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## The Physical Activity Climate in Minnesota Middle and High Schools

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### Abstract

**Background**—This article describes policies, practices, and facilities that form the physical activity climate in Minneapolis/St. Paul, Minnesota metro area middle and high schools and examines how the physical activity climate varies by school characteristics, including public/private, school location and grade level.

**Methods**—Surveys examining school physical activity practices, policies and environment were administered to principals and physical education department heads from 115 middle and high schools participating in the Transdisciplinary Research on Energetics and Cancer-Identifying Determinants of Eating and Activity (TREC-IDEA) study.

**Results**—While some supportive practices were highly prevalent in the schools studied (such as prohibiting substitution of other classes for physical education); other practices were less common (such as providing opportunity for intramural (noncompetitive) sports). Public schools vs. private schools and schools with a larger school enrollment were more likely to have a school climate supportive of physical activity.

**Conclusions**—Although schools reported elements of positive physical activity climates, discrepancies exist by school characteristics. Of note, public schools were more than twice as likely as private schools to have supportive physical activity environments. Establishing more consistent physical activity expectations and funding at the state and national level is necessary to increase regular school physical activity.

### Keywords

school wellness; policy; physical education; private schools

The importance of establishing a school environment that supports adequate physical activity is widely recognized. With 95% of American youth ages 5 to 17 enrolled in school and the average child spending 1300 hours in a school building per year, schools are one of the primary locations where children can be physically active.<sup>1–4</sup> Regular participation in physical activity has been shown to promote multiple physical, mental and emotional health benefits, including healthier bones and muscles,<sup>5,6</sup> reduced risk of obesity and chronic disease,<sup>5,6</sup> decreased feelings of depression,<sup>5,6</sup> and improved cognitive performance.<sup>7</sup> Despite the well-known benefits of physical activity, almost half of all young people ages 12 to 21 fail to participate in vigorous physical activity on a regular basis.<sup>6</sup> Outside of school, the majority of children do not regularly participate in organized physical activity.<sup>8</sup>

Given the impact of schools on children's lives, experts recommend that children engage in half of their daily physical activity (30 minutes per day) at school.<sup>9</sup> Recommendations for increased school physical activity have been proposed by the Institute of Medicine (IOM),<sup>9</sup> the National Association for Sports and Physical Education (NASPE),<sup>10</sup> and the Centers for Disease Control (CDC).<sup>3</sup> The development of physical activity policy was also mentioned as part of the 2004 Child Nutrition Act.<sup>11</sup> Though physical activity is widely recommended and is often supported by written policy, policy recommendations do not necessarily translate into practice at a local level. In addition, we know little about what school characteristics are related to a supportive physical activity climate in schools. It may be that the type and location of school or the demographic characteristics of the student body may influence a school's ability and motivation to provide the policies, practices and environment necessary to support physical activity.

The purpose of this paper is to present school-level data collected from a sample of 115 middle and high schools located in the Minneapolis/St. Paul, MN metropolitan area during the 2006–2007 school year. We describe a range of factors contributing to the school physical activity climate such as policies and practices regarding time spent in physical education classes, physical activity facilities available for student use, minutes of physical education per week, and support for biking and walking to school. In addition, we examine whether differences among these elements of the school physical activity climate are associated with school type (public/private), location (urban/suburban), level (middle school/high school), percent of students receiving free and reduced lunch, racial composition, size of school enrollment, and the presence of a wellness council.

## Methods

### Study Design and Sample

The data in this paper were collected during the baseline phase of the Transdisciplinary Research on Energetics and Cancer—Identifying Determinants of Eating and Activity (TREC-IDEA) study.<sup>12</sup> TREC-IDEA is a 3-year, longitudinal, cohort study being conducted in the Minneapolis/St. Paul metropolitan area examining youth and the influence of home, school, and neighborhood environments on unhealthy weight gain. The cohort of youth ( $n = 349$ ) were recruited from an existing cohort participating in the Minnesota Adolescent Community Cohort Tobacco Study,<sup>13</sup> a Minnesota Department of Motor Vehicle listing of 14 to 17 year-olds applying for a learner's permit or driver's license, and a convenience sample of youth living in the community. When enrolled, participants were asked to identify the school they would attend during the 2006–2007 school year; the identified schools were then contacted and invited to participate in the school-level measures of the TREC-IDEA study. Of 143 eligible schools, 116 agreed to participate for a response rate of 81.1%. All but 1 school completed the physical education head survey ( $n = 115$ ) so a sample of 115 schools was used for this paper.

The principal and physical education department head of participating schools completed self-administered questionnaires. The principal survey included questions regarding school physical activity policies (the written procedures or guidelines shared with students or staff). The physical education department head survey focused on questions about the school's physical activity practices (actions allowed for students and staff) and environment. The questions included in the principal and physical education department head surveys were adapted from the Middle School/High School version of the School Health Index.<sup>14</sup>

The study was reviewed and approved by the University of Minnesota Institutional Review Board for the protection of human subjects.

### **School Physical Activity Climate (SPAC) Variables and Cumulative Score**

Using data from the principal and physical education department head surveys, 10 dichotomous School Physical Activity Climate (SPAC) variables were created to assess the strength of schools' support for physical activity. These variables included 7 variables assessing physical activity policy and practices as assessed through both the school principal's survey (policy) and the physical education department head survey (practice) as well as 3 physical activity supports within a school as reported by the physical education department head (Table 1). We chose to examine concordant physical activity policies and practices as variables to capture the strongest elements of physical activity factors that may contribute to the school physical activity climate. Similar approaches have been used to examine how matching school policies and practices support healthy food choices<sup>15</sup> and to measure middle schools' environmental support for physical activity.<sup>16</sup>

The 7 variables representing a school's policies and practices were created by giving a school a score of '1' when a school had both policy and practice and '0' when they had either a policy or practice but not both, or had neither a policy nor a practice. The 3 physical activity support questions were derived from the physical education department head survey responses. Physical education department heads were asked to report the average minutes per week students in their school typically receive physical education. An average of 150 minutes or more of physical education per week earned a score of a '1' while a '0' denoted schools where students' average physical education per week was reported as less than 150 minutes. The cut point was based on the IOM's recommendation that students should receive half of their daily physical activity (30 minutes per day) at school.<sup>9</sup> This is less than the NASPE recommended 225 minutes of physical education per week. Schools with at least 3 of 5 of the indoor physical activity facilities listed on the physical education department head survey were given a score of '1' on that item. Schools with less than 3 indoor facilities were given a score of '0.' Indoor facilities included a weight room, fitness center, indoor pool, multipurpose room, or gym. Outdoor physical activity facilities were not included in the score due to the low variation between schools. Finally, a school was given a score of '1' for supporting alternative routes to school if the physical education department head answered yes to all 3 of the following items: 1) walking to school allowed, 2) biking to school allowed, and 3) bike rack provided for students to lock bikes. Using the 10 SPAC variables, a SPAC cumulative score (range = 0–10) was created to assess a school's overall physical activity climate. A score of 10 represented a school with the highest level of support for physical activity.

### **School Characteristics**

We examined the relationships between the 10 individual SPAC variables and the SPAC cumulative score with school-level characteristics, including: public/private school type, middle/high school level, suburban/urban school location, presence of wellness councils, percent white, percent receiving free or reduced price lunch, and student enrollment. Data

regarding the presence of a wellness council were obtained from the principal survey. School characteristic information for public schools was obtained from school report cards on the Minnesota Department of Education (MDE) website. Since report cards were unavailable for private schools, school characteristic information for private schools was obtained from principals at the same time principal survey data were collected.

## Data Analysis

Descriptive statistics were used to examine the prevalence of the 10 SPAC variables. T-tests were conducted to examine the mean differences in SPAC variables by the school characteristics. Analyses were stratified by school characteristics (middle vs. high, private vs. public, urban vs. suburban schools, and schools with vs. without a district or school wellness council). In addition, in multivariate models, linear regression was used to examine the associations between the SPAC cumulative score and all school characteristics (school type, school location, grade level, having a wellness council, race/ethnicity of student body, percent of students receiving free or reduced price lunch, and school size). A backward-stepwise selection method was used to identify variable associations and logistic regression was used to compare SPAC scores by school characteristics. Analyses were performed using SAS version 9.1 (SAS Institute, Cary, NC).

## Results

Schools in the sample were primarily public (79.1%), suburban (83.5%), high (60.9%) schools (Table 2). This compares to Minnesota schools where approximately 80.0% of schools in Minnesota are public and high schools make up 65.2% of Minnesota's secondary schools.<sup>17</sup> The student body represented in our sample of schools is 78.3% white; the statewide average of white students is 76.0%.<sup>17</sup> More than three-fourths (76.5%;  $n = 88$ ) of the schools reported having either a district or a school wellness council. The majority of schools (71.6%;  $n = 83$ ) reported having a district-level wellness council. Fewer schools (34.5%;  $n = 40$ ) reported having both district and school-level wellness councils. For those schools and districts with councils, less than one-third of the school (30.0%) and district (32.5%) wellness councils had addressed physical activity policy as a council (data not shown).

The majority of schools had both a practice and policy in place prohibiting the substitution of another class for PE (95%), requiring that PE teachers be certified (94%), requiring that PE grades be weighted equally to other classes (91%), and requiring that PE classes be graded (91%) (Table 3). Less than half of the schools provided opportunities for intramural (noncompetitive) sports (40%) or provided an activity bus for students after practices (42%). The majority of schools (69%) reported that students received, on average, 150 minutes or more of physical education per week. Only 1 school reported that students received the NASPE-recommended 225 minutes of physical education per week. More than half of the schools (62%) had at least 3 indoor physical activity facilities such as a weight room, fitness center, indoor pool, multipurpose room, or gym and 86% reported that they supported alternative routes to school by allowing walking or biking to school and by providing bike racks for students.

Public schools were significantly more likely than private schools to require physical education grades to be weighted equally to other classes ( $P = .03$ ), to provide an activity bus for rides home after practices ( $P = .0001$ ), and to report that students receive at least 150 minutes of physical education per week ( $P = .003$ ). The differences between public and private schools in requiring that physical education teachers be certified ( $P = .09$ ), requiring that physical education classes be graded ( $P = .09$ ), and supporting alternative routes to school ( $P = .06$ ) approached statistical significance. The relationship showing private

schools were more likely to provide opportunities for interscholastic (competitive) sports ( $P = .07$ ) than public schools also approached statistical significance.

In addition, suburban schools were significantly more likely than urban schools to provide activity buses for rides home after practices ( $P = .02$ ), provide opportunities for intramural (noncompetitive) sports ( $P = .02$ ), and have at least 3 indoor physical activity facilities such as a weight room, fitness center or gym ( $P = .05$ ). A relationship approaching statistical significance also suggested that more suburban schools than urban schools prohibited the substitution of other classes for physical education ( $P = .06$ ). Conversely, urban schools were more likely than suburban schools to require that physical education classes be graded ( $P = .001$ ).

High schools were found to be significantly more likely than middle schools to have indoor fitness facilities ( $P = .01$ ) and to report that students receive an average of at least 150 minutes of physical education per week ( $P = .0004$ ). The difference between high schools and middle schools for providing opportunities for intramural (noncompetitive) sports ( $P = .08$ ) approached statistical significance. Finally, schools with a wellness council at either the school or district level were significantly more likely than schools without a wellness council to provide an activity bus for student transport after practices ( $P = .02$ ).

The mean SPAC cumulative score across all schools was 7.6 (range = 0–10). Statistically significant differences in the SPAC cumulative score were found between public versus private schools ( $P = .0001$ ), suburban versus urban schools ( $P = .05$ ), high schools versus middle schools ( $P = .03$ ), and schools with a wellness council at either the school or district level as compared with those without a wellness council ( $P = .03$ ). When tested, linear associations between school characteristics and the SPAC cumulative score were also found. After backward-stepwise regression, the remaining significant characteristics of schools were school type (public vs. private) and school enrollment. Public schools were 2.23 times as likely to report a higher SPAC cumulative score than private schools ( $OR = 2.23$ ,  $\beta = 0.8$ ,  $P = .03$ ). In addition, as student enrollment increased the SPAC cumulative score also increased ( $\beta = 0.001$ ,  $P < .01$ ).

## Discussion

Only a small number of studies have examined schools' physical activity environments, policies and practices on a national or local level.<sup>16,18–21</sup> One of the few studies to extensively examine school policies and environment is the School Health Policies and Programs Study (SHPPS). In 2000 and 2006, SHPPS collected data from a national sample of schools regarding several areas of school health, including health education, physical education and physical activity.<sup>22,23</sup> A study, by Brener et al<sup>20</sup> using the SHPPS data, looked at the overall school health environment and assessed variation between school health policies and practices by school characteristics and found that schools of differing types were equally likely to have the key components of a quality school health program. However, private schools had fewer physical education policies and practices in place than public schools.<sup>20</sup> Importantly, our study adds to the overview of findings by SHPPS by examining potential differences by school characteristics in elements of the physical activity climate including those related to physical education class and other activity options.

In the current study, schools had more policies and practices supporting physical education than other types of physical activity. For example, the majority of schools reported that students received at least 150 minutes of physical education per week. However, we question the validity of the reported physical education time, especially for high schools. Many schools require only 1 semester of physical education during the high school year.

Minnesota requires that students in grades K–8 receive physical education every year and that students in grades 9–12 receive physical education once over the 4 years of high school. Respondents may not have known how to accurately self-report the average minutes of physical education time across the 4 years of high school, resulting in over-reporting of minutes. The majority of schools also reported having both a policy and a practice for the following physical education items: 1) PE teachers must be certified, 2) PE must be graded, 3) another class may not be substituted for PE, and 4) PE must be weighted equally to other classes. In contrast, less than half of the schools had both a policy and a practice that intramural (noncompetitive) sports were provided or that an activity bus was available to take students home after school activities. Though schools in this study were more likely to report support for physical education related policies and practices, the number of schools requiring regular physical education nationwide is declining. In 2000, SHPPS reported that 96.4% of schools nationwide required students to take some physical education.<sup>23</sup> By 2006, SHPPS found the number of schools nationwide requiring students to take some physical education had decreased to 78.3%.<sup>18</sup> The findings of this study suggest the importance of maintaining support for daily physical education while also emphasizing the importance of enhancing school's extracurricular physical activity opportunities.

The policies, practices, and facilities in support of a healthy physically active school climate varied significantly by school characteristics. Public schools, high schools, suburban schools and schools with a wellness council were significantly more likely to have a climate that supported physical activity than private schools, middle schools, urban schools or schools without wellness councils. Deficiencies in physical activity environment, policy, and practice impact children's physical activity levels. Research shows that environmental aspects of schools such as access to physical activity facilities<sup>24</sup> or policies and practices that increase opportunities for physical activity during the day<sup>25</sup> increase children's levels of physical activity. After adjusting for significant covariates (school type, school location, grade level, having a wellness council, race/ethnicity of student body, percent of students receiving free or reduced price lunch, and school size), public schools remained 2.23 times more likely than private schools to have supportive physical activity climates and larger schools also remained more likely to have a supportive school physical activity climate. Policy requirements differ between public and private schools and may play a role in a school's support for physical activity. For instance, the majority of private schools (79.2%) reported not having a wellness council compared with only 8.8% of public schools reporting no wellness council; having a wellness council was related to a more positive physical activity climate. Unless private schools received funds from the National School Lunch Program they were not required to develop school wellness plans to be used in the 2006 to 2007 school year. However, with more states considering options for school choice such as voucher systems to offset tuition costs at private schools these findings highlight the need to address the physical activity climate in private schools. As students shift to more private and charter schools, special attention should be given to the understudied physical activity climate of these schools.

This study also found a significant relationship between the SPAC cumulative score and school grade level. These differences by grade level and school location may be related to middle schools lacking some of the items included in the SPAC cumulative score such as indoor physical activity facilities or intramural sports due to space or funding issues. Similarly, Young et al<sup>16</sup> reported that barriers to quality physical education in middle schools included not prioritizing physical education, lack of funding for physical education and other physical activity opportunities, and poor physical activity facilities. Given these findings, extra attention may be warranted to incorporating daily physical activity at the middle school level and fostering middle school environments in support of physical activity. Though the many factors contributing to a healthy school environment such as

school food and health services all require attention, physical activity may require the strongest focus in middle schools since middle schools have been found more supportive than high schools in other areas of school health. For example, Kubik et al<sup>15</sup> found that middle schools were more likely than high schools to have more supportive environments with regard to food used as fundraisers. Thus interventionists should bear in mind that school food and physical activity environments may require different responses by grade level.

Strengths of this study include a school sample that allows comparison across school types (public/private, middle school/high school) and a good response rate among study schools. In addition, 2 individuals within each school reported policies, practice and environment separately. Principals reported on the school policies while physical education department heads reported on the school practices, decreasing reporting bias. The weaknesses of the study include the reliance on self-report data that may contribute social desirability bias and the limited generalizability since schools were recruited through a convenience sample of a largely white, suburban population located in the upper Midwest. Despite this limitation, our study found results similar to those of larger national studies.

## Conclusion

Although many schools report school climates that support a healthy school physical activity environment, this study suggests that children are exposed to different levels of supportive school environments depending on their school's characteristics. Parents, educators and other stakeholders, especially in small and/or private schools, could have an impact in the short-term on the school physical activity climate by supporting and creating regular opportunities for physical activity such as active class breaks or intramural sports. In the long-term, establishing more consistent physical activity policy, practice and environment regulations and funding at the state and national level is necessary to increase consistent physical activity opportunities among all schools.

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**Table 1****Items That Comprise the School Physical Activity Climate (SPAC) Score**

SPAC score items	Survey source	
	Policy	Practice
Physical activity policy and practice BOTH in place		
Require that PE classes be graded	School Principal	PE Department Head
Require PE grades to be weighted equally to other classes	School Principal	PE Department Head
Require that PE teachers be certified	School Principal	PE Department Head
Prohibit substituting other classes for PE	School Principal	PE Department Head
Provide opportunities for interscholastic (competitive) sports	School Principal	PE Department Head
Provide opportunities for intramural (noncompetitive) sports	School Principal	PE Department Head
Provide activity bus for rides home after practices	School Principal	PE Department Head
Physical activity supports		
Report students receive at least 150 minutes PE per week	PE Department Head	
Have indoor fitness facilities	PE Department Head	
Support alternative (bike/walk) routes to school	PE Department Head	

**Table 2**

## Characteristics of School Sample, MN, 2006

School characteristics	All schools (N = 115)
Grade level	
High school n (%)	70 (60.9%)
Middle school n (%)	45 (39.1%)
Location	
Urban n (%)	19 (16.5%)
Suburban n (%)	96 (83.5%)
School type	
Public	91 (79.1%)
Private	24 (20.9%)
Have wellness council	
Yes n (%)	88 (76.5%)
No n (%)	27 (23.5%)
Race/ethnicity	
% white mean (SD)	78.3 (20.1%)
SES	
% free or reduced lunch mean (SD)	19.4 (18.3%)
School size	
Student enrollment mean (SD)	1218 (717)
	(range = 50–3267)

Table 3

SPAC Variables and Cumulative Score Prevalence and Mean Differences by School Characteristics (n = 115)

	All schools (n = 115)	School type		School location		Grade level		Have wellness council		
		Public (n = 91)	Private (n = 24)	Urban (n = 19)	Suburban (n = 96)	High (n = 70)	Middle (n = 45)	Yes (n = 88)	No (n = 27)	
SPAC variables % (SD)										
Physical activity policy <i>and</i> practice both in place										
Prohibit substituting other classes for PE	95 (23)	94 (23)	96 (21)	78 (43)*	98 (15)	96 (21)	93 (25)	94 (24)	96 (20)	
Require that PE teachers be certified	94 (25)	97 (18)*	79 (42)	95 (23)	93 (25)	92 (27)	95 (21)	95 (21)	86 (36)	
Require PE grades to be weighted equally to other classes	91 (29)	96 (21)**	74 (45)	89 (32)	91 (28)	93 (26)	89 (32)	93 (26)	85 (37)	
Require that PE classes be graded	91 (29)	94 (23)*	78 (42)	100 (0)**	89 (31)	94 (24)	86 (35)	93 (25)	85 (37)	
Provide opportunities for interscholastic (competitive) sports	88 (33)	86 (35)*	96 (20)	89 (32)	87 (33)	91 (28)	82 (39)	86 (35)	93 (27)	
Provide activity bus for rides home after practices	42 (50)	50 (50)**	13 (34)	16 (37)**	47 (50)	36 (48)	51 (51)	48 (50)**	22 (42)	
Provide opportunities for intramural (noncompetitive) sports	40 (49)	40 (49)	38 (49)	16 (37)**	45 (50)	46 (50)*	30 (46)	41 (49)	37 (49)	
Physical activity supports										
Support alternative (bike/walk) routes to school	86 (35)	90 (30)*	71 (46)	89 (32)	85 (35)	84 (37)	89 (32)	89 (32)	78 (42)	
Report students receive at least 150 minutes PE per week	69 (47)	76 (43)**	43 (51)	78 (43)	67 (47)	82 (39)**	50 (51)	72 (45)	58 (50)	
Have indoor fitness facilities	62 (49)	66 (48)	48 (51)	42 (51)**	66 (48)	71 (46)**	48 (51)	64 (48)	58 (50)	
Mean SPAC cumulative score (range = 0,10); × (SD)	7.6 (1.6)	7.9 (1.5)**	6.4 (1.6)	6.9 (1.2)**	7.7 (1.7)	7.8 (1.5)**	7.2 (1.6)	7.8 (1.5)**	7.0 (1.8)	

\* Difference within school characteristics approaches statistical significance,  $0.05 < P < .10$ .\*\* Significant difference within school characteristics,  $P \leq .05$ .