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Shared Use of School Facilities With Community Organizations and Afterschool Physical Activity Program Participation: A Cost-Benefit Assessment

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ABSTRACT

BACKGROUND: Partnerships between school districts and community-based organizations to share school facilities during afterschool hours can be an effective strategy for increasing physical activity. However, the perceived cost of shared use has been noted as an important reason for restricting community access to schools. This study examined shared use of middle school facilities, the amount and type of afterschool physical activity programs provided at middle schools together with the costs of operating the facilities.

METHODS: Afterschool programs were assessed for frequency, duration, and type of structured physical activity programs provided and the number of boys and girls in each program. School operating costs were used to calculate a cost per student and cost per building square foot measure. Data were collected at all 30 middle schools in a large school district over 12 months in 2010-2011.

RESULTS: Policies that permitted more use of school facilities for community-sponsored programs increased participation in afterschool programs without a significant increase in operating expenses.

CONCLUSIONS: These results suggest partnerships between schools and other community agencies to share facilities and create new opportunities for afterschool physical activity programs are a promising health promotion strategy.

Keywords: school facilities; afterschool physical activity; school facility costs.

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Creating and enhancing access to community recreation facilities can increase opportunities for physical activity.[1-4] Partnerships between schools and other community organizations that include shared use of recreation facilities can increase access to physical activity opportunities and represent a promising childhood obesity prevention strategy.[5] For example, research indicates that children are more likely to be physically active if there is easy access (eg, proximity to facilities; low- or no-cost programs) to parks or other recreational facilities.[6-8] School facilities, in particular, have been identified as important environmental settings to facilitate physical activity.[2,9,10]

Afterschool programs have been noted as an important setting for promoting physical activity among children.[11] For example, 2 randomized controlled trial studies found afterschool programs positively impacted children's physical activity.[12,13] Although approximately 8.4 million US children (K-12th grade) participate in afterschool programs, an estimated 18.5 million more would participate if quality programs were available in their communities.[14] Afterschool programs, especially those offered at schools, are more

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conveniently located in most communities and offer an accessible and safe environment for children to engage in physical activity.[15]

Healthy People 2020[16] and the American Academy of Pediatrics[17] recommend that school grounds be accessible during afterschool hours. Research suggests even the most underserved neighborhoods have schools and other facilities such as recreation centers and churches that may be under used for recreation.[18] Partnerships for sharing public school facilities during nonschool hours could create more opportunities for afterschool physical activity,[19] while at the same time reducing overall land requirements and helping fund capital expenditures without substantially increasing operating costs.[20] Local agencies or community groups seeking to use public school buildings and grounds for community-based programs, however, often find it difficult to access these spaces during out of school hours.[21] For example, Lee et al[22] reported that only 59.6% of all public schools made their physical activity facilities available for children and adolescents in the evenings, 57.6% were available after school and 46% on weekends.

Frequently cited barriers to shared use of school facilities include concerns about security and liability; maintenance, staffing, and supervision costs; limited equipment, space and facilities; and scheduling.[18,21,23,24] Although liability associated with the shared use of schools is the most commonly cited barrier,[18,25] the perceived costs associated with the additional use of facilities has emerged as an important reason for restricting access. For example, in a national survey of school principals, 60% identified the cost of offering activities and programs and 57% identified facility maintenance costs and responsibilities as extremely important reasons for restricting access.[26] In a survey of California school administrators, 44% cited insufficient funding most frequently as a reason for not opening schools to the public outside of school hours.[24] Moreover, whereas national organizations such as the American Academy of Pediatrics recommend increasing access to school grounds as a strategy to increase physical activity among children, to our knowledge there is limited evidence that shared use increases the quantity of afterschool physical activity programs and participation. In addition, the actual physical activity opportunities associated with shared use of facilities weighed against the additional cost of operating and maintaining school facilities have yet to be determined.

Although afterschool programs can provide physical activity opportunities to millions of children and their families, afterschool providers have difficulty in serving youth once they enter middle school.[27] For example, only 18% of US children participating in afterschool programs are in middle school.[14] There are also disparities in access to afterschool programs for this age group by socioeconomic status,[28] with youth from lower-income neighborhoods having fewer opportunities for accessible programing and families reporting a need for easy access to quality programs.[29] Shared use of middle school facilities that create new opportunities for afterschool physical activity programs has the potential to address inequalities in accessible services, especially in low-income areas. Middle schools facilities such as athletic fields and gymnasiums are also more conducive to shared use for physical activity than facilities like playgrounds, typically found in elementary schools. Furthermore, middle schools have consistently been an understudied setting for examining physical activity.[30]

Therefore, the purpose of this study was to examine the impact of shared use of middle school physical activity facilities during nonschool hours on the amount and type of physical activity programs offered at schools and the cost of operating the school facilities used for physical activity.

METHODS

All public middle schools (N = 30) in the largest school district in North Carolina and the 16th largest in the United States, were selected for study. In 2010-2011, the school system had 143,289 total students, with 32,742 of them in middle schools. Within the middle school population, 26.3% were Blacks, 13.8% Latinos, 49.1% Whites, and 10.8% were members of other racial/ethnic populations; 34% received a free or reduced lunch program.

The afterschool physical activity programs in the 30 schools were assessed using the Structured Physical Activity Survey (SPAS).[31] Structured Physical Activity Survey identifies the frequency, duration, and type of structured afterschool physical activity programs offered at a school and the number of boys and girls participating in each program. Structured Physical

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Activity Survey also identifies whether programs are operated by the school or an outside agency (ie, nonschool administered), whether a paid staff member is assigned to the program, and whether a fee is charged.

Structured afterschool program offerings included all those formally administered by an organization such as (1) physical activity/sport lessons, (2) interscholastic sports (competition among different schools), (3) intramurals (competition among teams within the same school), (4) club programs (judo and aerobics clubs), and (5) other (special workshop on self-defense). Examples of structured programs offered by outside agencies included community sport leagues, church sport/physical activity programs, camps, club programs, or special events (tournaments). Informal drop-in programs were not included in SPAS.

Annual facility operating costs for each school were derived from financial data provided by the school district. School-level operating costs were available for custodial labor and material expenditures and for utilities (electricity, water, sewer, and natural gas). Building and outdoor facility costs were combined in the financial data provided by the school district. Facility operating costs for utilities and custodial labor were compiled and used with data on school enrollment and building gross square footage data to calculate a cost per student and cost per building square foot measure.

The athletic director or lead physical education teacher at each school completed the SPAS survey to determine the number and type of structured afterschool physical activity programs and activities offered at their school. Data were collected at 4 times over the course of 1 year (January, March, July, and October) to capture seasonal changes in program offerings and were adjusted for schools operating on a traditional and year-round school calendar. The total number of participants, total weekly program minutes, and total participant-minutes were calculated for both school and community administered programs at each school.

Shared use of school physical activity facilities was categorized by the amount or level of community use, defined as the number of afterschool physical activity programs operated by community organizations on school facilities and the number of participants, ranging from low- to high-shared use. Schools with 0 to 1 community programs and fewer than 100 participants in community programs across all four seasons were categorized as level 1 shared use. Schools with 2 to 4 community programs and 100 to 250 community participants were categorized as level 2 shared use, and schools with more than 4 community programs and more than 250 community participants were categorized as level 3 shared use. Shared use categories were derived from an estimation of the physical impact on school facilities including damage to sport field turf, additional facility wear, and facility damage. For example, schools with only 1 or no community programs or fewer than 100 community program participants over the course of a year would constitute little to no physical impact on school facilities. Level 2 shared use would result in a moderate amount of physical impact, and level 3 shared use would likely result in a greater amount of physical impact. All data were collected during 2010 and 2011.

Data Analysis

The Kruskal-Wallis test was used to examine the relationship between facility shared use and participant minutes in physical activity and between shared use and the school operating costs per square foot and per enrolled student. Mann-Whitney tests were used to follow up on the Kruskal-Wallis test, and Bonferroni correction was applied. Thus, all effects are reported at a .0167 level of significance. As a measure of effect size, r was calculated for each comparison. Kendall's τ (nonparametric) was used to examine the association between number of shared use programs and school operating cost per square foot and operating cost per enrolled student.

RESULTS

On average, at a school's facilities there were 11.4 afterschool physical activity programs per year (SD = 2.03) with 260.6 participants (SD = 98.02) administered by schools and 2.9 programs per year (SD = 2.26) with 137.7 participants (SD = 167.5) administered by community (nonschool) agencies. The mean annual operating cost of school facilities (buildings and outdoor facilities) was $1.14 per square foot of building space (SD = $.44) or $192 per enrolled student (SD = $87).

Minutes of afterschool program physical activity were positively correlated with level of shared use (Table 1). Using the 3 categories of shared use, the Kruskal-Wallis tests indicated that afterschool program physical activity minutes were significantly and positively associated with shared use policy for the overall student population, $H(3) = 17.64$, $p < .01$, for girls, $H(3) = 18.02$, $p < .01$, and for boys, $H(3) = 10.71$, $p < .01$. Follow-up Mann-Whitney tests showed significant differences in physical activity programs minutes among all 3 levels of school-shared use, but not between levels 1 and 2, for the total student population. For girls, significant differences in physical activity program minutes were found in comparisons among all levels of school-shared use. For boys, a significant difference in physical activity program time was seen only between levels 1 and 3 of school-shared

Table 1. **Correlations Between Number of Community Programs and Minutes of School-Based Leisure Time Physical Activity (N = 30 Schools)**

Population	Type of Activity	Correlation With Minutes of School-Based LTPA (τ)
Overall school population	Minutes of activity in school-sponsored programs	.127
	Minutes of activity in community-sponsored programs	.788**
	Minutes in all afterschool physical activity programs	.590**
Girls	Minutes of activity in school-sponsored programs	.227
	Minutes of activity in community-sponsored programs	.674**
	Minutes in all afterschool physical activity programs	.541**
Boys	Minutes of activity in school-sponsored programs	.000
	Minutes of activity in community-sponsored programs	.686**
	Minutes in all afterschool physical activity programs	.435**

*Correlation is significant at the .05 level.
**Correlation is significant at the .01 level.
Kendall's τ (nonparametric) used to estimate correlation coefficients.

Table 2. **Mann-Whitney U-tests of Differences in Minutes in Physical Activity Programs Based on Level of School-Shared Use**

Comparison	N Schools	Mean Rank	Z-score	*r*
Total student population				
Shared use level 1	11	8.95		
Shared use level 2	11	14.05	−1.839	−0.39
Shared use level 1	11	6.00		
Shared use level 3	8	15.50	−3.63	−0.83**
Shared use level 2	11	6.36		
Shared use level 3	8	15.00	−3.30	−0.75**
Girls				
Shared use level 1	11	7.55		
Shared use level 2	11	15.45	−2.86	−0.61**
Shared use level 1	11	6.05		
Shared use level 3	8	15.44	−3.59	−0.82**
Shared use level 2	11	7.18		
Shared use level 3	8	13.88	−2.56	−0.59**
Boys				
Shared use level 1	11	8.73		
Shared use level 2	11	15.45	−2.00	−0.43
Shared use level 1	11	6.73		
Shared use level 3	8	14.50	−2.97	−0.68**
Shared use level 2	11	8.00		
Shared use level 3	8	12.75	−1.82	−0.42

*Significant at the .05 level.
**Significant at the .01 level.
Alpha level of .0167 was used based on Bonferroni adjustment.

use (Table 2). The overall positive association of shared use policies with physical activity program participation was significant only between shared use level 3 and levels 1 and 2. A more consistent positive association was observed between shared use levels and increased participation in girls' programs than in boys' programs. While an increase in each level of share use was associated with a significant increase in participation in girls' programs, this relationship was significant only for boys' programs between levels 1 and 3.

No significant relationships were observed between shared use of school facilities for community-sponsored physical activity programs ($\tau = .105$, $p > .01$) and school operating costs ($\tau = -.157$, $p > .01$). Table 3 summarizes the relationship between community program minutes and school operating costs. Results indicated no significant relationships between any level of shared use and school operating costs, with the exception of a significant negative association between girls' afterschool program total minutes and operating cost per enrolled student. Interestingly, all correlations between the amount of afterschool program participation and cost per enrolled student were negative.

Using the 3 categories of shared use, the Kruskal-Wallis test showed no significant relationship between level of shared use and annual operating cost per square foot, $H(3) = 1.38$, $p > .01$ or between level of shared use and annual operating cost per enrolled student, $H(3) = 2.24$, $p > .01$. Follow-up Mann-Whitney tests showed no significant differences in annual operating costs per square foot or per enrolled student between any levels of school shared use (Table 4).

DISCUSSION

Shared use of school facilities has been identified as an effective strategy for increasing opportunities for community-based physical activity among children.[2,26,32] Meanwhile, commonly cited barriers to shared use include increased liability exposure and the additional costs of using facilities during afterschool hours.[18] Consistent with previous research, this study indicates that an increase in shared use of school facilities is associated with more afterschool physical activity programs operated on school facilities[2,3] and more children participating in physical activity programs.[27] Afterschool physical activity minutes for girls increased significantly with each level increase in shared use. For boys, however, afterschool physical activity minutes increased significantly only when schools had the highest level of shared use. Despite hosting more programs and having more children use school facilities after hours, the findings showed schools do not incur significant additional facility operating costs. Therefore, shared use policies that permitted increased use of school facilities by community-sponsored programs increased participation in afterschool physical activity

Table 3. **Correlations Between Number of Minutes in School and Community Programs and School Operating Cost per Square Foot and per Enrolled Student (N = 30 Schools)**

Population	Type of Activity	Correlation With Cost per ft2 (τ)	Correlation With Cost per Student (τ)
Overall school population	Minutes of activity in school-sponsored programs	.047	−.058
	Minutes of activity in community-sponsored programs	.073	−.240
	Minutes in all afterschool physical activity programs	.025	−.235
Girls	Minutes of activity in school-sponsored programs	.007	−.217
	Minutes of activity in community-sponsored programs	.118	−.217
	Minutes in all afterschool physical activity programs	.048	−.262*
Boys	Minutes of activity in school-sponsored programs	−.014	−.002
	Minutes of activity in community-sponsored programs	.064	−.234
	Minutes in all afterschool physical activity programs	.030	−.208

*Correlation is significant at the .05 level.
Kendall's τ (nonparametric) used to estimate correlation coefficients.

Table 4. **Mann-Whitney U-tests of Differences in Annual School Operating Costs Based on Level of School-Shared Use**

Comparison	N Schools	Mean Rank	Z-score	*r*
Annual operating cost per square foot				
Shared use level 1	11	11.45		
Shared use level 2	11	11.55	−.033	−0.0007
Shared use level 1	11	9.09		
Shared use level 3	8	11.25	−.826	−0.19
Shared use level 2	11	8.64		
Shared use level 3	8	11.88	−1.24	−0.28
Annual operating cost per enrolled student				
Shared use level 1	11	13.45		
Shared use level 2	11	9.55	−1.41	−0.30
Shared use level 1	11	11.18		
Shared use level 3	8	8.38	−1.07	−0.25
Shared use level 2	11	10.45		
Shared use level 3	8	9.38	−.413	−0.09

*Significant at the .05 level.
**Significant at the .01 level.
Alpha level of .0167 was used based on Bonferroni adjustment.

programs with no significant increase in operating expenses.

Schools can play a large role in helping children get recommended levels of physical activity. Unfortunately, demands to improve academic performance and funding reductions have resulted in decreased time for physical education, recess, and other forms of school-based physical activity promotion.[33-35] Although facilitating physical activity during the school day is an important health promotion strategy, afterschool physical activity programs are potentially more feasible settings for increasing the daily physical activity of children.[36] In addition, parents and their children are looking for quality afterschool programs that are accessible.[14] Previous research has indicated that 69% of middle school students would like to play more afterschool sports if more opportunities were available.[37] Our findings support the notion that if more afterschool programs are available, more children could participate. Furthermore, a study of afterschool programs reported that almost one-third of children's recommended 60 minutes of moderate-to-vigorous physical activity is provided through afterschool programs.[38] Therefore, shared use agreements with community partners not only represent a more efficient use of scarce public resources but also can increase the number of participants in afterschool physical activity programs and increase the number of children achieving over 30% of their recommended amounts of moderate-to-vigorous physical activity.

Findings showed that an increase in the amount of shared use by schools was associated with an increase in the number of girls participating in afterschool programs. However, a significant increase in the number of boys participating in afterschool programs was observed only for schools with the highest level of shared use programs. This may reflect that more community-based physical activity opportunities for boys, like sport leagues, exist in communities adjacent to the schools. Further research is needed to examine sex implications associated with participation in afterschool physical activity programs.

Whereas schools typically have the space and facilities to accommodate additional afterschool physical activity programs, school administrators have expressed concern about incurring additional operating and maintenance costs associated with increased facility use by nonschool sponsored programs.[26] Underfunding for utilities, maintenance, repair, custodial, and security costs that increase with higher facility use have been noted as significant challenges.[21] Our results, however, suggest that many of these perceived increases in cost were unrealized. Schools that did not provide any access to their facilities after hours incurred similar operating and maintenance costs as those that had shared use afterschool programs with hundreds of participants. Many

school officials may not be cognizant of facility use costs. Heat and air-conditioning are set at a constant level, athletic fields are maintained regularly, and custodial labor occurs throughout the year regardless of whether a school opens its facilities for afterschool-shared use.

Although the operating costs such as utilities and custodial labor remained relatively stable as facility use increased in this study, shared use can still be expected to incur costs for repairs and long-term capital improvements that result from general wear. Increased use of athletic facilities do require additional repair and maintenance,[39] and outdoor spaces such as athletic fields and multipurpose areas become distressed with increased use resulting in a combination of increased labor and material costs to maintain sufficient grass cover for continued access throughout the year.[40] For example, a 2011 study revealed that county high schools with high use spent an average of $45,400 per year on athletic field maintenance, whereas schools with lower use spent an average of $13,400.[40] One solution for managing the additional costs of sharing school athletic facilities is Joint Use Agreements (JUA) between the school and relevant outside agencies or organizations.[41] A JUA is a ''formal agreement between 2 separate government entities—often a school and a city or county—setting forth the terms and conditions for shared use of public property or facilities.''[42] Under the terms of the JUA, both parties define their rights and responsibilities for the costs associated with after-hours use of the school facilities.[14]

This study has 3 main limitations. First, data on afterschool physical activity programs resulted from sampling, not continuous collection over an entire calendar year. Although schools were surveyed during each season it is possible that some afterschool programs and participants were not accounted. Second, there was no measure of the intensity of physical activity, preventing a determination of the number of minutes that participants engaged in moderate-to-vigorous physical activity during the programs. Finally, the measures of school facility costs did not include equipment or facility damage costs associated with increased facility use for afterschool programs administered by nonschool organizations, and costs for school and community use could not be separated. However, as noted earlier, these additional costs could be offset by a JUA that specifies cost sharing responsibilities and fees for facility use by outside organizations.

Strengths of the study include the use of SPAS combined with a calculation of cost associated with shared use of school facilities. The statistical analysis for this study also used nonparametric techniques to examine school-level differences. This allowed for the examination of differences at an important environmental and policy level where larger sample sizes are often impractical. Finally, to our knowledge this is the first study to compare physical activity program data alongside the cost of sharing school facilities for afterschool physical activity. Because shared use of school facilities is recommended as an important strategy to increase physical activity,[17,23,25] more research on the implementation and effectiveness of this strategy is needed. These results contribute new knowledge about the potential of shared use of school facilities as an environmental and policy intervention to increase community-based physical activity.

IMPLICATIONS FOR SCHOOL HEALTH

Athletic facilities are expensive to build and costly to maintain, and school policymakers and administrators continue to struggle with diminishing resources for public education and must decide where to allocate limited funds. Administrators have valid concerns about sharing their facilities with nonschool groups, and they often anticipate that increased use results in heightened liability exposure and additional costs for facility maintenance and repair. Our findings, however, suggest that these costs are generally stable and do not fluctuate with changes in facility use. Furthermore, if shared use arrangements could include a formal JUA that includes liability protection and an articulation of responsibilities for facility operation, maintenance and repair costs, then school administrators would likely be more receptive to opening school grounds and facilities to community groups and organizations.

Research indicates that children are more physically active when there is easy access to facilities and programs.[6] Shared use of school facilities would likely increase the physical activity opportunities of children, especially those living in close proximity to schools. Schools that share their facilities can play an important role in creating an active friendly community, which is especially important for children from low income and racial minority households where barriers to physical activity opportunities are often the greatest. In addition, shared use of facilities can expand and diversify activity program offerings. Currently, afterschool sports within the United States are dominated by a competitive interscholastic sport model that limits participation to only a small percentage of the student population.[22] Increasing afterschool sport and physical activity opportunities through shared use could encourage participation among a broader population, particularly children who may not already be highly skilled or want more diverse options.

Human Subjects Approval Statement

This study was approved by the Institutional Review Board for the Protection of Human Subjects at North Carolina State University.

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