Accident Analysis and Prevention 42 (2010) 1–9

Contents lists available at ScienceDirect

Accident Analysis and Prevention

journal homepage: www.elsevier.com/locate/aap

American Public Health Association Award Winning Paper

School resources, resource allocation, and risk of physical assault against Minnesota educators

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ARTICLE INFO

Article history:
Received 7 March 2009
Received in revised form 22 April 2009
Accepted 26 April 2009

Keywords:
Occupational violence
Work-related injury
Physical assault
Educators

ABSTRACT

To investigate the relation between schools' resource levels (i.e., annual per student expenditures), school resource allocations, and physical assault (PA) against Minnesota's educators, a study was conducted from the two-phase Minnesota Educators' Study (MES) that incorporated school-level fiscal and demographic data from the Minnesota Department of Education (MDE). The MES examined a randomly selected cohort of employed, state-licensed kindergarten through grade 12 educators. From mailed questionnaires, response rates for both Phase I (comprehensive data collection on violent events) and Phase II (case–control) were 84%. Cases experienced a work-related PA event in the previous 12 months; controls reported no assaults. Based on the school in which they worked the most time and available MDE school-level data, together with MES questionnaire data, analyses were conducted on 238 cases and 640 controls. Multivariate analyses, using directed acyclic graphs to guide selection of confounders, suggested that increased spending (i.e. resources) was associated with decreased risk of PA. Analyses further suggested that the highest quartiles of resource allocations, compared with the lowest quartiles (referents), were associated with decreased risks of PA for: district level administration; regular instruction; special education; student activities and athletics; and pupil support services expenditures. Associations between increased resource allocations to student activities expenditures and decreased risks of PA were the strongest. For example, an allocation greater than 5% of the total annual per student expenditure to student activities programming (referent, less than 0.04%) was associated with a decreased risk of PA (OR = 0.30, 95% CI: 0.12, 0.77). Results suggested that allocations of school resources (i.e., expenditures) to key program areas such as student athletics and extracurricular activities may reduce risk of work-related PA against educators. Research to further explore the nature of the relations between disparities in school resources and spending, resource allocations, and PA will be important to the continued development of relevant prevention strategies.

1. Introduction

According to an analysis of data collected via the National Crime Victimization Survey (NCVS), 18% of all violent incidents reported annually occur in the workplace (Duhart, 2001). Such work-related violence, both physical and non-physical, has only recently been recognized as a major public health problem (Rosenberg and Fenley, 1991). Much of the existing literature on work-related (and school) violence has largely focused on addressing the relatively rare incidents of violence that have resulted in fatalities (0.1% of all violent work-related victimizations) (Duhart, 2001). Additional research is needed to identify risk factors for the more common incidents of non-fatal violence (estimated 1.7 million per year) that are perpetrated against individuals while working (Duhart, 2001).

Risk of work-related violence varies across occupational groups or types of workplaces. For example, those working in law enforcement, medical, mental health, teaching, retail sales, and transportation occupations reportedly incurred 38% of all NCVS-reported work-related violent victimizations (Duhart, 2001). Each year, teachers working in elementary, junior and high school, and special education experienced 8% of all violent work-related victimizations (Duhart, 2001). This equates to teachers experiencing an estimated 253,100 threats of injury and 127,500 physical attacks by students in elementary and secondary schools (Dinkes et al., 2007).

In spite of educators' notable risk of work-related violence, exploration and resulting knowledge of school violence has largely focused on student-on-student incidences of violence (National

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doi:10.1016/j.aap.2009.04.019

Center for Education Statistics, 2003). In some instances, cross-sectional surveys of educators (Dinkes et al., 2007; Noelle et al., 2007; DeVoe et al., 2004; Binns and Markow, 1999), rather than rigorous methodological studies (Casteel et al., 2007), have served to guide our limited understanding of the risk factors for violence that educators may face while working in school environments. Educators are unique in that they are often the targets of the student-perpetrated violence which occurs in schools; however, they experience these incidents as work-related violence.

In general, areas with reduced access to resources are typically more hazardous than areas rich in economic, human, and social capital. Low-income and resource-poor populations are also more likely to be exposed to toxic wastes, water pollution, ambient noise, as well as poorer quality housing, school and work environments (Evans and Kantrowitz, 2002). Further, socioeconomic status (SES) can be utilized as a predictor of injury (Cubbin et al., 2000) and, thus, those residing in low socio-economic status environments often experience higher rates of violence and injury (Krug et al., 2002; Winett, 1998; Baker et al., 1992). In addition, youth who attend schools in resource-poor, low-income areas, versus those schooling in higher income districts are more likely to engage in violent behavior (Leung and Ferris, 2008). Yet, the specific relations between resource levels (as measured by state-reported per student expenditures) within the school setting, and school violence perpetrated against educators, have yet to be fully explored.

The objective of this study was to investigate the relations between disparities in school resources (i.e., per student expenditures) and allocations of these resources, and work-related physical assault (PA) experienced by Minnesota's primary and secondary public school educators. Specifically examined, were the relations between the quantifiable level of per student expenditures (e.g., total annual state-reported K-12 General Fund operating expenditure per student), disparities in school-level allocations of these expenditures (i.e., resources) to various school program areas, such as, pupil support services and student activities/athletics, etc, and PA.

2. Methods

2.1. Data sets

This study involved linking data, self-reported by educators in the Minnesota Educators' Study (MES) (i.e., demographic variables and environmental exposures) (Gerberich et al., 2007), with school-specific fiscal (i.e., school expenditures, resources and allocations) and demographic data from the Minnesota Department of Education (MDE). The MDE data were associated with each educator's primary workplace (i.e., the school in which their reported environmental exposures and potential PAs would have occurred). Each of the datasets, MES and MDE, offered unique strengths; the MES data provided the educators' perceptions of his/her work environment (i.e., school), while the MDE fiscal and demographic data provided detailed information on school level demographics and actual annual dollar amounts spent on education and various education program efforts. In combination, the two datasets provided a unique opportunity to examine the work-related physical assault research questions in an innovative way. Approval to conduct this study was received from the Institutional Review Board for Human Subjects, University of Minnesota.

2.2. Target population

The MDE maintains a list of educators who have been licensed to teach in the state of Minnesota (MN). This list contained the names of all educators, currently and previously, licensed to teach in MN. The list also identified key variables pertaining to each educator, such as, date of birth, license type, and education level. For the purposes of this study, educators with a license expiration date prior to 2003 were excluded. Results of a pilot study ($n = 300$), to test all phases of the study, indicated that "lifetime license" holders could also be excluded; only 3% of eligible responders had a lifetime license and, of these, a large proportion were deceased or not working. Upon, consideration of the exclusion criteria, the target population for the MES was 116,661 licensed educators who had license expiration dates within the eligible range.

Initially, a cohort of 26,000 educators was randomly selected from the target population. In order to establish eligibility, a screening survey was mailed to them beginning in April 2005. The brief survey asked if the educator had worked, in the previous 12 months in a Kindergarten-Grade 12 (K-12) school in Minnesota. From this initial survey, 6469 eligible responders were identified. Responders ($n = 6469$) were, then, mailed a Phase I questionnaire to ascertain the magnitude of violence against educators, including PA occurrence; based on responses, 372 cases and 1116 controls (1:3) were identified to be included in the MES Phase II case–control study.

The response rate for each Phase of the MES Phase was 84%, and ultimately, 290 (all student-perpetrated) cases and 867 controls completed the MES Phase II questionnaire. For the purposes of the current study, it was necessary to further limit inclusion to educators working in public schools, identified by name on the questionnaire by the educator, as private school funding mechanisms are neither uniform nor publicly available. Thus, 238 (82%) cases and 640 (74%) controls were included in these analyses.

2.3. Data collection

MES data were collected via mailed questionnaires (http://www1.umn.edu/cvpc/research.html) (Gerberich et al., 2007). Initially, the MES involved a screening survey that was followed by two additional mailed questionnaire-based phases: Phase I (comprehensive study) and Phase II (case–control study). Data were collected on demographics and violent (both physical and non-physical) occurrences and consequences, through the comprehensive survey, while data on various work-related exposures were collected through the case–control survey. Data collected from the Phase I instrument were used to (1) determine the rates and consequences of PA, and (2) to study the potential associations of physical violence and several educator and environmental characteristics.

Questions on the Phase I survey asked about a specific time period in which the educator had worked. Respondents were asked about characteristics of themselves as well as their work environments. Data collected included: number of hours worked per month; the type (public, private, etc.) and location (urban, suburban, or rural) of school; primary professional activity; average age of students with whom the educator worked; number of hours of student contact per day; number of years as a licensed educator; topics taught; and typical class size, etc. Participants also provided demographic and SES information about themselves. Further, participants were asked whether or not they had experienced work-related PA (i.e., "when one is hit, slapped, kicked, pushed, choked, grabbed, sexually assaulted, or otherwise subjected to physical contact intended to injure or harm" while on the job). Educator's responses indicated if they had experienced any work-related PA (i.e., yes/no) and to what extent, during the past 12 months.

Phase II, involved a nested case-control design, to examine the relations between potential risk factors (e.g., actual and perceived amount of resources in the school environment and allocation of resources to various school program areas) and physical assault. Questions focused on the month, or a time period, just prior to the case event, or a randomly selected working month for controls.

Included, were various environmental exposure questions, such as: topics and types of students taught; hours of student contact; whether various types of resources were sufficient as provided by the school (e.g., up-to-date books and technology, human resources for students, necessary teaching tools for students, sports and musical equipment); whether personal out-of-pocket purchases for classroom supplies were made; and whether there were other potential stressors or the presence of written violence policies and assault deterrents.

The school-specific fiscal and demographic data, associated with each educator's primary workplace, were provided by the Minnesota Department of Education. These variables included several demographic characteristics of the schools such as student body race/ethnicity, average annual property taxes paid per home in the district; and percentage of students receiving free/reduced price lunches, special education curriculum, and limited English proficiency (LEP) curriculum. In addition, the MDE provided data indicating the total annual per student operating expenditure at each K-12 school and a breakdown of the manner by which each school had allocated its annual total per student expenditure into 10 different operating expense program areas (i.e., regular instruction; career and technical instruction [secondary schools]; special education instruction; student activities/athletics; district level administration; school level administration; instructional support services, pupil support services; operations, maintenance and other; and student transportation expenditures) (Table 1). In general, a school's operating expenditures are used for the day-to-day costs associated with operating a school (i.e., educational supplies and programs and various purchased services, as well as salaries and benefits for educators and other school staff) (St. John et al., 2007).

2.4. Case and control selection

The MES yielded 372 cases who had reported having experienced at least one work-related physical assault event within the eligible 13-month period. In the case of educators who experienced more than one event, the most remote event was considered for analyses. For the purposes of these analyses, only those educators working in public schools who identified the school in which they worked the most time were included. Ultimately, 238 of 290 (82.1%) student-perpetrated MES cases, who met these criteria and completed full MES surveys, were included in the analyses.

Controls ($n = 1116$) were identified as those educators who did not report, in the MES Phase I data collection, that they had experienced a physical assault. Controls were selected at a ratio of 3:1 to cases; 867 of the control educators who were mailed a Phase II questionnaire returned full completed surveys. For comparison purposes, each of the selected control educators had one month randomly selected from their pool of eligible months (i.e., months in which they worked during the eligible 13-month range). Again, the current analyses were limited to public school educators for whom their school work environment could be determined. Thus, 640 of 867 (73.8%) MES controls were included in the analyses.

2.5. Data analysis

The goal of this analysis was to estimate the association between the exposures of interest (i.e., annual per student expenditures and allocation of these school resources or expenditures to various program areas) and the dichotomous outcome of interest – work-related violence – while controlling for potentially confounding factors. Initially, each component was considered univariately; then, multivariate logistic regression modeling of the relation between the exposures of interest and the outcome were conducted (Breslow and Day, 1980). Each logistic model included the dichotomous outcome, work-related physical assault, as well as one of the main exposures of interest (i.e., one of eleven categorical per student expenditure variables), and additional categorical covariates or potential confounders (e.g., type and location of school, number of students at school, etc.). Identification of the factors that were controlled for are identified at the bottom of Table 4. The odds ratios estimated from multiple logistic regression models can be interpreted as the risk of work-related violence to educators in reference to the specific exposures of interest.

Directed acyclic graphs (DAGs) were developed for each of the exposures of interest to facilitate selection of potential confounding variables for control (Hernán et al., 2002; Maldonado and Greenland, 2002; Greenland et al., 1999). Generalized estimating equations (GEEs) were used to account for correlated observations among educators working within the same school (Liang and Zeger, 1986). Re-weighting was utilized to adjust for the potential biases due to non-response, as well as unknown eligibility of non-responders (Mongin, 2001; Efron and Tibshirani, 1993). Sensitivity analyses were also performed to determine the magnitude and direction of bias due to the presence of an unmeasured confounder (Rothman et al., 2008).

The annual per student expenditure exposure variable was considered as a categorical variable. In addition, the ten expenditure allocation exposure variables were also characterized as categorical variables. Categories were created using quartile cut-points from the distributions of exposure data (e.g., percentage of the total annual expenditure amount allocated to each of ten education program areas). Consideration of the allocation of variables as a percentage of the total annual expenditure was intended to account for the differences in total annual expenditures across schools.

3. Results

Response rates to the MES Phase I and II were both 84%. The overall adjusted PA rate for educators was 8.3 per 100 persons per year. Analyses for this study were limited to student-perpetrated incidents of PA experienced by public school educators who sufficiently identified the names of the school in which they worked the most time.

The demographic, occupational, and school characteristics, as reported by the cases and controls are presented in Table 2. Cases and controls were both primarily female (i.e., >75%) and similar in age. The majority of both cases and controls were also working full-time (>80%) in non-charter/alternative/magnet public schools (>88%). Educators who experienced PA tended to work with younger students (i.e., primarily K-6 grades) in schools with smaller student bodies (i.e., <1000 students). Cases were more likely to work in urban school environments. In addition, cases (versus controls) were more likely to cite their primary professional activity as working specifically with special education students (41% versus 13%) rather than with other types of students.

School-level fiscal and demographic data were provided by the MDE. These characteristics of the schools, in which participants worked, are summarized in Table 3. Annual per student expenditure varied by school location, with total annual spending reported as highest in urban, compared to rural and suburban schools (US$ 10,400 versus US$ 8521 and US$ 8238 per student per year). In addition, educators working in schools in which annual per student expenditure was high (i.e., >US$ 9350), were more likely to be cases (29% versus 21%). Further, in schools in which an educator had reported a physical assault, there were higher percentages of students receiving free or reduced price lunches, participating in special education classes, and with limited English proficiency (i.e., LEP). The schools, in which cases worked, were also more often located in urban areas and had higher percentages of stu-

Table 1
10 General fund operating expense allocation areas, Minnesota Department of Education (Report to Taxpayers Overview).

10 General fund expenditure allocation areas	Expenditures to be used for the following school programming efforts
1. Regular Instruction	Expenditures for elementary and secondary classroom instruction, not including vocational instruction and exceptional instruction.
2. Career and Technical Instruction	Expenditures in secondary schools for instruction that is related to job skills and career exploration. Includes expenditures for home economics, as well as industrial, business, agriculture, and distributive education.
3. Special Education Instruction	Expenditures for instruction of students who, because of atypical characteristics or conditions, are provided educational programs that are different from regular instructional programs. Includes expenditures for special instruction of students who are emotionally or psychologically disabled, or mentally retarded; for students with physical, hearing, speech, and visual impairments; and for students with special learning and behavior problems.
4. Student Activities/Athletics	Expenditures for all student extra curricular, co-activities, and student sports programs. They may or may not be offered for school credit.
5. District Level Administration	Expenditures for district-wide services including school board, superintendent district office, and general administrative support including the costs of their immediate offices.
6. School Level Administration	Expenditures for activities of administrators and their offices responsible for a school, a group of schools or an instructional area.
7. Instructional Support Services	Expenditures for activities intended to help teachers provide instruction, not including expenditures for principals or superintendents. Includes expenditures for assistant principals, curriculum development, libraries, media centers, audio visual support, staff development, and computer assisted instruction.
8. Pupil Support Services	Expenditures for all non-instructional services provided to students, not including transportation and food. Expenditures for counseling, guidance, health services, psychological services, and attendance and social work services.
9. Operations, Maintenance and Other	Expenditures for operation, maintenance, and repair of the district's buildings, grounds, and equipment (includes expenditures for custodians, fuel for buildings, electricity, telephones, and repairs). Other expenditures include dues and memberships, judgments against the school district, and any other expenses not otherwise classified.
10. Student Transportation	Expenditures for transportation of students, including salaries, contracted services, fuel for buses, and other expenditures.

dents of color (i.e., African American, American Indian, Asian, and Hispanic/Latino).

Data provided by the MDE included the annual per student expenditure at each of the schools in which MES participants worked, as well as a detailed account of how this total expenditure was annually allocated to each of ten main operating expense areas. The average education expenditures at the schools in which educators worked the most time differed significantly (i.e., $p < 0.05$) between case and control educators in terms of total annual per student expenditure, as well as resources (i.e., expenditures) allocated to regular instruction, career and technical instruction, special education instruction, school level administration, student activities and athletics, and instructional support services.

Table 4 identifies results of the univariate and multivariate level analyses. Initially, the total annual expenditure exposure variable and, then, each of ten expenditure allocation areas were considered univariately (Model 1). Next, multivariate analyses considered the relations between each of these eleven main exposures and physical assault, while controlling for relevant variables. The multivariate models (2A and 2B) were weighted to account for non-response and unknown eligibility. In Model 2B the effect of each expenditure exposure was also adjusted for all of the other expenditure exposures or allocation percentage variables. Overall, these allocation percentages covariates were not highly correlated as suggested by Pearson correlation coefficients.

In terms of annual per student expenditure, results of the categorical univariate model, suggested that, compared to educators working in schools with an expenditure of less than US$ 7600 per student, educators working in schools with a higher annual per student expenditure (i.e., >US$ 9350) experienced an increased risk of physical assault (OR 1.94, 95% CI: 1.18–3.18). Also, those educators working in schools that did not provide fiscal data to the MDE (i.e., "missing" expenditure data), were at elevated risk of physical assault (OR 2.97, 95% CI: 1.60–5.52); those schools tended to have smaller school enrollments and were more likely to be urban, non-traditional public schools (i.e., public magnet or charter). In addition to "missing" values for MDE-reported total annual per student expenditure, 59% of these schools were also missing values for percent free/reduced price lunches, LEP, and teaching special education students, as well as student body race/ethnicity demographic classifications.

The observed trend in positive association between increased per student expenditure and risk of physical assault at the univariate level was not confirmed in the adjusted multivariate model (Model 2A). Although the multivariate results exploring the relations between disparities in annual per student expenditure and assault were not important, statistically, the results suggested that an increased expenditure (i.e., highest quartile versus reference group) was associated with decreased risk of assault (OR 0.82, 95% CI: 0.41–1.62). In addition, the "missing" MDE fiscal data showed insignificant, but decreased risk of PA (OR 0.44, 95% CI: 0.03–6.49) after controlling for several confounding variables in the multivariate model.

Additional important findings from the univariate model suggested decreased risk of physical assault (OR 0.53, 95% CI: 0.31–0.91) associated with increased expenditures on district level administration (i.e., greater than 5% of total expenditure allocated to district level administration versus the referent of less than 3%). Further, at the univariate level, increased spending on career and technical instruction (less than 0.2% versus 0.8–2.8% and greater than 2.8%) in secondary schools was associated with decreased risks of PA (OR 0.47, 95% CI: 0.26–0.85; OR 0.30, 95% CI: 0.16–0.60). Increased resource allocation to operations/maintenance (i.e., less than 7% versus all other higher levels) was also associated with decreased risks of PA; however, these results were not statistically important. At both the univariate and multivariate levels, moderate levels of allocations to student transportation and school level administration were associated with increased risk of PA. For example, important results at the multivariate level suggested that allocation of 5.5–6.5% of the total education expenditure to student transportation (versus the referent of less than 4.5%) was associated with increased risk of assault (OR 1.8, 95% CI: 1.02–3.15). Also,

Table 2
Educators' demographic and school characteristics by case–control status—Minnesota educators' study data.

Educator characteristics	Cases		Controls	
	$n = 238$	%	$n = 640$	%
Educator Gender				
Female	190	79.8	488	76.3
Male	48	20.2	152	23.8
Educator age				
Less than 30	20	8.4	43	6.7
30 to <40	51	21.4	146	22.8
40 to <50	64	26.9	176	27.5
50 to <60	93	39.1	236	36.9
60 or older	10	4.2	39	6.1
Teaching job classification				
Full-time contract	212	89.1	530	82.8
Part-time contract	12	5.0	65	10.2
Long-call substitute	3	1.3	8	1.3
Building substitute	1	0.4	1	0.2
All other substitutes	7	2.9	35	5.5
Missing	3	1.7	1	0.2
Primary professional activity				
Classroom teacher	94	39.5	462	72.2
Special Education	98	41.2	85	13.3
Any other, non-classroom teacher	43	18.1	89	14.0
Missing	3	1.3	4	0.6
Type of school				
Public	210	88.2	594	93.0
Public Alternative	12	5.0	26	4.0
Public Charter/Magnet	14	6.0	18	2.8
Missing	2	0.8	2	0.3
Location of school				
Urban	73	30.7	136	21.3
Suburban	89	37.4	268	41.9
Rural	74	31.1	234	36.6
Missing	2	0.8	2	0.3
Grade levels taught at school				
Kindergarten	116	48.7	235	36.7
Grades 1–3	134	56.3	269	42.0
Grades 4–6	149	62.6	330	51.6
Grades 7–12	98	41.2	367	57.3
Classes Not in Session	15	6.3	24	3.8
Missing	2	0.8	2	0.3
Number of students in school				
Less than 50 students	11	4.6	9	1.4
50 to 200 students	27	11.3	51	8.0
201 to 500 students	83	34.9	200	31.3
501 to 1000 students	84	35.3	230	35.9
More than 1000 students	31	13.0	148	23.1
Missing	2	0.8	2	0.3

School-level demographics pertain to the school in which the educator worked most time in previous 12 months.

allocation of 3.4–4.3% (compared to referent of less than 3.4%) to school level administration was associated with increased risk of assault (OR 1.9, 95% CI: 1.07–3.35).

Educators who worked in schools with the highest quartile of percentages allocated to student activities and athletics expenditures (i.e., greater than 4.8%), experienced decreased risk of PA in the univariate model analysis (OR 0.25, 95% CI: 0.15–0.44), as well as the multivariate model analyses (OR 0.30, 95% CI: 0.12–0.77). Although results, pertinent to some of the other levels of allocations, did not appear to be important, the trends suggested consistent decreased risks of PA associated with increased allocations to student activities and athletics (i.e., a dose–response relationship).

Sensitivity analyses were conducted to consider the effect of an unmeasured confounder; an example of this confounder is the provision of additional resource funds by outside, private groups (such as a sports "booster club") that are not documented in the available MDE fiscal records. Using methods as described by Rothman et al. (2008), sensitivity analyses were used to examine the potential impact – in terms of magnitude and direction of bias – of the presence of such an unmeasured confounder. From the current study, results suggested that increased allocation of resources to student activities and sports programming was associated with decreased risks of PA for educators. Analyses were conducted whereby the prevalence of an unmeasured confounder among educators who were exposed to high levels of sports and activities resources (i.e., greater than 5% of the total expenditure allocated to sports and activities) was equal to, less than, and greater than the prevalence among those unexposed educators. The sensitivity analyses demonstrated that, if the odds ratio for the association between the unmeasured confounder and work-related PA is less than one (e.g., OR = 0.1, strong protective confounder) and the prevalence of the confounder is greater among educators with high levels of sports resources than among those without (i.e., 0.9 and 0.3, respectively), then the protective effect of the exposure could be reversed (e.g., OR changes from 0.3 to 1.15); however, results of the sensitivity analyses considered only the point estimate and not the precision of the estimate.

4. Discussion

Previously, the specific relations between school resources (measured as state-reported per student expenditure), resource allocations, and violence against educators had not been fully explored. In Minnesota, the state legislature determines the complex formulaic mechanisms that dictate the amount of funding or resources appropriated to a given school district. Individual school boards, in turn, determine how to allocate these school resources across the schools within their districts (approximately 75% of funds are discretionary and, thus, are allocated as determined by the school board). School boards are, of course, constrained by the total annual K-12 education dollars for which the schools in their district qualify. State fiscal budgets often do not allow for the desired increases in K-12 education expenditures, and existing literature offers little indication that increases in overall per student expenditures indeed lead to positive student outcomes. Therefore, it is important to consider if the manner by which school boards allocate existing school education funds to various program areas might impact student outcomes, such as student-perpetrated violence.

Results of this study suggested that increased allocation of a greater proportion of a school's total annual expenditure (i.e., increased resources) to student activities and athletics programming is associated with a decreased risk of PA for the educators working in these environments. Additional funds allocated to this critical programming area, in turn, provide opportunities for extracurricular activity involvement for more students, (i.e., increasing time students are exposed to adult-supervised environments, which may serve to foster cooperation and socially appropriate behavior), thereby, potentially reducing students' delinquent and violent behaviors. This study finding is consistent with some previous research which has indicated participation in extracurricular activities and sports, for K-12 students, is associated with pro-social behavior or other positive educational outcomes (Langbein and Bess, 2002; Eccles and Barber, 1999; Segrave and Hastad, 1982).

Many local K-12 schools, confronted with the increasing costs and finite resources have begun to implement cost cutting measures at their schools. Often, programs which are deemed extracurricular (i.e., sports and music) are the first programs to be cut. For example, one Minnesota school district recently announced that their 2008–2009 sports and activities budget would be reduced by US$ 860,000 and fees associated with student participation

Table 3
Characteristics of educators' schools—Minnesota Department of Education Data.

Characteristics	Cases (n = 238)		Controls (n = 640)	
	n	%	n	%
Average Annual Per Student Expenditure: Rural Schools—US$ 8521 (S.D. = US$ 2048) Urban Schools—US$ 10,400 (S.D. = US$ 3094) Suburban Schools—US$ 8238 (S.D. = US$ 1464)	US$ 9204 (S.D. = US$ 2621)		US$ 8686 (S.D. = US$ 2155)	
Annual per student expenditure quartiles				
Less than US$ 7600	44	18.5	158	24.7
US$ 7600 less than US$ 8400	42	17.7	159	24.8
US$ 8400 to less than US$ 9350	53	22.3	148	23.1
Greater than US$ 9350	69	29.0	135	21.1
Missing	30	12.6	40	6.3
Percent student free/reduced price lunch eligible				
Less than 25%	71	29.8	286	44.7
25 to <50%	84	35.3	237	37.0
50% to <75%	33	13.9	66	10.3
More than 75%	27	11.3	30	4.7
Missing	23	9.7	21	3.3
Percent special education students				
Less than 10%	43	18.1	164	25.6
10 to <12%	48	20.2	160	25.0
12% to <14.5%	49	20.6	133	20.8
More than 14.5%	75	31.5	162	25.3
Missing	23	9.7	21	3.3
Percent limited English proficiency (LEP)				
Less than 0.25%	44	18.5	163	25.5
0.25 to <3.5%	60	25.2	215	33.6
3.5% to <8.0%	29	12.2	104	16.3
More than 8.0%	82	34.5	137	21.4
Missing	23	9.7	21	3.3
Average annual tax per home in school district				
Less than US$ 286 per year	48	20.2	153	23.9%
US$ 286–501 per year	45	18.9	126	19.7%
US$ 502–677 per year	67	28.2	165	25.8%
Greater than US$ 677 per year	46	19.3	156	24.4%
Missing	32	13.5	40	6.3%
Student body race/ethnicity				
African American				
Less than 1%	46	19.3	174	27.2
1% to <3%	51	21.4	167	26.1
3% to <11%	39	16.4	148	23.1
More than 11%	79	33.2	130	20.3
Missing	23	9.7	21	3.3
American Indian				
Less than 0.3%	44	18.5	168	26.3
0.3% to <0.8%	54	22.7	153	23.9
0.8% to <1.8%	47	19.8	156	24.4
More than 1.8%	70	29.4	142	22.2
Missing	23	9.7	21	3.3
Asian				
Less than 1%	58	24.4	177	27.7
1% to <3%	49	20.6	147	23.0
3% to <7%	41	17.2	148	23.2
More than 7%	67	28.2	147	23.0
Missing	23	9.7	21	3.3
White				
Less than 71%	84	35.3	122	19.1
71% to <87%	39	16.4	178	27.8
87% to <94%	50	21.0	157	24.5
More than 94%	42	17.7	162	25.3
Missing	23	9.7	21	3.3
Hispanic/Latino				
Less than 1%	42	17.7	135	21.1
1.0% to <2.7%	56	23.5	182	28.4
2.7% to <6.3%	45	18.9	164	25.6
More than 6.3%	72	30.3	138	21.6
Missing	23	9.7	21	3.3

School-level demographics pertain to the school in which the educator worked most time in previous 12 months.

Table 4
Univariate and multivariate analyses of expenditure exposures and educators' risk of physical assault.

Per student expenditure exposures	*N*	No. Events	Model 1—Unadjusted		Model 2A[a]—Adjusted	
			OR	95% CI	OR	95% CI
Total annual per student expenditure						
Less than US$ 7600	202	43	1	–	1	–
US$ 7600 less than US$ 8400	201	42	1.02	(0.60–1.74)	1.16	(0.65–2.09)
US$ 8400 to less than US$ 9350	201	53	1.51	(0.93–2.46)	1.28	(0.72–2.28)
Greater than US$ 9350	204	69	1.94	(1.18–3.18)	0.82	(0.41–1.62)
Missing	70	29	2.97	(1.60–5.52)	0.44	(0.03–6.49)
	N	No. Events	Model 1—Unadjusted		Model 2B[b]—Adjusted	
			OR	95% CI	OR	95% CI
(1) Regular instruction expenditure						
Percentage of total per student expenditure allocated to regular instruction resources and expenditure						
Less than 41.3%	205	47	1	–	1	–
41.3 to less than 46.2%	200	47	1.14	(0.67–1.95)	1.14	(0.61–2.14)
46.2 to less than 50.0%	199	60	1.53	(0.92–2.53)	1.12	(0.55–2.30)
Greater than 50.0%	204	53	1.39	(0.82–2.35)	0.67	(0.28–1.60)
Missing	70	29	2.76	(1.46–5.21)	–	–
(2) Career and technical instruction expenditure						
Percentage of total per student expenditure allocated to career and technical instruction resources and expenditure						
Less than 0.2%	149	53	1	–	1	–
0.2 to 0.8%	116	34	0.8	(0.44–1.46)	0.88	(0.38–2.03)
0.8 to 2.8%	135	28	0.47	(0.26–0.85)	1.12	(0.49–2.56)
Greater than 2.8%	134	20	0.3	(0.16–0.60)	1.09	(0.37–3.18)
Missing	70	29	1.34	(0.72–2.50)	–	–
(3) Special education instruction expenditure						
Percentage of total per student expenditure allocated to special education resources and expenditure						
Less than 12.4%	205	42	1	–	1	–
12.4 to less than 15.4%	202	36	0.86	(0.48–1.55)	0.62	(0.33–1.15)
15.4 to less than 18.8%	203	63	1.67	(0.99–2.83)	1.34	(0.74–2.41)
Greater than 18.8%	198	66	1.7	(1.00–2.88)	0.97	(0.45–2.09)
Missing	70	29	2.79	(1.45–5.38)	–	–
(4) Student activities and athletics expenditure						
Percentage of total per student expenditure allocated to student activities and athletics resources and expenditure						
Less than 0.04%	201	69	1	–	1	–
0.04 to less than 0.8%	197	54	0.73	(0.46–1.15)	0.7	(0.41–1.19)
0.8 to less than 4.8%	210	59	0.73	(0.45–1.19)	0.66	(0.35–1.25)
Greater than 4.8%	200	25	0.25	(0.15–0.44)	0.3	(0.12–0.77)
Missing	70	29	1.41	(0.78–2.56)	–	–
(5) District level administration expenditure						
Percentage of total per student expenditure allocated to district level administration resources and expenditure						
Less than 3.1%	193	57	1	–	1	–
3.1 to less than 3.9%	220	56	0.82	(0.49–1.36)	1.16	(0.66–2.03)
3.9 to less than 4.9%	197	56	0.8	(0.49–1.31)	1.01	(0.54–1.91)
Greater than 4.9%	198	38	0.53	(0.31–0.91)	0.66	(0.34–1.29)
Missing	70	29	1.71	(0.91–3.21)	–	–
(6) School level administration expenditure						
Percentage of total per student expenditure allocated to school level administration resources and expenditure						
Less than 3.4%	195	41	1	–	1	–
3.4 to less than 4.3%	222	62	1.65	(0.95–2.85)	1.9	(1.07–3.35)
4.3 to less than 5.0%	192	53	1.55	(0.89–2.70)	1.56	(0.88–2.76)
Greater than 5.0%	199	51	1.21	(0.70–2.10)	1.11	(0.61–2.02)
Missing	70	29	2.96	(1.52–5.78)	–	–
(7) Instructional support services expenditure						
Percentage of total per student expenditure allocated to instructional support services resources and expenditure						
Less than 3.3%	199	44	1	–	1	–
3.3 to less than 4.4%	208	46	0.9	(0.53–1.53)	1	(0.56–1.78)
4.4 to less than 5.6%	185	56	1.31	(0.77–2.25)	1.06	(0.58–1.96)
Greater than 5.6%	216	62	1.37	(0.80–2.36)	1.07	(0.57–2.01)
Missing	70	30	2.51	(1.30–4.82)	–	–
(8) Pupil support services expenditure						
Percentage of total per student expenditure allocated to pupil support services resources and expenditure						
Less than 1.3%	194	55	1	–	1	–
1.3 to less than 2.5%	222	69	1.22	(0.76–1.94)	1.25	(0.72–2.16)
2.5 to less than 3.5%	202	45	0.79	(0.47–1.32)	1.17	(0.61–2.25)
Greater than 3.5%	190	38	0.61	(0.35–1.07)	0.8	(0.38–1.66)
Missing	70	29	1.99	(1.07–3.68)	–	–

Table 4 (*Continued*)

	N	No. Events	Model 1—Unadjusted		Model 2B[b]—Adjusted	
			OR	95% CI	OR	95% CI
(9) Operations, maintenance, and other expenditure						
Percentage of total per student expenditure allocated to operations and maintenance resources and expenditure						
Less than 7.0%	216	61	1	–	1	–
7.0 to less than 8.4%	187	50	0.95	(0.57–1.58)	1.03	(0.58–1.81)
8.4 to less than 9.8%	186	44	0.67	(0.41–1.11)	1.1	(0.59–2.04)
Greater than 9.8%	219	52	0.77	(0.47–1.26)	1.53	(0.82–2.83)
Missing	70	29	1.86	(1.01–3.44)	–	–
(10) Student transportation						
Percentage of total per student expenditure allocated to student transportation resources and expenditure						
Less than 4.8%	200	46	1	–	1	–
4.8 to less than 5.5%	200	49	1.3	(0.79–2.13)	1.45	(0.82–2.56)
5.5 to less than 6.5%	207	62	1.63	(1.00–2.66)	1.8	(1.02–3.15)
Greater than 6.5%	201	50	1.43	(0.85–2.42)	1.13	(0.62–2.06)
Missing	70	29	2.92	(1.58–5.48)	–	–

[a] Model adjusted for: school type and location; number of students enrolled; grade levels taught at the school; student race; % students eligible for free/reduced price lunch; % special education students; % limited English proficiency; average property tax per home in the school district; adjusted for with-in correlations using GEEs; and, weighted for non-response and unknown eligibility.

[b] Model adjusted for: covariates listed above; and, all other categorical percentage expenditure allocation covariates.

in sports or extracurricular activities would increase 300 percent (Walton, 2008). Based on results presented here, such cuts to sports and extracurricular program budgets may have unintended consequences, such as increased violence in the schools.

This study focused on school resources, measured as the total amount of per student operating expenditure (i.e., day-to-day school operations costs). This metric is often considered the traditional measure of a school's fiscal resource level; however, there are also other potential unmeasured school resources, such as parental support or local community support and involvement (both of which may provide monetary or social support). Such unmeasured resources may also play a role in reducing student's acts of violence and aggression in the school environment.

Given the self-reported nature of the work-related violence events and other exposures, there were several other potential biases to address: recall, information, misclassification, selection biases; and confounding. Recall bias was addressed by limiting the recall period to the previous 12 months for assaults and one month for exposures (Gerberich et al., 2005, 2004; Gabel and Gerberich, 2002). To further reduce information bias, educators were also followed-up by mail to clarify missing or unclear information provided on survey instruments. Response bias was considered by inversely weighting observed responses by probabilities of response, which were estimated as a function of the educator variables in the MDE license database (Horvitz and Thompson, 1952). Unknown eligibility among non-responders was addressed by accounting for the probability of eligibility, based on these same licensure list variables (Mongin, 2001).

In an effort to reduce the effect of confounding, DAGs guided the selection of potential confounders for logistic regression analyses (Greenland et al., 1999). Although efforts were made to control for potential confounders, there may be additional socio-economic factors that influenced the likelihood of student-perpetrated physical assault against educators (e.g., other neighborhood-level characteristics or student/family-level SES). Educators self-reported on their experiences with physical assault, which limited our ability to capture a complete SES profile of the student perpetrators. Sensitivity analyses, were also utilized to examine the potential impact of an unmeasured confounder, and suggested relatively stable results (Rothman et al., 2008).

5. Conclusion

This study was unique in that it combined self-reported information from educators with fiscal and demographic data from the MDE to address the work-related school violence question. Previous efforts to examine this issue have primarily relied on cross-sectional surveys of teachers rather than quantitative analyses of case control data in conjunction with state-reported, school-specific fiscal and demographic variables.

Given that most K-12 schools must work within the confines of scarce school resources, it is critical to understand how allocation of existing resources to key education program areas might have a positive impact on reducing violent outcomes in schools for *both* educators and students. This study is an initial step in improving our understanding of the nature of the relations between schools' resources or expenditures, resource allocations, and physical assault against educators. Future studies, might also further explore how changes in school resources or education expenditures over time might, in turn, impact violent outcomes in schools.

Acknowledgments

Support for this research was provided by the: National Institute for Occupational Safety and Health (NIOSH), Centers for Disease Control and Prevention, Department of Health and Human Services (R01 OH007816); Midwest Center for Occupational Health and Safety (NIOSH Training Grant T42 OH008434); Center for Violence Prevention and Control, University of Minnesota; and Regional Injury Prevention Research Center, University of Minnesota. Additional gratitude is offered to the entire research team, as well as our advisory board of educators and school administrators, each of whom offered invaluable insights into this research effort. This study would not have been possible without the contributions of thousands of dedicated K-12 educators working Minnesota's schools. These committed individuals deserve to work in safe environments.

This manuscript was awarded a "Co-Best Student Paper Award" from the Injury Control and Emergency Health Services Section of the American Public Health Association, 2008. The award was sponsored, in part, by the Liberty Mutual Research Institute for Safety. Contents of this effort are solely the responsibility of the authors and do not necessarily represent the official view of the American Public Health Association or the Liberty Mutual Research Institute for Safety.

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