Injuries among young workers in career-technical-vocational education and associations with per pupil spending

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Abstract

Background: New Jersey Department of Education (NJDOE) requires by law for accidents/incidents (injury) involving career-technical-vocational education (CTE) students and staff to be reported within five business days to the NJ Safe Schools Program (NJSS) using an online surveillance system. NJ public schools and charter schools (CS) through school districts (SD) or county offices report school data annually to NJDOE, including per pupil spending (PPS). In this study, we examined potential associations of PPS with several variables on injury in NJ: injury cause, injury location on the body, injury type, injury severity, use of PPE, and location of treatment for injury.

Methods: PPS data for December 1998–June 2015 from CTE SDs (one per NJ county, n = 21), four CS SD and eight county special services districts were analyzed. T-test examined potential differences in PPS regarding injury severity and use of personal protective equipment (PPE). Stepwise logistic regression assessed potential associations between PPS and various injury surveillance variables.

Results: There were more CTE injuries reported among SD with lower PPS than among SD with higher PPS. Relatively less severe injuries, e.g., bruise/bumps and cuts/lacerations, more often occurred at schools and SD with higher PPS. Conversely, relatively more severe injuries, e.g., fractures, more often occurred at schools and SD with lower PPS.

Conclusion: Future research should further investigate disparities regarding younger worker injuries reported within school-based career-technical-vocational education programs by PPS and other factors like sex or gender, severity, safety training provided and work experience at time of injury.

Keywords: Adolescents, High schools, Injury, Per pupil spending, Secondary schools, Young workers

Background

Unintentional injuries among adolescents and young adults age 21 and younger, an already susceptible, vulnerable subpopulation, are ongoing public health concerns. Approximately 18.1 million young workers under age 24 comprised about 13% of the workforce in the U.S. in 2013. [1] In 2012, 375 young U.S. workers died from work-related injuries. [1] In 2009, there were approximately 26,500 emergency-department (ED) treated illnesses and injuries among 15–17 year-old youth workers in the U.S., and it was estimated by the U.S. Centers for Disease Control and Prevention-National Institute of Occupational Safety and Health (NIOSH) only about one-third of incidents were even treated at hospitals. [2] Furthermore, in 2009, 4380 illnesses and injuries among workers under age 18 in the U.S. required at least one day away from work; this number excluded workers at small farms, local agencies and if self-employed. [2] Compared to older adults, these higher numbers of young worker injuries may relate to their inexperience, lack of safety and health knowledge and awareness due to a lack of proper training, cultural and economic barriers, and their biological and physiological characteristics, e.g., inadequate strength and cognitive skills to operate some potentially hazardous manual and automatically operated equipment for certain tasks. [1, 3, 4]
Secondary school resources such as per pupil spending (PPS), class size, teachers (e.g., numbers or teacher-to-student ratio), and the quality and content of curriculum are factors potentially influencing safety and health outcomes among students; several of these factors also relate to socioeconomic status (SES) indicators. Previous studies have suggested childhood injury outcomes, in terms of morbidity and mortality, varied by SES. Among students in supervised, school-sponsored career-technical-vocational education (CTE) programs, SES may influence reported injuries. [5] However, at present, few data exist on potential associations between PPS and injury and illness—overall or work-related—among secondary school students.

PPS has been defined to include money from federal, state, and local sources, and has varied among states, ranging from the lowest PPS state, Utah ($6555) to the highest, New York ($19,818); New Jersey was among higher PPS states ($17,572). [6] Recent research suggested adolescents attending schools with higher PPS had increased scores on the adult health utility index, and college students in the top quartile of PPS had a higher adult utility index score than those in the bottom quartile of PPS. [7] These findings were also supported by sibling fixed models, which suggested individuals who attended schools with higher PPS have better subsequent health outcomes than their siblings who attended schools with lower PPS. [7] Another study reported increased PPS was associated with decreased physical assault among educators. [8] Another study suggested U.S. schools with higher PPS more often prohibited use of physical activity as punishment in physical education. [9] Furthermore, in those higher PPS schools, nurse-to-student ratios and physician-provided services to students at school were higher, and they were also more likely not to offer brand-name fast food to students. [9]

Other studies besides those on PPS have suggested SES was an important factor for getting injured in general, whether non-fatal or fatal injuries, in particular among adolescents and young adults. [10] It must also be noted non-fatal injuries can be severe; youth workers can have permanent disabilities and work restriction. [11] Research also suggests higher parental SES was significantly associated with decreased work-related injuries among adolescents. [12] However, data are limited on associations between SES indicators, including PPS, and work-related injuries among adolescents and young adults, particularly on students enrolled in CTE programs.

CTE programs offer a great opportunity to prepare students—adolescents and young adults—to enter the work force, and encompass youth who could drop out from traditional schools. There are over 20,000 CTE and “Ready to Work” programs in the U.S. financially supported by the federal government (over $1 billion). [13] Moreover, students in CTE programs have been more likely to report having been informed of legal rights and having received safety training than those working outside of these structured programs. [14] The U.S. Office of Vocational and Adult Education previously estimated, on average, every high school student has taken at least one CTE course, and 1-in-4 students completed three or more courses in a single program area. [13]

Based on NJ Administrative code 6A:19–6.5, the New Jersey Department of Education (NJDOE) requires by law for accidents/incidents (injury or illness) involving CTE students and/or staff treated by a licensed physician, physician’s assistant, or advanced practice nurse to be reported to the NJ Commissioner of Education. [15–17] Incidents are directly reported to the NJ Safe Schools Program (NJSS) online surveillance system (via Psychdata) for aggregate analyses.

Data on incidence of injuries reported from CTE schools in NJ between 12/1998–12/2013 were described in a prior paper examining associations with District Factor Groups (DFG) scores as one potential indicator of area-level SES. [5] In the present study, we examined potential associations between injuries reported from students enrolled in NJ CTE schools and school district (SD)-level PPS. Although PPS is a SES indicator commonly used throughout the U.S., no known study has simultaneously tested whether DFG scores or SD-level PPS both are associated with injury characteristics occurring within CTE schools. Moreover, PPS is a more specific measure of SES than DFG scores. The DFG scores are derived from U.S. Census-based sociodemographic variables, but PPS is a direct reflection of monetary resources spent within each SD.

Specifically, in this paper, we examined potential associations of PPS with several key variables: injury cause, injury location on the body, injury type, injury severity, use of PPE, and location of treatment for injury. We hypothesized lower PPS school districts would have relatively more severe injuries, use PPE less often, and have higher number of reported injuries treated at hospitals/ED compared to SDs with higher PPS. In the present analyses, data collected through the NJSS incident reporting surveillance system between the years 12/1998–06/2015, i.e., 1.5 years more data than prior analyses, [5] were used along with PPS data from CTE and charter schools (CS) in NJ for state fiscal years 1998–2015. [18]

**Methods**

Aggregate, de-identified injury surveillance data were used; there was no personal, identifying information. The Rutgers University-New Brunswick Institutional Review Board (IRB) has approved NJ Safe Schools Program incident surveillance and training-related evaluation activities as exempt research since they are based on various laws (IRB #021997 W0383). Overall, most injury reports were...
students (96%), with the remaining 4% of injuries being acquired by school staff (adults); these reports were excluded in further analyses.

PPS data were abstracted from a NJDOE database [18] and were expressed with different terms throughout the State of NJ Fiscal Year (FY) records as Total Cost Per Pupil (1999–2002), Total Comparative Cost Per Pupil (2003–2010), Budgetary Per Pupil Cost (2011-present), and Total Spending Per Pupil (2011-present). The definition of each term was similar; and served an indicator to allow comparisons of SD costs. The SD cost included a SD’s general fund and special fund budgets related to services for enrolled students. Other costs included in these indicators were costs of governance, support, and instruction considered common and generally uniform, i.e., staff salaries and fringe benefits, textbooks, supplies and materials, rentals and insurance, legal fees and other purchased professional, technical and property services. The former three indicators are different from the Total Spending Per Pupil. The Total Spending Per Pupil also includes state expenditures (i.e., pensions and social security payments) on behalf of the SDs; transportation costs (including costs for students transported to non-public/private and CS); and, legal judgments against the SD. In addition, Total Spending Per Pupil includes food services expenditures, including those covered by school lunch fees; capital spending budgeted in the general fund (facilities and equipment); special revenues supported by local, state, and federal revenues; payments by one SD to other private and public SD for the provision of regular, special, and preschool education services; school departments; and, an estimate of the SD’s share of the debt service the State of NJ is paying for school construction bonds issued for school construction grants and School Development Authority Projects. In this study, we did not use the Total Spending Per Pupil because data were only available 2011–2015. Instead, in this study, the indicator used was PPS, i.e., reflecting Total Cost Per Pupil, Total Comparative Per Pupil Cost, or Budgetary Per Pupil Cost (similar definitions). PPS of each SD for the 1998–2015 school/academic years (state fiscal years) were managed in Microsoft Excel by school types--secondary schools of grades 7–12 or 9–12, county special services SD (CSSD), CTE SD, or charter school (CS) SD. Inflation adjustments to PPS were calculated using monthly consumer price index data specific to the education industry, averaged according to the academic fiscal year (July 1 – June 30), and standardized to 2010 U.S. dollars. [19] To investigate the association between annual PPS and work-related high school injuries, reported injuries were matched to each school’s PPS (based on its SD) by academic year.

As detailed elsewhere, [5] the year 2000 DFG scores were averaged at the county level and linked to each county/SD’s CTE program. This was necessary because despite each CTE program being reported separately as approved within a city/town SD or the county-wide service area, it could not receive a separate DFG scores because any student within the county (as opposed to geographically based local SD within a county) could attend the respective county-based CTE SD or special services SD.

Data analysis
The distributions of mean PPS of CTE SDs and CTE plus non CTE SDs (i.e., eight CSSD and four CS SDs) were slightly right-skewed. In this study, PPS was categorized into higher PPS and lower PPS based on above and below the 50th percentile, respectively.

Statistical analyses were conducted within SPSS 24 (IBM) and SAS 9.4 (Cary, North Carolina). Data were not normally distributed and were log transformed. T-test assessed potential differences in PPS among reported injury severity groups (i.e., non-disabling, temporary disabling, permanent disabling, and death) and PPE used at time of incident. Multilevel logistic regression assessed potential associations between PPS and reported injury severity, adjusting for potential confounding factors and correlation of individuals within SDs. [20]

Results
There are twenty-one county CTE SDs in NJ. The twenty-one counties in NJ had at least one SD submit an injury report between 1998 and 2015. There was a wide range of PPS among CTE SDs, from approximately $6700 to $40,600 during the 1998–2015 school years. When eight CSSD and four CS SDs were included in the analysis, the range of mean PPS increased ($8000 – $66,200). The differences between highest and lowest SD PPS values annually were approximately 60–90%. (Tables 1-3) Average annual PPS trends indicate that inflation-adjusted PPS has generally declined from academic year 1998–1999 to most recent data (Tables 2 and 3). Comparing longitudinal trends between the CTE SDs (Table 2) and CTE together with eight CSSD and four CS SDs (Table 3) suggests that CTE SDs have experienced a greater PPS decline than CSSD and CS SDs. On average, Hudson County CTE SD had the highest PPS (about $24,000) while Hunterdon County CTE SD had the lowest PPS (about $8000). The PPS of Bergen, Camden and Cape May County CTE SDs tended to increase annually, whereas in other CTE SDs, PPS fluctuated over time.

In this analysis, we focused only on PPS of CTE SDs depending on the injury report data. There was higher incidence of injuries among males (72%) than females (28%) (Table 4). The most commonly injured body parts were hands and fingers, and the most commonly reported injury type was cuts/lacerations. [16, 17] Also, 55% of injuries were treated at a hospital/ED compared to 45% being treated at an outpatient clinic. Overall, injury severity was primarily non-disabling (70%), followed
by temporarily disabling (30%); only one incident was
considered a permanent disability as a finger amputa-
tion. The PPE usage was about evenly distributed among
use (51%) and no use (49%).

When stratified by PPS—higher and lower, defined as
above and below median at $14,694, respectively—re-
sults suggested about two-thirds (68%) of injury inci-
dents were among lower PPS SDs and about one-third
(32%) of injury incidents were among higher PPS SDs.
Moreover, the percentage injuries considered to be more
severe (temporarily disabling) varied by PPS; 26% of all
injuries within higher PPS SDs were temporarily disab-
ing compared to 34% of such injuries in lower PPS SDs
(Table 5). After adjustment for county DFG score, loca-
tion of treatment, and year of injury, there was a

Table 1 Average per pupil spending (PPS) of State of New Jersey (NJ), career-technical-vocational education (CTE), county special
services district (CSSD), and charter school (CS) school districts (SDs) in Fiscal Years 1998–99 to 2014–15\(^1\)

| Type of school districts | Total (n) | Mean ± S.D. mean | Min | Max | Percentile 25 | 50 | 75 |
|--------------------------|-----------|------------------|-----|-----|--------------|----|----|
| CTE \(^a\)               | 21        | 18,413 ± 5951    | 6752| 40,612| 14,766 | 17,447 | 22,061 |
| CTE, CSSD and CS\(^b\)   | 33        | 23,954 ± 12,917 | 6752| 66,199| 14,800 | 19,014 | 30,591 |

\(^1\)Values reported in inflation adjusted, 2010 U.S. dollars
\(^a\)PPS of only 21 CTE school districts from Fiscal Year (FY) 1998–99 to 2014–15 were used for analysis
\(^b\)PPS of 21 VOC and eight CSSD school districts from Fiscal Year 1998–99 to 2014–15, and four CS SDs, were used in analysis

For CS SDs, the available data of each school district were as follows: Academy Charter School, Monmouth County from FY 1998–99 to 2014–15; Charter Technology, Atlantic County from FY 1999–2000 to 2014–15; Camden Academy, Camden County from FY 2001–02 to 2014–15; and, University Academy, Hudson County from FY 2002–03 to 2014–15

‘n’-shaped relationship between inflation-adjusted PPS and injury severity. The probability of experiencing a more severe injury (Fig. 1) increased with increasing PPS only up to a PPS of $20,000. Among PPS SDs with greater than $20,000 the probability of experiencing a more severe injury decreased with increasing PPS.

Statistically significant differences were observed between PPS and nature of injury (results not tabulated). There were significantly higher number of reported injuries, i.e., bruises/bumps (\(p < 0.001\)), cut/laceration (\(p = 0.03\)), and other, e.g., pain, seizure, bloody nose, and fainted (\(p = 0.04\)), among higher PPS than lower PPS SDs. There was significant higher reported incidence of fractures, which are a relatively more severe type of injury, among lower PPS than higher PPS SDs (\(p = 0.001\)). Also, statistically significant differences

Table 2 Annual per pupil spending of career-technical-vocational education school districts in the State of New Jersey (\(n = 21\) counties, one per county)\(^a\)

| School Year | Total (n) | Mean ± S.E. mean | Min | Max | Percentile 25 | 50 | 75 |
|-------------|-----------|------------------|-----|-----|--------------|----|----|
| 1998–1999   | 21        | 22,084 ± 6627    | 12,384| 40,613| 17,714 | 21,615 | 26,486 |
| 1999–2000   | 21        | 22,455 ± 6416    | 7113 | 37,883| 18,452 | 22,151 | 24,910 |
| 2000–2001   | 21        | 22,986 ± 6050    | 11,137| 37,048| 19,258 | 25,469 | 26,922 |
| 2001–2002   | 21        | 20,976 ± 5846    | 9697 | 34,560| 16,266 | 21,865 | 24,311 |
| 2002–2003   | 21        | 19,837 ± 5475    | 9923 | 34,542| 16,680 | 19,992 | 22,390 |
| 2003–2004   | 21        | 18,966 ± 5927    | 8332 | 33,649| 15,959 | 19,057 | 21,888 |
| 2004–2005   | 21        | 18,989 ± 5391    | 9558 | 33,270| 16,170 | 18,482 | 22,628 |
| 2005–2006   | 21        | 19,026 ± 5780    | 9160 | 31,307| 15,464 | 18,150 | 22,490 |
| 2006–2007   | 21        | 18,542 ± 5454    | 8451 | 33,074| 16,294 | 17,627 | 18,876 |
| 2007–2008   | 21        | 17,203 ± 4642    | 7125 | 28,996| 14,912 | 16,243 | 20,416 |
| 2008–2009   | 21        | 16,983 ± 5210    | 7466 | 32,652| 13,745 | 17,233 | 19,155 |
| 2009–2010   | 21        | 16,765 ± 6111    | 6752 | 30,584| 13,014 | 16,705 | 19,014 |
| 2010–2011   | 21        | 15,454 ± 4907    | 6862 | 26,285| 12,436 | 15,250 | 17,444 |
| 2011–2012   | 21        | 15,472 ± 4734    | 7469 | 25,858| 12,683 | 15,341 | 17,005 |
| 2012–2013   | 21        | 14,422 ± 3761    | 7470 | 22,535| 11,978 | 14,588 | 16,003 |
| 2013–2014   | 21        | 14,450 ± 3473    | 8256 | 22,306| 12,791 | 13,989 | 15,859 |
| 2014–2015   | 21        | 16,939 ± 999     | 10,292| 28,230| 13,600 | 16,266 | 18,985 |

\(^a\)Values reported in inflation adjusted, 2010 U.S. dollars
Per pupil spending of each school district was compared in the same state fiscal year (school year)
were observed between PPS and cause of injury. The injuries among lower PPS SDs were more likely to be caused by fall from elevation ($p = 0.03$); whereas among higher PPS SDs, the injuries were more likely to be caused by caught in/under/between ($p = 0.01$). The injured body part most often reported was ‘other’ (e.g., back, thumb, finger, shoulder and fainting), which was higher among lower PPS than higher PPS SDs ($p = 0.04$). The results also suggested no statistically significant difference between PPE usage and injury among higher and lower PPS SDs.

Discussion
This study suggested a statistically significant difference between SD-level, per pupil spending and various injury characteristics among NJ youth attending CTE programs. The relatively less severe, non-disabling to temporarily disabling injuries like bruises/bumps were more likely to occur at schools/SDs with higher PPS, conversely more severe injuries like fractures were more likely to occur at schools/SDs with lower PPS.

This study also suggested how for reported injuries there was no statistically significant difference in the location of reported injury treatment, i.e., treated at hospitals/EDs versus treated at outpatient clinics. Components of PPS related to health care facilities and doctor/nurse-student ratio may not be substantially different among schools/SDs with varying total PPS. In addition, in this study, health insurance status may not have been an issue for choosing the location of injury treatment. Reported injuries were usually acquired within school-sponsored CTE programs; thus, costs incurred would potentially be covered by the reporting school/SD and/or the student’s family. Irrespective of who is responsible for paying for treatment, each trip to an ED costs society around $200. [21] Therefore, school-based injury prevention remains warranted.

Furthermore, in a previous report by the U.S. Department of Labor, workplace injuries among the adult population placed burdens on the workers, especially low-wage and immigrant workers, and their families, and have contributed to income inequality, another SES indicator. [22] Moreover, previous studies suggested poor families and minorities with higher health disparities and lower child achievement measures were more likely to attend schools with lower PPS than schools with higher PPS. [23] Further school-based research on SES and race/ethnic disparities in reported CTE injuries and potential impacts on academic performance is needed.

Limitations
There were several limitations of this study. One limitation was PPS might not be a representative of the real budget of each SD; PPS did not include total revenue,
which includes other sources (non-state, private organization, community funding). Other limitations of this study were similar to our prior analyses with DFG scores as an SES indicator. There were no denominator data. This study’s data were reported incidents within CTE programs; there were no data of uninjured students/staff enrolled in CTE program between the school years 1998–2015. Another limitation related to the generalizability of results to the general secondary school/student population. Students enrolled in NJ CTE programs might not represent the overall student population.

### Table 4
Summary of injury reports to New Jersey Safe Schools Program state-law based surveillance system, 12/1998–06/2015

| Characteristic               | Total (n) | Total (%) |
|-----------------------------|-----------|-----------|
| Total Injury reports a      | 2066      |           |
| Gender                      |           |           |
| Male                        | 1475      | 72.2      |
| Female                      | 569       | 27.8      |
| Status                      |           |           |
| Student                     | 1933      | 96.3      |
| Staff                       | 75        | 3.7       |
| Treatment                   |           |           |
| Hospital                    | 808       | 55.0      |
| Doctor                      | 661       | 45.0      |
| Injured Body Part           |           |           |
| Finger                      | 793       | 37.6      |
| Hand                        | 218       | 10.3      |
| Multiple                    | 199       | 9.4       |
| Eye                         | 158       | 7.5       |
| Head                        | 87        | 4.1       |
| Foot                        | 75        | 3.6       |
| Arm                         | 73        | 3.5       |
| Face                        | 60        | 2.8       |
| Back                        | 53        | 2.5       |
| Ankle                       | 51        | 2.4       |
| Knee                        | 42        | 2.0       |
| Other                       | 300       | 14.2      |
| Injury Type                 |           |           |
| Cut/Laceration              | 815       | 42.5      |
| Burn                        | 178       | 9.3       |
| Multiple                    | 165       | 8.6       |
| Sprain                      | 95        | 5.0       |
| Bruise/Bump                 | 86        | 4.5       |
| Fracture                    | 74        | 3.9       |
| Puncture                    | 72        | 3.8       |
| Abrasion                    | 50        | 2.6       |
| Other                       | 381       | 19.9      |
| Injury Cause                |           |           |
| Struck By                   | 664       | 34.1      |
| Struck Against              | 305       | 15.6      |
| Extreme Temperature         | 149       | 7.6       |
| Caught In/Under/Between     | 134       | 6.9       |
| Fall (Same Level)           | 87        | 4.5       |
| Multiple                    | 63        | 3.2       |
| Rubbed/Abraded              | 55        | 2.8       |
| Other                       | 493       | 25.3      |
| Severity                    |           |           |

### Table 5
Injury reports to the New Jersey Safe Schools Program state-law based surveillance, 12/1998–06/2015, by per pupil spending (PPS) status

| Characteristics        | Higher PPS a | Lower PPS b |
|------------------------|--------------|-------------|
|                        | Number       | Percentage  | Number       | Percentage  |
| Gender                 |              |             |              |             |
| Male                   | 812          | 72.1        | 632          | 69.3        |
| Female                 | 314          | 27.9        | 280          | 30.7        |
| Treatment (p = 0.03)   |              |             |              |             |
| Hospital               | 399          | 58.0        | 407          | 52.3        |
| Doctor                 | 289          | 42.0        | 371          | 47.7        |
| Severity (p = 0.0002)  |              |             |              |             |
| Non-disabling          | 775          | 72.2        | 547          | 64.2        |
| Temporary Disabling    | 299          | 27.8        | 305          | 35.8        |
| Personal Protective Equipment (PPE) Use (p = 0.86) | | |
| Yes                    | 101          | 50.0        | 202          | 48.9        |
| No                     | 101          | 50.0        | 211          | 51.1        |

aHigher PPS signifies PPS above median, $17,447 (inflation-adjusted 2010 U.S. dollars)
bLower PPS signifies PPS below median, $17,447 (inflation-adjusted 2010 U.S. dollars)
cThere was one permanent disability reported within the higher PPS group; no deaths reported
dYes and No indicated PPE used and no type of PPE used at the time of incidents, respectively
population, especially general education students throughout NJ. Also, these students may not generalize to CTE students in other U.S. states, as CTE programs differ among each state. Furthermore, some PPS values were for a specific school within a SD, while some were based on the PPS of the overall SD, which might be only an estimation of the exact amount of PPS among each school reporting injuries. Finally, besides the well-known potential for information bias due to underreporting of data, one other issue related to certain missing or incomplete data fields. However, as of October 2013, reports have been only submitted online to NJSS via Psychdata. Thus, the problem about leaving certain spaces blank as sometimes occurred with the past paper-based injury surveillance system was eliminated. Other analyses compared completeness of reporting factors between the former paper-based and current online reporting system and are reported elsewhere. [24]

This study also had strengths. Data represented injury surveillance over 15 years for the State of NJ. Results inform the literature by specifically examining injuries relating to secondary school students enrolled in CTE programs by PPS as one major SES indicator, and are supported by a previous study [5] but now with 1.5 years more data.

Conclusions
The NJ Safe Schools Program/NJ Department of Education state law-based online surveillance system for youth/young workers in approved secondary school career-technical-vocational education programs allows examination of potential disparities regarding reportable work-related injuries by per pupil spending or PPS, an indicator of socioeconomic status, as well as by sex or gender, severity, safety training provided and work experience at time of injury. Future research should further explore these associations, and incorporate other attributes of the school environment as well as the presence (or not) of school policies on safety, health, and operations and maintenance of school facilities including classrooms. Moreover, development of enhanced injury prevention trainings and interventions could decrease numbers of reported injuries and thus help both decrease medical expenditures and increase student academic performance.

Abbreviations
CS: Charter schools; CTE: Career-technical-vocational education; DFG: District factor group score; ED: Emergency department; IRB: Institutional Review Board; NIOSH: National Institute of Occupational Safety and Health of the U.S. Centers for Disease Control and Prevention; NJ SS: New Jersey Safe Schools Program; NJ: State of New Jersey; NJDOE: New Jersey Department of Education; PPE: Personal protective equipment; PPS: Per pupil spending; SD: School district; SES: Socioeconomic status

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Availability of data and materials
This study’s data are secured on computers per IRB approved stewardship of NJ SS and/or are also publicly available from New Jersey Department of Education. Datasets used and analyzed during the current study are available from the corresponding author on reasonable request.
Author's contributions

DGS led the writing and editing of this manuscript, and reviewed preliminary and final data analyses. SN and AAA led database assimilation, management and analyses and assisted with literature review and editing of this manuscript. JJP led final advanced statistical analyses and both wrote specific paragraphs and assisted with overall editing of this manuscript. Each of the four authors have read and approved the final manuscript.

Ethics approval and consent to participate

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Rutgers University-New Brunswick Institutional Review Board (IRB) has approved NJ Safe Schools Program (NJSS) incident surveillance and training-related evaluation activities as exempt research since they are based on various State of New Jersey (NJ) laws (IRB #201997-W0383). Data used in this study are either openly available via NJ Department of Education (NJDOE), i.e., per-pupil spending data through local and county (districts or schools) and state (NJDOE) websites or, injury data in de-identified form can be available via NJSS upon a formal written request approved by NJDOE. Our study obtained the necessary administrative permissions by the NJDOE to analyze these data, which are reported by State of NJ law directly to NJSS, as a grantee of NJDOE, or directly to NJDOE by the school districts and their secondary schools.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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