classification system for determining rurality of schools (U.S. Department of Education, 2015). The study was approved by the NC State University Institutional Review Board.

Data collection was completed in two phases. School principals and athletic directors were surveyed to identify structured physical activity programs and level of shared use occurring at each school during non-school hours (Kanters et al., 2014). Using the survey results, PA facilities were identified and used to determine the target areas for subsequent systematic assessment of facility use and PA.

2.2. Instrumentation

The amount of structured physical activity programs at schools with SUAs was assessed using the Structured Physical Activity Survey (SPAS) instrument (Powers et al., 2002). The SPAS documents the frequency, duration, and type of structured afterschool PA programs offered by the school and non-school community groups at each PA facility within a specified two week period. This estimates the number of afterschool PA programs from shared use operated by community organizations on school facilities and the number of non-school participants served per year (Kanters et al., 2013).

The System for Observing Play and Recreation in Communities (SOPARC), a widely accepted approach for assessing PA in community settings (McKenzie et al., 2006) was used to measure school facility use and PA. SOPARC is based on momentary time-sampling in which school facilities are divided into predetermined target areas, where observers perform rapid visual scans at specified times per day. Observers count the number of people in target areas while also coding for PA level, age, and gender. As part of the protocol, simultaneous coding was conducted for contextual characteristics such as the accessibility, usability, presence of organization, provided equipment, and supervision. Observations were conducted on randomly selected Mondays, Wednesdays, and Fridays and both weekend days in 30 min intervals between the hours of 3:00 PM and 7:00 PM on week days and 9:00 AM and 7:00 PM on weekend days between January and August 2014.

2.3. Measures

Amount of organized shared use programming from non-school groups was calculated to analyze the relationship between shared use structured programs with PA. Informal or general open use policies that indicated no organization affiliation were removed leaving only structured, organized programs for analysis. Open use policies were excluded because principals found it impossible to estimate the amount of usage since SPAS intakes the characteristics of programs from structured activities. Researchers totaled the number of 60 min program sessions run by non-school, community organizations at each site. Outcome measures for PA were: (1) Total number of participants observed and (2) Total Metabolic Equivalent of Tasks (TMETs). Users' gender and age were documented along with PA levels. Standard TMETs were calculated by multiplying each observed participants' PA level with an assigned energy expenditure value: 1.5, 3.0, and 6.0, for every *sedentary* person, *moderate* person and *vigorous* person, respectively. These values have been accepted and widely used in estimating the amount and level of PA (Ainsworth et al., 2011; Kanters et al., 2015). School facilities were categorized into five facility types: multi-purpose field, track, baseball/softball field, tennis court, and indoor gym. Participants were summed to calculate the total number of participants per observation.

2.4. Analysis

Descriptive and regression analyses were conducted using IBM's Statistical Package for Social Sciences (SPSS) Version 22.0 software.

Descriptive statistics were calculated for all study variables. Because of the extreme positive skewness of the data (with high 0 observations), a logarithmic transformation of total METs (TMETs) was used as the outcome variable to more closely approximate a normal distribution (Tabachnick and Fidell, 2007). Due to the hierarchical structure of the data (repeated observation periods within facilities within schools), initial unconditional models were estimated using SAS v. 9.3 PROC MIXED to establish whether differences in TMETS existed across facilities and schools and would suggest the use of multi-level models. Results of the unconditional models indicted that small, but significant variation in levels of TMETS existed at both levels of analysis. This result indicated that variation in TMETS existed across hierarchical levels and supported the use of mixed models to examine the data. Thus, to answer the third research question, a theoretical three-level hierarchical linear random intercept model was estimated (Raudenbush and Bryk, 2002) with TMETS as the outcome variable with observation time of day (Level 1), facility type (Level 2), school type (Level 3), and number of community programs offered (Level 3) as predictor variables.

3. Results

3.1. Sample characteristics

Descriptive statistics of the schools are shown in Table 1. Of the 20 schools, 13 were high schools and 7 were middle schools. All but one was considered a Title I school (i.e., the proportion of students who qualify for the federal free-reduced lunch program is >40%). The rural locale database showed 15 schools to be either rural or rural-fringe while the other 5 schools were considered urban or suburban (U.S. Department of Education, 2015). Within these schools, 772 non-school, community shared use program sessions were identified. Three schools reported having more shared use than school-sponsored activities. Two schools did not report any non-school, community shared use programs.

SOPARC resulted in 9140 usable observations with a total count of 11,897 people (Table 2). Observations were relatively equally distributed across days of the week. Reliability checks were completed at every school totaling 1882 simultaneous observations. Inter-observer agreement for all SOPARC categories was high (Kappa = 0.90–1.00). A vast majority of facilities observed were empty (87.7%) with no PA observed. Outdoor tracks had the lowest proportion of empty observations (75%) while indoor gyms had the highest (92%). Multi-purpose, baseball, and softball fields accounted for over half of the empty observations. Baseball/softball fields were the most used but contained low TMETs on average. The most used facilities were baseball and softball fields followed by multipurpose fields, indoor gyms, tracks, and tennis courts being the least used. Sedentary participants were most frequently found in baseball and softball fields.

Males were observed using facilities more frequently than females (Table 3). The age distribution was almost even (51% child; 49% adult). Of the participants observed, 45.3%, 35.3%, and 19.4% were coded as being sedentary, moderate and vigorously active, respectively (Table 4). On average, outdoor tracks and tennis courts were seen to have the highest proportion of people engaged in moderate to vigorous PA.

Results of the final regression model are presented in Table 5. The test of independence using –2LL was used to determine model fit. The results suggested that using the three-level model was appropriate in this sample and using AIC, the theoretical model was a better fit than the unconditional model. Examination of fixed effects suggested that within facilities, significantly lower TMETS were observed on evenings and weekends. Within schools (in comparison to outdoor tracks) significantly lower TMETS were observed in all other facility types except baseball/softball fields. Outdoor tracks were chosen as the reference category due to previous research suggesting that this facility type is most likely to be included in SUAs by schools (Kanters et al., 2014). Finally, higher TMETS were observed in high schools (in comparison to middle schools) and higher TMETs were associated with higher levels of community sport programming in schools. The Type III tests of fixed effects suggested that observation period being a weekday rather than a weekend ($F = 270.61$, $p < 0.0001$) was the strongest predictor of TMETS. Variance components indicated that, within this sample, the theoretical model explained 27% of variance across facilities and 74% of variance across schools from the unconditional model.

Table 1
Grade level, rurality, Socioeconomic Status (SES), and racial/ethnic characteristics of study schools.

School #	Grade level	Locale	Title I school	SES[a]	% White	% Black	% Hispanic
1	Middle	Suburban	Yes	40.7	56.5	19.8	17.8
2	High	Suburban	Yes	58.9	43.5	32.9	18.4
3	High	Urban	Yes	77.7	8.6	41.1	46.4
4	High	Rural-fringe	Yes	68.2	70.9	11.1	12.6
5	High	Rural-fringe	Yes	42.6	80.0	9.4	3.4
6	High	Rural-fringe	Yes	54.7	93.8	2.5	2.3
7	High	Urban	Yes	48.9	36.1	53.6	5.7
8	Middle	Rural	Yes	59.8	75.9	5.0	17.2
9	High	Rural	Yes	57.7	83.6	0.3	1.7
10	Middle	Rural	Yes	86.4	13.2	72.1	6.3
11	Middle	Rural-fringe	Yes	52.2	59.3	26.0	6.5
12	High	Rural-fringe	No	13.8	80.2	10.7	5.9
13	High	Suburban	Yes	47.8	65.3	7.0	20.0
14	Middle	Rural	Yes	64.1	48.6	23.9	23.9
15	High	Rural	Yes	87.5	7.0	90.8	0.9
16	Middle	Rural-Fringe	Yes	56.6	70.6	22.2	3.8
17	High	Rural-fringe	Yes	47.6	85.9	0.8	3.8
18	High	Rural	Yes	56.4	51.2	42.6	2.5
19	High	Rural	Yes	53.0	64.2	32.7	1.4
20	Middle	Rural	Yes	72.7	87.4	0.4	6.5

[a] Percent of student population receiving free or reduced price lunch.

4. Discussion

Although 89% of recently surveyed North Carolina public school principals indicated they make their PA facilities available for community use (Kanters et al., 2014), findings from this study indicated that 87% of the time these facilities are empty after the school day, on weekends and during the summer. The underutilization of school facilities is not a new phenomenon (Bocarro et al., 2012; Cohen et al., 2013) but was unexpected for two reasons. First, the schools selected in this study had general after school open use policies for outdoor facilities, especially during the weekends and over the summer. Second, it was expected that more use by community members would occur during the summer months when school was not in session and facilities were not occupied by school sponsored activities and sports, giving community groups access to facilities. While previous studies indicate school facilities go largely unused during the summer (Zimmerman et al., 2013), results of this magnitude were not anticipated. Unlike urban areas, public school resources located in rural settings are often the only convenient option for people looking for PA facilities. But it is possible that residents living in the surrounding neighborhoods may also have viable options other than school facilities to be physically active. The perception that public schools are off limits to the public other than for school-related activities could explain why outside individuals or organizations are not using these spaces (Spengler et al., 2012). School staff commonly take the summer months off and are away from school grounds for months at a time. The absence of school administration to oversee community use of facilities could also be a reason for the lack of activity observed. This leads to other practical questions about how to enhance school facility use through partnerships with outside/community groups during the summer months when the demand for school sponsored extracurricular activities is at its lowest.

Previous research suggests that the combination of making PA facilities available and information to increase awareness of facilities and the

Table 2
Number of SOPARC observations by physical activity facility ($n = 9140$).

		Multipurpose field	Outdoor track	Baseball/Softball	Tennis court	Indoor gym	Total
School Type							
	Middle	759 (28.1)	226 (20.4)	1139 (39.3)	137 (21.8)	688 (38.1)	2949 (32.3)
	High	1942 (71.9)	883 (79.6)	1759 (60.7)	491 (78.2)	1116 (61.9)	6191 (67.7)
Day of week							
	Week day	1431 (53.0)	564 (50.1)	1490 (51.4)	318 (50.6)	918 (50.9)	4721 (51.7)
	Weekend	1270 (47.0)	545 (49.9)	1408 (48.6)	310 (49.4)	886 (49.1)	4419 (48.3)
Total		2701 (29.6)	1109 (12.1)	2898 (31.7)	628 (6.9)	1804 (19.7)	9140 (100.0%)

policies that make them accessible can be effective in increasing use by community residents (Kahn et al., 2002; Suau et al., 2012). In contrast to parks, where a primary purpose is recreation use, informational outreach may play a significantly greater role in encouraging community use of schools in rural communities. Community members might expect LTPA activities are only allowed in areas designated as public parks. Since school buildings and properties are prioritized for school district and student use above other constituents, residents may perceive schools to be prohibitive to non-school affiliated use of facilities (ChangeLab Solutions, 2010). Particularly, parks are more highly characterized by greenness/green space versus schools who have facilities usually designated for a single purpose. The presence of green spaces is attractive to users but public schools rarely have the luxury of incorporating/maintaining such places on the school property. Nonetheless, in rural areas, public schools could be considerably closer for residents than the nearest public park and may be the only facility option for LTPA (Giles-Corti et al., 2005), but use of these facilities may be passed over for fear of trespassing or not knowing that open use of resources is, in fact, permitted through an SUA. Agencies could provide more information to promote recreational opportunities on school grounds to change these perceptions.

When people were observed at school facilities, more males than females used facilities, consistent with previous reports (Bocarro et al., 2012; Chung-Do et al., 2011; McKenzie et al., 2010). Sedentary behavior was less prevalent (45%) across all facility types relative to findings from studies in public parks ranging from 60% (Cohen et al., 2007) to 66% (Chung-Do et al., 2011). Outdoor tracks were the most consistently used with the lowest proportion of empty observations and highest TMETs. Although little research attention has been devoted to the use of school tracks, this supports previous research regarding the importance of accessible trails, tracks, and walking routes in parks (Cohen et al., 2006; Sharpe et al., 2004). Walking is the most common form of PA worldwide (Seigel et al., 1995) and is the most popular form of physical fitness across a majority of population groups (Weikert et al., 2011). Knowledge of accessible areas for jogging and walking has been associated with increased odds of meeting PA recommendations (Sharpe et al., 2004).

School observations also indicated that tracks were rarely locked and open to the public on most occasions. Outdoor tracks, by their design, encourage moderate to vigorous PA whereas other facility types (e.g., open fields and indoor gyms) can be sport-specific, relying on program implementation for high levels of PA to occur. Rarely do people visit tracks without the intention of performing at least moderate amounts of PA (Brownson et al., 2000). Therefore, it's not surprising that while outdoor tracks in this study did not have the most participants across facility types, they did have the lowest proportion of sedentary behavior.

Conversely, although observations of baseball/softball fields had almost half of the total participants observed (45%), these facilities had the lowest average TMETs (0.19) and highest proportion of sedentary people (57.6%). Most people observed using baseball and softball fields were not engaging in MVPA, similar to Bocarro et al.'s (2012) report on METs in school facilities. In addition, the findings are similar to previous research showing that while baseball and softball fields attracted the most users, people in them were frequently sedentary (McKenzie et al., 2010). Furthermore, activities such as baseball and softball facilities are generally associated with lower energy expenditure of participants compared to other athletic/sports fields (Bocarro et al., 2014; Floyd et al., 2009; Floyd et al., 2011). The inherent design of most school baseball/softball facilities may also be a factor limiting greater shared use and active participants. Community groups seeking available spaces to deliver PA programs other than baseball or softball are likely pass over a school's baseball/softball field as a viable option.

Findings also indicated indoor gyms were the least used school facilities (92% empty) with one of the lowest PA production. This is supportive of previous findings that gyms are harder for people to access during after school hours due to security reasons and liability concerns (McKenzie et al., 2006). Furthermore, schools have recently reported that indoor gyms are overwhelmingly only shared in a formal SUA capacity (Chace and Vilvens, 2015). Even then, administrators are reluctant to allow outside use of indoor facilities. Again, the disparity between baseball/softball field and indoor gym use is consistent with previous findings (Bocarro et al., 2012; Sallis et al., 2012).

A finding of particular interest was the number of shared use program sessions positively correlated with PA behavior and energy expenditure. Not surprising, when observed schools had more structured programs during after school hours and during the summer, they had more active people using the facilities. Similarly, Kanters et al. (2013); Cohen et al. (2013), and Lafleur et al. (2013) all found the amount of afterschool programs positively correlated with more PA. A consistent finding with studies of both school and park facilities is that when activities are organized and formal in nature, more PA can be expected especially with women and girls (Bocarro et al., 2012; Floyd et al., 2011). It now appears that schools in rural communities have the same characteristic – simply making school facilities available is not sufficient to increase facility use among community residents. Organized programming, whether operated by the school or a community organization is needed to facilitate use by active participants. But the presence of programs is no guarantee for success, especially if the target is middle and high school students (Wilson et al., 2011). Just creating a program may be insufficient to promote more PA; interventions involving afterschool programming is largely dependent on the time, place, and

Table 3
Observed participants by physical activity facility ($n = 11,897$).

Facility category (n)	Male	Female	Total
Multi-purpose field (35)	1859 (26.2)	1091 (22.8)	2950 (24.8)
Track (14)	639 (9.0)	957 (20.0)	1596 (13.4)
Tennis court (8)	213 (3.0)	144 (3.0)	357 (3.0)
Baseball/Softball field (35)	3756 (52.8)	1602 (33.5)	5358 (45.0)
Indoor gym (23)	642 (9.0)	994 (20.8)	1636 (13.8)
Total	7109 (59.8)	4788 (40.2)	11,897 (100.0)

Table 4
Participant physical activity levels by facility.

Facility category (n)	Physical activity level (% within facility category)			Total participants
	Sedentary (%)	Moderate (%)	Vigorous (%)	
Multi-purpose field (35)	1087 (36.8)	999 (33.9)	864 (29.3)	2950 (24.8)
Track (14)	409 (25.6)	814 (51.0)	373 (23.4)	1596 (13.4)
Tennis Court (8)	98 (27.5)	165 (46.2)	94 (26.3)	357 (3.0)
Baseball/Softball field (35)	3084 (57.6)	1709 (31.9)	565 (10.5)	5358 (45.0)
Indoor gym (23)	710 (43.4)	519 (31.7)	407 (24.9)	1636 (13.8)
Total (115)	5388 (45.3)	4206 (35.4)	2303 (19.3)	11,897 (100.0)

leadership that surrounds them. If new programming is targeting middle and high school age children then there may be limited participation (Jago et al., 2015). However, younger aged groups are likely to have greater demand for programmed activities. Program intervention should be targeted at specific age groups that are most likely to engage in structured after school programs (e.g., elementary school age). Organizations that deliver sport and recreation programs within the community would have a good perspective on programming needs and target populations. Any intervention designed to increase use of school facilities should seek out input from local sport and recreation organizations like the YMCA and Parks & Recreation. Established, local organizations know the pulse of the community and can more accurately direct PA programming efforts for maximum engagement.

5. Conclusions

As shared use of school facilities are increasingly implemented (Zimmerman et al., 2013), schools can provide a safe and inexpensive option for people to engage in PA during non-school hours. While shared use may seem like a quick fix for under-resourced and rural communities (Suminski et al., 2011), other factors may need to be addressed in addition to fostering sustainable shared use partnerships (Stein et al., 2015). Barriers exist not just at the policy level but also within the organizational and physical environment.

This study sought to inquire on the interplay between athletic facility use, school and user characteristics, community shared use, and their influence on PA behavior. While SUAs certainly offer a boost in accessible places for more PA production, findings suggest much more is needed beyond just creating a SUA. Open use policies requiring no formal contractual agreement can be valuable for communities, especially in nonurban areas (Spengler et al., 2011; Stein et al., 2015). But in some cases, general open use policies during non-school hours may not be sufficient for increasing PA, especially for young children and adolescents. Organized and structured PA programming appears to be a major factor in promoting both use of facilities and elevated levels of PA (Cohen et al., 2009; Lafleur et al., 2013).

The two most meaningful findings from this study was the extent of non-use of school PA resources and the positive association between programming from SUAs and the amount of PA observed. The facilities are still primarily used for what appears to be interscholastic sport programs with little additional use in the evenings and on weekends. For community stakeholders, especially those leading recreation/sport-based organizations, this study provides key insight into the availability of PA resources. The two most commonly cited barriers to schools' involvement in SUAs have been liability and cost and some community organizations may be deterred from engaging in SUAs based on high facility rental fees (Spengler et al., 2011). However, more recently principals and athletic administrators overwhelmingly cited the "lack of knowing where to start" as the leading factor into not engaging in SUAs (Kanters et al., 2014). Therefore, given the abundance of empty facilities during non-school hour periods, there is ample opportunity for mutually beneficial partnerships to exist. It is recommended that community groups in need of space to facilitate structured programs should more intensely explore avenues for sharing facilities with public schools. Future studies are encouraged to further explore the effects of the specific types of shared use programs on PA promotion. More research is also needed on the role of community characteristics and socioeconomic conditions of residents, as well as the potential effects of accompanying rental fees, facility quality, types of amenities, neighborhood walkability, street connectivity, and other built environment variables commonly associated with PA. Collecting data on the thoughts and opinions of users/residents living nearby the school would be valuable in further understanding the perception of schools as accessible places for PA and also uncovering reasons why so many facilities were empty. Lastly, additional context is needed to indicate whether residents surrounding the study areas have adequate alternative options for LTPA other than nearby public schools. Information was not collected on the use of other nearby outdoor spaces, such as parks and green spaces. It is quite possible that community residents and organizations were actively using other facilities within the general area of the schools.

Table 5
Hierarchical regression model for log of total METs.
(Level 1 $N = 9140$, Level 2 $N = 81$, Level 3 $N = 20$)

	Estimate	SE	t value	p
Fixed effects				
Observation level				
Intercept	0.239	0.041	5.77	<0.0001
Observation time of day[a]				
Morning	0.001	0.014	0.060	0.954
Evening	−0.021	0.010	−2.16	0.031
Afternoon				
Weekend	−0.164	0.010	−16.45	<0.0001
Physical activity facility level				
Facility type[b]				
Indoor gym	−0.152	0.039	−3.85	0.0001
Baseball/Softball field	−0.062	0.039	−1.58	0.1147
Tennis court	−0.125	0.050	−2.48	0.0132
Multipurpose field	−0.142	0.039	−3.62	0.0003
Outdoor track				
School level				
Type - high school	0.084	0.029	2.90	0.0037
Outside programs	0.001	0.0004	2.49	0.0130
Variance components				
Level 2 – facility level	0.0103	0.0021		
Level 2 – variance explained	27.5%			
Level 3 – school level	0.0005	0.0012		
Level 3 – variance explained	73.7%			
Goodness of fit (independence)				
−2 Log L	10,200.5			
Independence −2LL	10,554.4			
AIC	10,226.5			
Independence AIC	10,562.4			

[a] Afternoon was the reference category.
[b] Outdoor track was the reference category.

Conflicts of interests

The authors declare that there are no conflicts of interests.

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