

RESEARCH ARTICLE

A Multilevel Assessment of School Climate, Bullying Victimization, and Physical Activity

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ABSTRACT

BACKGROUND: This study integrated criminological and public health perspectives to examine the influence of bullying victimization and the school environment on physical activity (PA).

METHODS: We used a weighted sample of 7786 US middle school students surveyed as part of the Health Behavior in School-Aged Children study to conduct a multilevel analysis of bullying victimization as a predictor of self-reported PA and number of days attending physical education (PE) classes. Hierarchical models assessed the contribution of school climate and anti-crime programs.

RESULTS: Results indicated that bullying victimization was associated with fewer days in PE and lower odds of reporting at least 60 minutes of PA more than once a week. Although one of the school crime prevention policies examined was associated with more days in PE, the school-level factors did not account for a large portion of the variance in the 2-level models for either days in PE or PA.

CONCLUSIONS: The results suggest that reduced levels of PA can be added to the growing list of health issues associated with bullying victimization and provide support for the importance of bullying prevention efforts in conjunction with health promotion programs targeted to middle school students.

Keywords: crime prevention; hierarchical; school safety; obesity.

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Over the last 2 decades, studies have identified health problems associated with bullying victimization, including an increased likelihood of depression, anxiety, and symptoms of physical illness.¹⁻³ This literature has rapidly mounted in recent years and continues to affirm that many bullying victims experience serious mental health problems.⁴ Much less attention, however, has been given to the relationship between bullying victimization and physical activity (PA). This is surprising considering the qualitative work that suggests bullied youth may avoid certain social contexts, including school-based environments related to PA that have limited adult supervision or make them feel vulnerable.^{5,6} Furthermore, a recent review of 15 studies found that bullying and peer victimization that occurred within PA settings at school, and particularly

involving physical education (PE) classes, led to distress and avoidance of school-based PA for overweight and obese youth.⁷

In addition to the health problems associated with bullying victimization, physical inactivity among US youth has become an increasing concern. Research suggests that PA declines as young people age⁸ and obesity prevalence among adolescents is increasing.⁹ Of interest to this article is the association between bullying victimization and PA and participation in PE classes across school settings. The school context may be particularly important for understanding the association between bullying and PA because the review study cited above found that of 35 barriers to PA identified, 13 occurred in PA situations in a school setting.

Only 2 known quantitative studies have explicitly examined bullying or peer victimization as a risk factor

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for physical inactivity.^{10,11} One study examined the interaction of obesity, PA, psychosocial well-being and peer victimization among roughly 100 overweight or obese youth and found that peer victimization was negatively related to self-reported PA.¹⁰ The second study found that weight criticism during PA was significantly associated with reduced PA among 576 fifth to eighth graders.¹¹

Furthermore, research has shown that school-based PA settings are common locations for bullying. A study examining perceptions of bullying across a diverse school district in Maryland found that 20% of middle school students who were victims of bullying reported being bullied during PE classes.¹² A Canadian study that surveyed students in 75 schools in Ontario found that 43% of middle school students who were both perpetrators and victims of bullying reported that victimization occurred in the gym, 44% in locker/changing rooms, 37% on the playground, and 27% during intramural sports.¹³ A recent study examining weight-based victimization in Connecticut high school students found that 85% of students reported witnessing weight-based teasing of overweight/obese students during PA, such as in gym class.¹⁴ A study that explicitly focused on bullying, settings for bullying within and nearby school, and avoidance behaviors found that bullied students were significantly more likely to avoid locations in or around schools than students who did not experience bullying victimization.¹⁵

In this study, we examined the relationship between bullying victimization and PA across a large sample of schools, and also assessed whether school-level factors explained additional variation in activity outcomes. Using a nationally representative sample of middle school youth, this study tested the following hypotheses: (1) bullied youth will have lower levels of self-reported PA and fewer days in PE classes; (2) the school-level measures will explain a significant amount of variation in PA over and above individual-level measures; and (3) having crime prevention programs and security policies, as well as a more cohesive school environment, will result in higher PA levels.

As research suggests that bullying victimization is deeply embedded in the environmental fabric of schools,^{12,16} it was important to account for the contextual opportunities within schools that might support or prevent it. Environments that support bullying may also be environments that are not conducive to PA. Studies have shown that contexts characterized by disorder, low collective efficacy, and fear diminish opportunities for PA.¹⁷⁻¹⁹ Much of the prior work on youth PA has utilized an ecological framework focused on the interplay of a variety of individual factors with contextual factors found in neighborhoods, cities, or counties. Although school

is an important context for youth, few empirical studies have used a nationally representative sample to address the socioenvironmental factors in and around schools that may discourage PA.²⁰

METHODS

Participants

A secondary data analysis of the Health Behavior in School Aged Children (HBSC) survey conducted in the United States in 2001 to 2002 was used in this study. In the United States, the HBSC project is managed by the National Institute of Child Health and Human Development (NICHD) under the National Institutes of Health (NIH). The NICHD project is comprised of a national sample of public, Catholic, and other private school students in grades 6 through 10 or their equivalent in the 50 states and the District of Columbia. The project used a 3-stage cluster design: school district (or a group of school districts) was the primary sampling unit, the school was the second stage, and classroom was the third stage. The within-school student response rate was 82% and the administrator response rate was 73%.

For this study, we focused on middle school students in the 2001 to 2002 school year. Although newer HBSC data sets exist (2005 to 2006 and 2009 to 2010), we were interested in the 2001 to 2002 sample because later data sets do not include the outcome variable “days in PE” and several items about school climate, and the 2009 to 2010 administrator questionnaire does not include any items regarding crime prevention programs or policies. The original sample of middle school students consisted of 9461 students in 191 schools across the country. Owing to missing data for some schools for all school crime prevention items on the administrator survey, 15 schools were excluded, resulting in a student sample of 8724. After missing data at the student level were examined and multiple imputations using SAS were performed for the independent variables, a final sample of 7786 students in 176 schools was identified. The average number of student respondents per school was 44, with a minimum of 7 and maximum of 171.

Procedure

Dependent variables. *Days in PE class* measured the number of days that a respondent reported participating in PE at school during an average week. Overall PA was assessed using the following item: “Over a typical or usual week, on how many days are you physically active for a total of at least 60 minutes per day?” This measure is part of the Patient-Centered Assessment and Counseling for Exercise Plus Nutrition Project (PACE) + adolescent PA measure specifically designed to measure PA in youth.²¹ The measure

was collapsed into a binary variable to distinguish adolescents who were usually active 2 or more days a week (value of 1) from those who were only active, on average, 1 or 0 days each week. This level of PA would be the equivalent to at least 3 days of PE a week, a suggested requirement for middle school children and a level at which studies have shown health benefits for youth.²²

Independent variables: individual-level measures.

Overweight/Obese is a dichotomous measure created using body mass index (BMI) scores calculated from self-reported height and weight information and then converted to BMI percentile. On the basis of US Centers for Disease Control and Prevention (CDC) criteria, overweight/obese was assessed as those adolescents whose BMI was at or above the 85th percentile.²³

Bullying victimization was assessed using the 7 items from the Olweus Bully/Victim Questionnaire that comprise the victimization questions.²⁴ Students were asked whether they had been bullied at school in the past couple of months in 7 different ways (called names/teased; excluded from things or group; hit/kicked/pushed/shoved/locked indoors; other students told lies/spread false rumors; made fun of because of race/color; and other students made sexual jokes/comments/gestures). Response options were none, once or twice, 2 or 3 times a month, about once a week, and several times a week. Consistent with prior studies,²⁵ scale reliability was good in the current sample ($\alpha = .84$). Following previous studies using HBSC data,²⁵⁻²⁷ we created a dichotomous measure of bullying victimization representing mean scale scores of being a victim of bullying a few times a month or more.

Number of friends was assessed by aggregating categorical responses to 2 items: at present, how many close male friends do you have? And how many close female friends do you have? This measure can be considered a proxy for the amount of social support,²⁸ as individuals who experience lack of peer acceptance and social support could become resistant to PA.²⁹

Positive self-image is a binary measure with a value of 1 for youth who responded that they considered themselves either very good looking or quite good looking. *Academic achievement* was assessed by one item: "In your opinion, what does your class teacher(s) think about your school performance compared to your classmates?" Response categories included below average, average, good, very good, and were coded on a scale of 1 (*below average*) to 4 (*very good*).

Demographic controls included measures of *socio-economic status* (SES), *age*, and *sex*. SES was assessed using the Family Affluence Scale (FAS),³⁰ a measure designed specifically for the HBSC population.³¹ The FAS includes 4 items related to family material wealth—having own bedroom, times traveled on vacation in the past year, computers in the home, and cars owned—and ranges from 0 to 9, with higher

scores indicating greater SES. Age is a continuous variable, and sex is binary (girl = 1).

Independent variables: school-level measures. To examine the relative effects of school-safety climate, we included a number of binary measures from the school administrator's survey that operationalized school *crime prevention* policies and practices. The intent was to both examine whether schools had prevention programs related to bullying prevention embedded within the curriculum and to assess any additional security-related measures schools may undertake that are explicitly focused on crime or victimization reduction. Typical security-related school crime and victimization reduction measures can include, for example, using uniformed police officers and security guards to patrol school premises or security cameras to monitor the premise. For this study, we included 6 binary items related to school crime prevention and security that were asked of school administrators: (1) school has a peer mediation program, (2) school has a bullying prevention program, (3) school uses staff or volunteers to monitor the halls, (4) school conducts bag, locker, and desk checks, (5) school requires school uniforms, and (6) school has uniformed police/security guards during a regular day.

We also created a scale to represent student report of the school-level affective aspects of *school climate* related to cohesion. A number of studies have suggested that the appropriate measurement of cohesion-related aspects of climate is at the school level, not the individual level^{32,33} and that school cohesion and organization can support PA.^{34,35} Respondents were asked to indicate the extent to which they thought: (1) when a student in class is feeling down, someone else tried to help, (2) the students in their class(es) enjoy being together, (3) most students are kind and helpful, (4) other students accept them as they are, and (5) they felt safe at school. Possible responses ranged from 1 (*strongly agree*) to 5 (*strongly disagree*). Larger values indicate a negative school climate or one of "discontent." Internal reliability of the scale is good ($\alpha = .76$), and the level-2 reliability of the scale is also good (.72) suggesting that the scale is a reliable indicator at the school level.³⁶

We also included 3 school-level controls related to the opportunity for PA. *PE required* was operationalized as an affirmative response by the school administrator to the question: Is PE required in grades 6 through 10 in this school? *School-based opportunity for intramural sports* was assessed by administrator response to the question: Does this school offer students opportunities to participate in intramural activities or PA clubs (yes = 1)? *Community-sponsored sports at school* assessed whether the administrator indicated that youth can use, outside of school hours, any of the school's facilities for community-sponsored sports teams or programs (yes = 1).

Table 1. Descriptive Statistics for Study Variables

	Minimum	Maximum	Mean	SD
Dependent variables				
Days in PE (0 to 5)	0	5	3.09	1.90
2+ days of at least 60 minutes PA	0	1	0.87	0.33
Independent variables				
Level 1: Individual-level variables				
Bullying victimization	0	1	0.07	0.25
Overweight or obese	0	1	0.25	0.43
Positive self-image	0	1	0.50	0.50
Number of friends	0	6	5.12	1.38
School achievement	1	4	2.90	0.85
Family affluence	0	9	5.62	1.87
Age	10	16.7	12.84	0.99
Sex (girls)	0	1	0.53	0.50
Level 2: School-level variables				
Peer mediation program	0	1	0.71	0.46
Bullying prevention program	0	1	0.65	0.48
Staff monitor halls	0	1	0.87	0.33
Routine bag/desk/locker checks	0	1	0.52	0.50
Uniforms required	0	1	0.27	0.45
Uniformed police/guards	0	1	0.49	0.50
Discontent scale	1.54	3.04	2.31	0.26
PE required	0	1	0.89	0.31
Intramural activities	0	1	0.73	0.44
School fields used for community clubs	0	1	0.81	0.39

Level 1: N = 7786 middle school students; Level 2: N = 176 schools.

The HBSC data set also contains school-level stratification and sampling variables that were used as controls for school demographics. Percent Black represents the percentage of students who are non-Hispanic Black. Dummy variables were used to distinguish schools located in urban areas (value of 1) versus suburban or rural, and public schools (value of 1) versus private or Catholic. Descriptive statistics for all study variables are presented in Table 1.

Data Analysis

Multilevel modeling (MLM) was conducted using the generalized linear latent and mixed models (GLLMM) commands of Stata software version 11.³⁷ Models for each dependent variable were developed incrementally to evaluate the between-school variance at each level. The null model included a random effect term for school but no fixed effects. The next model (Model 1) included individual-level variables. Model 2 included the addition of school-level variables. The estimation procedure used in GLLMM was numerical integration (10 integration points) with adaptive quadrature in order to obtain more reliable estimates of parameters. The log-link function in Stata³⁸ was used to fit the multilevel mixed effects Poisson regression model to predict days in PE classes. Poisson models are used when the outcome of interest is a count

and the conditional mean equals the conditional variance.³⁹ The logit-link function in Stata³⁸ was used to fit the multilevel logistic regression models for the dichotomous weekly PA measure. The variables used in the models for the 2 different outcome variables were the same except that the model examining days in PE did not include 2 of the school-level controls pertaining to opportunities for PA—school-based intramurals, and school used for community sports because they were not substantively relevant. All variables were modeled in their original metric. Student- and school-level weights that were available in the data set were scaled to take into consideration the multilevel analytic design.⁴⁰

RESULTS

Table 2 presents the results for the null models. For each outcome, the variance component was significant—the χ^2 test statistics are significantly different from 0 ($\chi^2 = 3467.53$, $p < .001$; $\chi^2 = 93.13$, $p < .001$, for days in PE and overall PA, respectively). The table also provides the intraclass correlation which is the percentage of observed variation in the dependent variable attributable to school-level characteristics. For days in PE, the percentage is large—43%. For PA, only 8% of the variation to be explained is between schools. Given the large proportion of variability that exists between Level 2 units (at least for the days in PE outcome), we determined that it was appropriate to continue with a MLM approach in this study.

Table 3 presents the results of the multilevel Poisson regression models for days in PE. Once individual-level variables were added to the null model (Model 1), the between-schools variance was reduced by only 0.5% and remained significant ($u_{0j} = 0.200$; $\chi^2 = 3408.34$; $p < .001$). As hypothesized, bullying victimization had a significant negative association with days in PE. The only other significant predictor in Model 1 was positive self-image, indicating that youth who viewed themselves as good looking or very good looking were likely to report more days in PE.

When the school-level variables were added to the model (Model 2), the between-school variance was reduced by 11%, and again, the variance component remained significant ($u_{0j} = 0.178$; $\chi^2 = 3046.96$; $p < .001$). For days in PE, substantial variation between schools remained that was not explained by individual- and school-level variables in the model. This is not surprising because investigation of statistically significant associations between level 2 measures and days in PE shows that only one level 2 measure was significant. Students were more likely to report more days in PE in schools that implemented random bag, desk, and locker checks. Bullying victimization remained a significant predictor of days in PE.

Table 2. Intercept-Only (Null) Model

Fixed Effects	Days in PE		Physical Activity	
	Coefficient	SE	Coefficient	SE
Between-schools				
School mean	1.021***	0.035	1.954***	.056
Random effects				
	Variance	χ^2 (df)	Variance	χ^2 (df)
Between-schools	.201	3467.53***	.284	93.13***
Within-schools	.440	(176)	.053	(176)
Intraclass correlation coefficient (ρ)	.428		.079	

* $p < .05$; ** $p < .01$; *** $p < .001$.

Table 3. Hierarchical Poisson Regression Model Predicting Days in PE

	Model 1 (Individual Level Only)			Model 2 (Full Model)		
	ERR	95% CI	p	ERR	95% CI	p
Level 1: Individual-level variables						
Bullying victimization	0.95	(0.91, 1.00)	*	0.95	(0.96, 1.02)	*
Overweight or obese	0.99	(0.97, 1.02)		0.99	(0.91, 1.00)	
Positive self-image	1.04	(1.02, 1.07)	**	1.04	(1.01, 1.06)	**
Number of friends	1.00	(0.99, 1.01)		1.00	(0.98, 1.01)	
School achievement	1.00	(0.99, 1.02)		1.00	(0.99, 1.02)	
Family affluence	1.00	(1.00, 1.01)		1.00	(0.99, 1.02)	
Age	1.02	(0.99, 1.05)		1.02	(0.00, 1.01)	
Sex (girls)	0.97	(0.94, 1.00)		0.97	(0.94, 1.00)	
Level 2: School-level variables						
Peer mediation program				0.91	(0.77, 1.08)	
Bullying prevention program				1.06	(0.90, 1.24)	
Staff monitor halls				1.19	(0.97, 1.47)	
Bag/desk/locker checks				1.19	(1.02, 1.39)	*
Wear uniforms				0.95	(0.74, 1.21)	
Uniformed police/guards				0.93	(0.67, 1.24)	
Discontent scale				0.91	(0.67, 1.24)	
Percent Black				1.05	(1.00, 1.12)	
Public school (public = 1)				1.22	(0.86, 1.75)	
Urban (urban = 1)				0.93	(0.79, 1.10)	
PE required				0.99	(0.75, 1.30)	
Random effects	Variance	χ^2 (df) [†]		Variance	χ^2 (df) [†]	
Between-schools	0.200	3408.34*** (176)		0.178	3046.96*** (176)	

* $p < .05$; ** $p < .01$; *** $p < .001$.

ERR, event rate ratio, calculated as $\exp(\beta)$.

Level 1: N = 7786 middle school students; Level 2: N = 176 schools.

[†]Significance of variance estimate based on unweighted data.

Results from the multilevel logistic models of self-reported PA are presented in Table 4. The outcome variable is in the form of the natural logarithmic transformation of the odds of reporting engaging in PA for 60 minutes or more on 2 or more days each week,

Table 4. Logistic Regression Model Predicting 2 Days or More of at Least 60 Minutes of Physical Activity/Week

	Model 1 (Individual Level Only)			Model 2 (Full Model)		
	OR	95% CI	p	OR	95% CI	p
Level 1: Individual-level variables						
Bullying victimization	0.72	(0.55, 0.95)	*	0.73	(0.56, 0.95)	*
Overweight or obese	0.89	(0.74, 1.06)		0.90	(0.75, 1.09)	
Positive self-image	1.14	(0.97, 1.34)		1.24	(1.06, 1.45)	**
Number of friends	1.19	(1.13, 1.26)	***	1.19	(1.13, 1.26)	***
School achievement	1.30	(1.20, 1.41)	***	1.28	(1.18, 1.39)	***
Family affluence	1.11	(1.05, 1.17)	***	1.10	(0.99, 1.02)	***
Age	0.97	(0.91, 1.05)		1.02	(0.00, 1.01)	
Sex (girls)	0.68	(0.58, 0.80)	***	0.70	(0.59, 0.83)	***
Level 2: School-level variables						
Peer mediation program				1.17	(0.90, 1.52)	
Bullying prevention program				1.20	(0.98, 1.47)	
Staff monitor halls				0.96	(0.97, 1.47)	
Bag/desk/locker checks				0.91	(1.02, 1.39)	
Wear uniforms				0.86	(0.69, 1.07)	
Uniformed police/guards				0.91	(0.73, 1.15)	
Discontent scale				0.71	(0.45, 1.12)	
Percent Black				0.67	(0.56, 0.81)	***
Public school (public = 1)				0.61	(0.40, 0.92)	*
Urban (urban = 1)				0.91	(0.72, 1.14)	
PE required				1.08	(0.86, 1.36)	
Intramural activities				1.00	(0.77, 1.28)	
School fields used for community clubs				1.16	(0.92, 1.46)	
Random effects	Variance	χ^2 (df) [†]		Variance	χ^2 (df) [†]	
Between schools	0.206	56.20*** (176)		0.104	16.48*** (176)	

* $p < .05$; ** $p < .01$; *** $p < .001$.

OR, odds ratio, calculated as $\exp(\beta)$; PE, physical education.

Level 1: N = 7786 middle school students; Level 2: N = 176 schools.

[†]Significance of variance estimate based on unweighted data.

in a usual week. Model 1 shows that once individual-level independent variables were added to the null model (Table 1), the variance component for mean PA remained significant ($u_{0j} = 0.206$; $\chi^2 = 56.20$; $p < .001$), although the variance was reduced by 28%.

A number of individual-level variables were significantly associated with PA in model 1, but most importantly, as hypothesized, students who reported being bullied were less likely to report engaging in PA more than 1 day per week. In addition, students who reported more friends, a positive self-image, receiving higher grades, being more affluent, and are boys, reported engaging in more PA. The addition of school-level measures (Model 2) reduced the between-schools variance component by 50%, but again, the variance component remained significant ($u_{0j} = 0.104$; $\chi^2 = 16.48$; $p < .001$). None of the crime prevention policy/program-related variables was significant; only the school-level control variables for percent Black and being a public school were significant (and negatively associated with PA). The

odds ratios and significance levels remained relatively the same between model 1 and model 2, with the exception of the measure for positive self-image, which was significantly and positively associated with PA in model 2, but not in model 1.

DISCUSSION

We investigated the association between bullying victimization and PA across school contexts. Our findings indicate support for our first hypothesis. Students who reported being bullied reported significantly fewer days in PE and had significantly lower odds of engaging in more than one day of PA for 60 minutes or more. Because schools play a critical role for PA of middle school students,³⁸ these findings have implications for school policies and practices (discussed below) and continued research in this area. The correlational findings in this study suggest that longitudinal research deciphering whether victimization causes reduced PA is an important next step. Indeed, the cross-sectional nature of the data is a key limitation in this study, as we cannot infer causality.

We found mixed support for our second hypothesis. The models predicting days in PE showed that the inclusion of the school-level variables only reduced the between-schools variance somewhat (11%) and variation remained to be explained. The school-level variables provided a much larger reduction in the between-schools variance (50%) for the models examining overall PA, although significant variation remained to be explained. These findings indicate that schools do provide an important setting for understanding PA outcomes for youth, but more research, perhaps using data sets that contain a wide array of constructs related to supportive PA environments, is warranted.

Hypothesis 3 was generally not supported—none of the school prevention measures was significantly associated with weekly PA and only random locker, bag, or desk checks was associated with days in PE. These findings may not be too surprising because the immediate logic behind implementation of security measures does not include outcomes associated with general PA (including activity outside of school), and any likely impact on overall PA may be too many steps removed from simple implementation of these measures. It is possible, however, that random checks cut down on skipping classes, including PE. Given the dearth of literature in this area, research focused on compliance with PE and truancy may be an important avenue for further study.

Given that some studies have found that school cohesion helps provide an atmosphere supportive of PA^{34,35} and that a school climate supportive of bullying reduced participation in extracurricular activities,⁴¹ it is somewhat surprising that the school discontent scale was not significantly associated with

PA. However, the null finding may be due to the fact that the discontent survey items did not reference PA or that the days of PA measure was not solely focused on *school-based* PA. It is nonetheless important to continue to examine PA and related health behaviors within a multilevel context as it is likely that data limitations are partly responsible for null findings. The significance of the variance component remaining in the full model of days of PA is suggestive of this.

Furthermore, the school-level safety measures were operationalized as either having the program or policy or not, and although the availability of these administrator-report measures is an improvement over many previous studies, these measures do not capture any variations in the *implementation* of the programs and policies across schools. Research has shown that the quality of crime prevention program implementation in the typical school is low.⁴² Because some components of both bullying prevention and PA support interventions rely on improvements to school culture and climate, the selection of appropriate, valid, and rigorous school climate indicators in school-related research is an important consideration for future research.

Limitations

Other important limitations include potential endogeneity from cross-sectional data (and the inability to infer causal processes, as already mentioned). For instance, schools with high rates of bullying victimization (or any type of victimization) may be the schools likely to have metal detectors, uniformed officers, and other visible security measures. Other limitations include a lack of indicators related to PE beyond whether PE is required, and limited items to operationalize school climate that are directly applicable to PA. Also, the reliance on self-reported data is a limitation and the measures of PA were not validated. The use of objective measures of PA would add weight to the findings, although it is difficult and expensive to use objective measures in large national samples. Finally, the data are a decade old, but there is no particular reason to assume that the relationships found using this data set would be much different if examined with current data, with the exception that in recent years, cyberbullying has been noted as a problem, and hence, such measures have been added to surveys. We believe that the wide range of school-level variables found in this data set coupled with the PA variables creates an important data set that outweighs any potential issues with the data set not being current. As noted earlier, more current HBSC data sets do not include many of important variables in this study.

Conclusions

Nevertheless, this study has a number of strengths that include a rare focus on days in PE class as an

outcome, an important aspect in the prevention of sedentary behavior, and obesity among adolescents, but not often studied within the broader ecological context of schools and their policies. Another notable strength of this study is the size and composition of the sample—few data sets consist of both a nationally representative sample of students and a wide range of individual-level and contextual measures that span more than 1 or 2 substantive domains, such as health and crime prevention. Considering that schools are part of the daily routine of millions of youth, an understanding of risks and buffers associated with the school environment becomes paramount for developing a comprehensive strategy that can promote environments conducive not only to increasing PA, but also to reducing bullying victimization, and perhaps general violence. A safe school-based environment for PA means not only well-lit fields, access to water and safe equipment, but also an environment free from violence and victimization. Even though experts widely agree that opportunities for school-based PA abound³⁵ and could help curtail obesity,⁴³ the link between bullying victimization and PA in the school context has only begun to be explored.

IMPLICATIONS FOR SCHOOL HEALTH

The finding that bullying victimization among adolescents is associated with fewer days in PE and lower odds of engaging in PA adds to the concerns about possible negative health consequences of bullying. This underscores the need for school administrators to think comprehensively when addressing student health or when developing both bullying prevention programs and programs targeted to increase PA among youth. More specifically, school health professionals should consider health promotion programs that are multidimensional—where the program logic leads to both reductions in bullying victimization and increases in PA.

With regard to PE, the National Association of State Boards Association (NASBA) recommends that PE should be considered “a cornerstone to teaching students the skills necessary to lead enjoyable, active lifestyles throughout their lives.”⁴⁴ PE class is 1 of the 2 obvious places (in addition to recess) for PA during middle school. Hence, it is important for school administrators to consider the environment in which PE occurs and perhaps gauge students’ perceptions of support for PE, as well as whether the school atmosphere appears conducive to bullying or weight criticism during PE or recess. Creating an atmosphere supportive of PA among students, staff and administrators makes good school and health policy sense in general, as the potential harms are likely to be minimal with careful implementation of curricula and evidenced-based programs supportive

of PA. Furthermore, other studies have shown that enjoying PE class is one of the strongest and most consistent correlates related to PA out of school.^{45,46}

Human Subjects Approval Statement

The study protocol was reviewed and approved by the institutional review board of the Eunice Kennedy Shriver National Institute of Child Health and Human Development.

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