

Preventing school violence: assessing armed guardians, school policy, and context

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Abstract

Purpose – Recent highly publicized acts of violence and shootings on campus have prompted numerous crime prevention suggestions including having an armed presence in the schools. The purpose of this paper is to assess the impact of protective measures, policies, and school/neighborhood characteristics on school violence.

Design/methodology/approach – The data used in this study were part of the School Survey on Crime and Safety collected in 2006. The dependent measures of school violence include reports of violence, threatened attack with a weapon, attack with weapon, and gun possession. The sample was divided into high schools and all other grades to consider differences in levels of school violence among grade levels in relation to various law enforcement security measures, school security measures, and school characteristics.

Findings – Findings revealed mixed and often counterproductive results for law enforcement and school security efforts to control school violence. School characteristics, such as reports of bullying, location, and gang activity yielded numerous statistically significant findings. Policy recommendations and suggestions for future research are provided.

Originality/value – This study differs from much of the previous literature, which typically examines student and administrator attitudes about victimization and crime prevention. The current study examines detailed information on the actual effects of school violence prevention efforts. Furthermore, this study moves beyond most other works (that typically focus on high schools) as it considers school safety approaches by different grade levels.

Keywords Armed teachers, Campus safety, School resource officers, School shootings, School victimization, Situational crime prevention

Paper type Research paper

Schools at all levels of education have sought to better prepare for, prevent, and respond to school shootings and other forms of violence. Several high-profile mass murders and various other shootings and violent acts, most notably those occurring toward the latter part of the 1990s, generated various legislative acts, school policies, and prevention efforts to address concerns regarding school violence. The present study expands upon the earlier work of Jennings *et al.* (2011), which examined the effectiveness of law enforcement and school security measures in relation to school violence. Particularly, the present work builds upon the work of Jennings *et al.* through more closely examining armed presence and other school security measures of violence prevention, and considering potential differences among grade levels.

Various research efforts directed toward school violence have emerged in light of society's concern for violence in schools. Such efforts have sought to better understand offender behavior, student victimization, and school violence protective measures.



Gottfredson and Gottfredson (2001, p. 313) noted that with regard to preventing problem behaviors, “schools engage in a large number of activities ranging from security and surveillance, through school climate change, to counseling and curricular or instructional programs.” The present study contributes to the literature in this area through using a large data set and assessing relationships between various protective measures, school/neighborhood characteristics, and different types of school violence. This study differs from most other examinations of school violence, as the primary focus is on protective measures as opposed to victimization. Both lines of inquiry are important to better understand the nature and prevention of school violence. Results from the present study can be used to assist schools at all levels, as the present work also differs from other works through considering potential differences among grade levels.

The present research, like some other works, considers opportunity and situational crime prevention theories as a framework for the research design. In summarizing the research on student victimization at schools, Tillyer *et al.* (2011) noted that victimization is often explained through exposure or proximity to crime and/or offenders, the suitability of targets, and a lack of guardianship at both the individual and school level. These explanations are primary components of routine activities theory (Cohen and Felson, 1979); an opportunity-based theory that has been used to explain differences in gender victimization at school (e.g. Popp and Peguero, 2011) and other aspects of school violence, such as sexual assault (e.g. Cass, 2007).

In summarizing the literature on the prevention of school violence, McLaughlin and Miller (2008) noted:

Numerous high-profile forms of violence in the school setting have led to an atmosphere of fear and apprehension among many students, teachers, administrators, health care professionals, parents, and communities about the safety of their schools. While statistics show that schools, in general, remain safer than their surrounding neighborhoods, every community must take steps to address school violence (pp. 439-440).

Conflicting and limited research in the area of school crime, and the need to provide safer school environments perpetuate the need for additional research in this area.

The literature

Schools are relatively safe places and the likelihood of violent crime occurring at school is relatively low (e.g. Burns and Crawford, 1999; Jennings *et al.*, 2011). There are, of course, differences among schools and some are more violent than others. The National Center for Education Statistics (NCES), located within the US Department of Education and the Institute of Education, is the primary federal entity for collecting and analyzing data related to education in the US and other nations. The NCES reported that in 2010, there were about 828,000 nonfatal victimizations at school, which included 359,000 victims of violence among students ages 12-18. It was also noted that in 2009-2010, about 74 percent of public schools recorded one or more violent incidents of crime, and 16 percent recorded one or more serious violence incidents (Robers *et al.*, 2012).

Violence in schools has long been a concern for students, parents, school officials, and political leaders, however a series of school shootings in the 1990s directed much societal and research efforts toward better understanding the nature and extent of the problem (e.g. O'Neill and McGloin, 2007). The fear generated by these and other acts of violence resulted in notable shifts in school safety procedures and policies intended to make schools safer (e.g. Burns and Crawford, 1999). However, a lack of clarity

regarding the extent of the problem and the efficacy of various preventive measures has hampered protective efforts (e.g. Borum *et al.*, 2010).

Among the researchers who examined the efficacy of school safety measures in relation to school violence are Jennings and colleagues (2011), who assessed the relationship between law enforcement and school security measures on the incidence of violence and serious violence in schools. Using the same data analyzed in the present study, they found that using school resource officers (SROs), dealing with problems concerning bullying, and addressing racial tensions, student disrespect, and gangs were the most promising approaches to addressing problems at high schools. Tillyer *et al.* (2011) examined the effects of school-based crime prevention strategies aimed at reducing criminal opportunity with regard to student victimization, risk perception, and fear of violence at school. They found that the prevention practices examined in their study did not significantly reduce the likelihood of violent victimization or perceptions of risk, for instance as only one measure, metal detectors, significantly reduced fear.

Other studies that address school crime prevention include O'Neill and McGloin's (2007) work, which examined the efficacy of various situational crime prevention tactics regarding violent and property crimes at school. They found that most of the situational crime prevention techniques they measured had no impact on school crime. Closing campus for lunch and the number of classroom changes were the only situational crime prevention measures that impacted crime occurrence.

Researchers have categorized school violence prevention efforts in similar ways. For instance, Time and Payne (2008) identified three distinct forms of school violence prevention strategies: physical remedies (e.g. structural changes implemented to reduce school violence), interactionist remedies (e.g. encouraging students to openly communicate with faculty and staff), and legal remedies (e.g. strategies, laws, or policies that permit school officials to perform certain functions).

Related, O'Neill and McGloin (2007) suggested that research on school crime exists in three planes. The first focusses on addressing offender behavior, in which the school is a base and/or assists in prevention and intervention strategies. The second and third planes move beyond the offender toward the school environment. The second area of research focusses on reactions to school crime, for instance in the form of suspensions and zero tolerance approaches. The third plane shifts from reaction strategies to investigations of predictors of school crime. This area of research exists in two streams: focussing on predictors of school disorder (e.g. through consideration of individual-level and school variables), and examining efforts to reduce school crime through reducing opportunities to commit crime. The latter approach is often examined with consideration of situational crime prevention efforts. The researchers noted that various situational crime prevention efforts exist in schools, however the existing research "could only make minimal statements about their efficacy" (p. 519). The present work considers O'Neill and McGloin's third plane of research through examining law enforcement security measures, individual-level opportunity measures, and school security measures and characteristics.

Law enforcement security measures

Several variables were used in the present study to assess the law enforcement and security measures taken by schools, including the use of SROs, guards in uniform, armed security personnel, security personnel armed with oleoresin capsicum (OC spray), and security personnel armed with a Taser. The use of uniformed guards, SROs, or any type of security personnel in schools has become increasingly

popular, although research in the area questions their effectiveness. Theriot (2009) noted that the number of SROs has substantially increased since the mid-twentieth century, when only a small percentage of SRO programs existed. In 2007, an estimated 38 percent of local police departments, which employed 76 percent of all local police officers, assigned full-time sworn personnel to be SROs. Nearly 90 percent of police departments in jurisdictions with 25,000-499,999 residents did so (Reaves, 2010). The presence of police officers in schools has notably increased since the turn of the century, largely in response to increased federal funding for SROs, increased juvenile delinquency in the 1980s, and concerns about victimizations in schools (Na and Gottfredson, 2013).

Research results regarding the effectiveness of using SROs and other forms of security personnel in schools are mixed. Some studies suggest that SROs appear to be an effective crime prevention approach, for instance as it was found that they were promising in mitigating and confronting problems regarding bullying, racial tensions, student disrespect, and gangs on high school campuses (Jennings *et al.*, 2011). Further, Johnson (1999) found that school suspensions decreased as did crime in high schools and middle schools after SROs were assigned. Jennings *et al.* (2011) found that 76.9 percent of security personnel in schools were uniformed, and schools averaged 1.76 security officers and 0.85 SROs. They noted that levels of violence were significantly lower in schools in which the security officers, including SROs or security officers, were in uniform.

Other studies suggest that SROs and other forms of security personnel in schools provide limited and sometimes counterproductive results. For instance, several researchers noted that the use of security personnel was largely ineffective with regard to students' victimization risk (e.g. Schreck *et al.*, 2003; Burrow and Apel, 2008; Fisher *et al.*, 1998; Tillyer *et al.*, 2011), and some studies suggest that students in schools with security personnel were more likely to be victims of theft (Burrow and Apel, 2008). Other research suggested that the increased use of police in schools resulted in more crimes involving drugs and weapons, and a higher percentage of non-serious violent crime being reported to the police (Na and Gottfredson, 2013).

Among the few researchers who examined school security personnel possessing weapons were Jennings *et al.* (2011), who suggested that about 58 percent of security personnel in schools maintained OC spray, 27 percent possessed Tasers, and 71 percent had firearms. They found that serious school violence was higher in schools where the security officers carried Tasers and/or firearms. Additionally, Maskaly *et al.* (2011) noted that in schools that used only SROs, 16 percent of the officers had a firearm only, 1.7 percent had mid-level force only, about 30 percent were permitted to use all levels of force, and 52 percent were unarmed. They further noted that school crime was higher in schools that used only SROs and the officers had mid-level force capabilities (e.g. OC spray/pepper spray and/or Tasers).

School security measures

The variables used in the present study to measure school security measures include the use of teachers trained in safety measures, access controlled doors, security cameras, metal detectors, a written plan for shooting incidents, and a hotline for reporting trouble. Research with regard to school protective measures designed to reduce the opportunity for crime generally suggests that such measures are ineffective.

The tenets of situational crime prevention would suggest that target hardening and related security protections would provide a safer school environment, and many

schools have engaged in various target hardening practices. Nevertheless, several studies found that reducing opportunities for crime through target hardening and related practices produced limited, if any, positive effects. For instance, Tillyer *et al.* (2011) suggested that environment-focussed crime prevention (e.g. school communal organization) was more effective at reducing victimization than were efforts to control access, formal surveillance, and target hardening. Similarly, Schreck *et al.* (2003), and Burrow and Apel (2008) reported that school security policies such as locker searches and visitor sign-in were largely ineffective at curbing students' victimization risk. Further, O'Neill and McGloin (2007) cited the limitations of situational crime prevention techniques in suggesting that they did not have a relationship with school crime. Some researchers suggested that visible, physical security measure might increase students' perceptions of victimization risk (Schreck and Miller, 2003; Thompkins, 2000).

Despite these and related findings, various school security measures have been implemented in the past 20 years to better address school violence. For instance, the NCES noted that between the 1999-2000 and 2009-2010 school years, schools were more likely to report using controlled access to the building during school hours (75-92 percent), and one or more security cameras to monitor the school (from 19 to 61 percent; Robers *et al.*, 2012). The same report noted that about 11 percent of students reported the use of metal detectors at their schools. Gottfredson and Gottfredson (2001) found that a similar percentage (10 percent) used metal detectors, with urban schools being the most likely to do so. Garcia (2003), however, noted that 55 percent of districts in her study reported having some form of weapon-detection system.

The use of metal detectors and related devices may offer some benefits, for instance as Jennings *et al.* (2011) noted that installing weapon-detection devices appeared to stymie generalized violence, yet had no significant impact on reducing serious violence. Others suggested such systems can be useful in reducing the number of guns and knives in school (Johnson, 2000). Despite the ostensible benefits of using metal detectors to thwart school violence, some researchers found that such devices were an ineffective crime prevention approach (e.g. Schreck *et al.*, 2003; Burrow and Apel, 2008).

Other school security measures include the use of security cameras in schools and clear plans and policies for addressing violence. With regard to plans and policies, critical incident plans are more likely to be found in schools with higher levels of violence and serious violence. Jennings *et al.* (2011) suggested that schools that require these plans seem to have- and practice them, and Burrow and Apel (2008) found that clarity of rules in school was negatively related to victimizations at school.

School characteristics

Several variables were used in the present study to assess the relationship between school characteristics and violence, including reports of gang activity at school, daily/weekly reports of bullying, daily/weekly reports of racial tension, whether more than 50 percent of students feel school is important, whether the school was located in a high-crime area, and whether the school was in a city.

Gang-related crime has been problematic in many schools. Jennings *et al.* (2011) noted that school violence was significantly higher in school that experienced higher levels of gang crimes, and suggested that effective school-based gang prevention initiatives were needed to better address school violence.

It would seem that schools reporting higher levels of bullying and racial tension, and lower levels of students who believe school is important would experience higher levels of violence. The research in the area generally supports this assumption.

Maskaly *et al.* (2011) and Jennings *et al.* (2011) found that school crime was higher in schools that experienced a greater frequency of bullying. Jennings and colleagues also noted that racial tensions were related to higher levels of school violence. It appears that schools that experience higher levels of bullying, racial tension, and related issues are generally more likely to be more crime-prone, as the students enrolled at the schools are more likely to engage in delinquent behavior.

Student alienation has been shown to have a positive relationship with victimization. According to Schreck *et al.* (2003), students who feel disconnected from school were less likely to seek assistance when victimized, leaving them more vulnerable. Prosocial bonds, including attachment to school, could foster guardianship and a belief in the rules thereby reducing victimization (Schreck and Fisher, 2004).

A substantial amount of research has focussed on the location of schools in relation to student victimization and offending. The research largely suggests that students who attend schools in high-crime areas are more vulnerable to victimization. For instance, Everett and Price (1995) found that students who attended school in high-crime areas were twice as likely to be victims of violence then were students who attended school in low-crime neighborhoods. Others found similar results (e.g. Chen, 2008; Augustine *et al.*, 2002; George and Thomas, 2000; Jennings *et al.*, 2011; O'Neill and McGloin, 2007). Related, schools located in cities are known to be more violent than schools located in suburban and rural areas (e.g. Robers *et al.*, 2013).

As noted, the present research is an extension of Jennings *et al.*'s (2011) earlier work which examined the relationship between law enforcement and school security measures, and school violence. The current study expands upon this work through consideration of additional forms of violence, and evaluation of potential differences among grade levels. In their insightful work, Jennings *et al.* considered only two measures of school violence (reported violence and reported serious violence), and included only high school students. The present work considers four types of violence (reports of serious violence, threatened attack with weapon, attack with weapon, and gun possession), and includes grade levels other than high school. The more detailed account of the different types of violence, and consideration of differences between grade levels extend the research literature in this area and provide guidance for creating safer school environments.

Methods

The data used in this study were part of the School Survey on Crime and Safety (SSOCS) collected in 2006 by the NCES on behalf of the US Department of Education. The SSOCS collects extensive data on school safety and crime from principals and school administrators in the USA. Survey packets were mailed out between March and May 2006 to a representative cross-section of schools. A total of 2,724 usable questionnaires were returned (a 76.64 percent response rate) which included 715 elementary schools, 948 middle schools, 924 high schools, and 137 combined schools. The primary focus of the current research was to assess the crime reduction and safety procedures of schools. Since certain responses for these measures were needed to conduct the analysis, listwise deletion was used to remove the cases with missing data on security procedures of interests reducing the final sample size to 1,659 schools. Due to the nature of the SSOCS 2006 sample design the database included a weighted variable with the purpose of reducing non-response bias and sampling error, and making the sample more representative of national populations. The exact weighting procedure is described in detail in Nolle *et al.* (2007).

Previous studies on school violence and crime prevention have typically focussed on high schools due to the high-profile shooting incidents have taken place in these settings. These incidents raised much public disdain and policy concerns regarding school violence and security on campus. In addition, prior research has shown that violence is most likely to occur in a high school setting (Chen, 2008). However, security concerns in grade levels other than high school shifted to some extent in 2013 with the shooting of 20 elementary school students in Newtown, Connecticut. Due to the heightened awareness of safety at all school levels, the current study divides the sample of into two groups: high schools and other grade levels (elementary, middle, and combined). The distinction was made to better assess the influences of various safety and security practices in each setting.

The distinction between grade levels was encouraged by research findings that suggest there are differences in levels of violence and victimization among students of different ages (e.g. Augustine *et al.*, 2002; O'Neill and McGloin, 2007). Gottfredson and Gottfredson (2001) noted that junior high or middle schools reported more prevention activity than did elementary or high schools. Welsh (2001) suggested that the differences among grade levels and their effects on school disorder appear vague and difficult to assess, for instance, as older students are generally more likely to engage in delinquency and crime although they are also more likely to be expelled from school or drop out, which could influence measurements of such activities.

Dependent variables

The dependent variables for the study are based on school administrator reports of incidents of violence and serious crimes from the SSOCS, which notes the number of each incident. The variable serious violence indicates the number of school reported incidents of rape, sexual battery, robbery, or aggravated assault. As a primary focus of the present study was to assess school prevention of weapons-related violence, the following dependent variables were also included: threatened attack with weapon, attack with weapon, and gun possession. Table I presents the summary of the data for the study.

Independent variables

The independent variables selected for the study were based on the literature review of factors associated with violence and victimization, factors used by schools to increase safety on campus, and the criminological literature on situational crime prevention. The variables are organized into three broad categories: law enforcement security measures, school security measures, and school characteristics. Law enforcement security measures include the number of SROs and security guards, and guards in uniform. In addition, three variables were included to assess the impact of armed guardians on campus, specifically in relation to armed security (firearms), and the use of OC spray (pepper spray) and Tasers.

School security measures include variables that reflect the measures schools employed to either prevent or deter violence and serious crime on campus. These variables include having teachers trained in safety measures, and the use of access controlled doors, security cameras, metal detectors, school policies in the forms of having a written plan for a shooting incident, and a hotline for reporting trouble. Finally school demographics and characteristic were included to measure the influence of the school context on safety.

<i>n</i> = 1,659 Schools	All grades			High schools	Other grade levels
	<i>M</i>	SD	Range	<i>M</i> , <i>n</i> = 758	<i>M</i> , <i>n</i> = 901
Elementary schools	37%				
Middle schools	29%				
High schools	25%				
Combined grade levels	9%				
<i>Dependent variables (school violence)</i>					
Serious violence	1.06	4.28	0-90	1.83	0.79
Threatened attack with weapon	0.33	1.95	0-60	0.50	0.27
Attack with weapon	0.17	2.19	0-70	0.17	0.17
Gun possession	0.27	1.37	0-22	0.28	0.26
<i>Independent variables</i>					
Law enforcement security measures					
Number of school resource officers	0.75	0.68	0-7.5	0.93	0.69
Number of security guards	0.97	1.18	0-15	1.84	0.67
Guards in uniform	90%			92%	89%
Armed security	74%			85%	70%
Security armed with OC spray	57%			68%	53%
Security armed with Taser	30%			33%	30%
School security measures					
Teachers trained in safety by security personnel	51%			58%	49%
Access controlled doors	85%			80%	87%
Use of security cameras	56%			76%	49%
Use of metal detectors	2%			3%	2%
School has written plan for shooting incident	83%			90%	80%
School has hotline for reporting trouble	40%			50%	36%
School characteristics					
Number of gang crimes	0.80	4.44	0-87	1.91	0.42
Daily/weekly reports of bullying	32%			23%	33%
Daily/weekly reports of racial tension	4%			6%	3%
More than 50% of students feel school is important	71%			74%	70%
School in high-crime area	8%			6%	8%
School located in city	30%			25%	31%

Table I. Summary of data, independent, and dependent variables for preventing school violence

Analytic strategy

The dependent variables in the present study are count-based, therefore a negative binomial regression model is the analytic technique employed in this research rather than a Poisson regression. Negative binomial regression models are increasingly used in criminological research as sociological data rarely reflect the mean and variance assumptions needed for Poisson regression, and the models are suited for the rare event nature of crime data (Piza, 2012). The weighted variable included in the SSOCS was normalized for this analysis by dividing the sample weight by its own mean to create a new weight mean of one. Normalized weight data address the issues of sample size and ensures the standard errors are correct given the sample (Hahs-Vaughn, 2005). All models were estimated after adjusting for the sample weight. Essentially, the present study examines factors related to a reduction or increase in the four measures of school violence while controlling for important school

characteristics. Multicollinearity can be an issue in social science research as independent variables may be intercorrelated. Bivariate correlations were examined for all variables, with no coefficient approaching 0.8, a frequently accepted level indicative of multicollinearity (Fox, 1997).

Findings

Table II presents the negative binomial regression results for the dependent variables reports of serious violence and threatened attack with weapon. Among the law enforcement measures, for the dependent variable reports of serious violence, the number of security guards and guards in uniform was associated with a significant increase in reports serious violence in high schools, SROs, and the number guards in uniform were also positively associated with reports of serious violence in other grade levels. For the armed guardian variables, reports of serious violence were significantly higher in schools where security possessed firearms, and OC spray. None of the security weapons variables were statistically significant for other grade levels and reports of

	Reports of serious violence		Threatened attack with weapon	
	High school n = 758 Exp (b) (β)	Other grade levels n = 901 Exp (b) (β)	High school n = 758 Exp (b) (β)	Other grade levels n = 901 Exp (b) (β)
<i>Law enforcement security measures</i>				
Number of school resource officers	0.95 (-0.06)	1.29 (0.25)*	1.25 (0.23)*	0.90 (-0.11)
Number of security guards	1.15 (0.14)*	1.13 (0.12)*	1.11 (0.10)*	1.23 (0.21)*
Guards in uniform	1.46 (0.38)**	2.44 (0.89)**	0.96 (-0.05)	1.53 (0.43)**
Armed security	1.93 (0.67)*	1.48 (0.39)	2.40 (0.88)*	1.98 (0.66)*
Security armed with OC spray	1.32 (0.28)*	1.04 (0.04)	0.71 (-0.35)*	1.12 (0.12)
Security armed with Taser	1.01 (0.84)	1.08 (0.07)	1.06 (0.06)	0.61 (-0.49)*
<i>School security measures</i>				
Teachers trained in safety by security personnel	1.14 (0.21)	1.53 (0.43)*	0.93 (-0.08)	0.92 (-0.09)
Access controlled doors	1.34 (0.30)*	1.03 (0.03)	0.70 (-0.35)**	0.45 (-0.79)*
Use of security cameras	1.13 (0.12)	0.89 (-0.12)	1.77 (0.57)*	1.32 (0.28)*
Use of metal detectors	2.59 (0.95)*	0.93 (-0.71)	1.88 (0.63)**	0.68 (-0.38)
School has plan for shooting incident	1.62 (0.49)*	0.70 (-0.36)	1.31 (0.27)	1.71 (0.58)*
School has hotline for reporting trouble	1.03 (0.29)	1.40 (0.34)*	1.53 (0.42)*	0.89 (-0.12)
<i>School characteristics</i>				
Number of gang crimes	1.03 (0.24)*	1.01 (0.01)	1.04 (0.04)*	1.14 (0.13)*
Daily/weekly reports of bullying	1.13 (0.12)	1.50 (0.40)*	1.56 (0.44)	3.04 (1.11)*
Daily/weekly reports of racial tension	2.59 (0.95)*	1.29 (0.26)	2.06 (0.72)*	1.36 (0.31)
More than 50% of students feel school is important	0.84 (-0.18)	0.62 (-0.48)*	0.71 (-0.34)*	0.58 (-0.55)*
School in high-crime area	1.53 (0.43)*	1.38 (0.32)	1.62 (0.48)**	2.25 (0.81)*
School located in city	1.50 (0.41)*	1.65 (0.50)*	1.48 (0.39)*	0.99 (-0.01)
Likelihood ratio χ^2 (df)	448.13 (18)*	469.17 (18)*	367.51 (18)*	211.04 (18)*

Note: * $p < 0.05$; ** $p < 0.10$

Table II. Preventing school violence negative binomial regression results for reports of serious violence and threatened attack with weapon

serious violence. For school security measures, three of the six variables were significant for high schools. Access controlled doors, use of metal detectors, and if the school had a plan for shooting incident were significantly associated with reports of serious violence. Having teachers trained in school safety and a hotline for reporting trouble were positively associated with reports of serious violence for other grade levels.

There were several statistically significant findings for school characteristics and reports of serious violence. Reports of serious violence were significantly higher in high schools with gang crimes and daily/weekly reports of racial tension. There were also higher in high schools that were located in a high-crime area or city. Daily/weekly reports of bullying, and school located in the city were positively and significantly associated with reports of serious violence in other grade levels. The only school characteristic, or more generally, only independent variable shown to significantly lower reports of serious violence was for schools that had more than 50 percent of students who feel school is important ($b = -0.48, p < 0.05$). In general the positive statistically significant findings for reports of serious violence in high schools and armed guardians were similar to those of Jennings *et al.* (2011), yet there were interesting distinctions once the model was examined for other grade levels.

Table II also presents the results for the dependent variable threatened attack with weapon. Among the law enforcement security measures, the number of SROs and security guards were positively related to a higher incidence of threatened attack with weapon in high schools. The number of security guards and guards in uniform were positively associated with the incidence of a threatened weapon attack in the other grade levels. There were two statistically significant findings for armed guardians in high schools. Threatened weapon attacks were significantly higher in schools with armed security for both grade levels. Interestingly, threatened weapon attacks were lower in high schools where security carried OC spray ($b = -0.35, p < 0.05$) and in other grade levels where they carried Tasers ($b = -0.49, p < 0.05$).

With regard to school characteristics, the use of accessed controlled doors was associated with a significantly lower incidence of threatened attack with weapon in both high schools ($b = -0.35, p < 0.10$) and other grade levels ($b = -0.79, p < 0.05$). Threatened weapon attacks were significantly higher in both high schools and other grade-level schools that employed the use of security cameras. Furthermore, the use of metal detectors, and a hotline for reporting trouble were positively associated with higher incidences of threatened attack with weapon in high schools. Other grade-level schools that had a plan for school shootings also had increased reports of threatened weapon attacks.

There were several significant findings for school characteristics. Threatened attack with weapons was significantly higher in both high schools and other grade levels with regard to reported gang crimes. In addition, daily/weekly reports of racial tension, being located in a high-crime area, and being located in a city significantly increased threatened attack with weapon for high schools. Threatened weapon attacks were significantly higher in other grade-level schools that had daily/weekly reports of bullying, and were located in high-crime areas. The one school characteristic associated with lower incidences of threatened attack with weapon was if more than 50 percent of the students feel school is important in both high school ($b = -0.34, p < 0.05$) and other grade levels ($b = -0.55, p < 0.05$).

Table III presents the results for the dependent variables attack with weapon and gun possession. There were mixed findings for law enforcement security measures for the dependent variable attack with weapon. The number SROs were negatively

	Attack with weapon		Gun possession	
	High school	Other grade	High school	Other grade
	<i>n</i> = 758 Exp (<i>b</i>) (<i>β</i>)	<i>n</i> = 901 Exp (<i>b</i>) (<i>β</i>)	<i>n</i> = 758 Exp (<i>b</i>) (<i>β</i>)	<i>n</i> = 901 Exp (<i>b</i>) (<i>β</i>)
<i>Law enforcement security, easures</i>				
Number of school resource officers	0.95 (−0.06)	0.56 (−0.58)*	1.29 (0.25)*	0.37 (−0.99)*
Number of security guards	1.12 (0.11)*	1.55 (0.44)*	1.13 (0.12)*	1.11 (0.07)
Guards in uniform	2.18 (0.78)	4.21 (1.44)*	2.44 (0.89)**	0.50 (−0.70)*
Armed security	0.95 (−0.06)	1.66 (0.51)	1.47 (0.39)	0.48 (−0.73)*
Security armed with OC spray	1.15 (0.14)	1.02 (0.02)	1.04 (0.37)	0.79 (−0.23)
Security armed with Taser	1.44 (0.37)	0.37 (−1.00)*	1.08 (0.07)	0.99 (−0.01)
<i>School security measures</i>				
Teachers trained in safety by security personnel	0.93 (−0.08)	0.97 (−0.03)	1.53 (0.43)*	1.41 (0.34)**
Access controlled doors	2.01 (0.73)*	0.14 (−1.94)*	1.03 (0.03)	2.30 (0.83)*
Use of security cameras	2.03 (0.71)*	1.08 (0.08)	0.89 (−0.12)	1.75 (0.56)*
Use of metal detectors	1.53 (0.42)	0.78 (−0.26)	0.93 (−0.07)	0.52 (−0.66)
School has plan for shooting incident	2.76 (1.02)*	10.43 (2.35)*	0.70 (−0.35)	0.77 (−0.26)
School has hotline for reporting trouble	0.95 (−0.05)	0.70 (−0.36)	1.40 (0.34)*	1.41 (0.34)**
<i>School characteristics</i>				
Number of gang crimes	1.02 (0.23)*	1.00 (0.02)	1.01 (0.01)	1.08 (0.08)*
Daily/weekly reports of bullying	1.17 (0.16)	1.82 (0.60)*	1.49 (0.40)*	1.79 (0.58)*
Daily/weekly reports of racial tension	2.23 (0.80)*	0.65 (−0.43)	1.29 (0.26)	2.85 (1.05)*
More than 50% of students feel school is important	0.67 (−0.39)**	0.43 (−0.86)*	0.62 (−0.48)*	0.41 (−0.88)*
School in high-crime area	2.93 (1.08)*	3.61 (1.28)*	1.38 (0.32)	1.04 (0.05)
School located in city	2.09 (0.74)*	0.74 (−0.30)	1.65 (0.50)*	2.18 (0.78)*
Likelihood ratio χ^2 (df)	202.46 (18)*	506.89 (18)*	122.00 (18)*	247.34 (18)*

Note: * $p < 0.05$; ** $p < 0.10$

Table III. Preventing school violence negative binomial regression results for attack with weapon, and gun possession

associated with attacks with a weapon in other grade levels ($b = -0.58, p < 0.05$). There was only one statistically significant finding for high schools and law enforcement. The number of security guards in the school was positively associated with increased reports of attack with weapon, which was also the case for other grade levels. Interestingly, the presence of security armed with a Taser was associated with a lower incidence of an attack with weapon in other grade levels ($b = -1.0, p < 0.05$). For school security measures, access controlled doors, the use of security cameras, and plan for school shooting incident were all positively associated with increased reports of an attack with weapon for high schools. Although access controlled doors was positively associated with weapon attacks in high schools, other grade-level schools that employed access controlled doors experienced significantly fewer incidences of attack with weapon ($b = -1.94, p < 0.05$). Schools at both grade levels with a plan for a shooting incident experienced higher incidences of attack with weapon. Among the school characteristics, five of the six variables for high schools were statistically

significant. The number of gang crimes, daily/weekly reports of racial tension, and school location were positively associated with higher reports of attack with weapon. Other grade-level schools with daily/weekly reports of bullying and those located in a high-crime area had higher incidences of attack with weapon. Again the consistent school characteristic that was associated with lower incidences of violence in both high schools and other grade levels was if more than 50 percent of the students feel school is important ($b = -0.39, p < 0.10$) and ($b = -0.86, p < 0.05$), respectively.

The final dependent variable, gun possession, may be the most politically charged measure included in the present research given the current fervor over school gun violence. Intriguingly, the number of SROs had different effects on gun possession by grade level, as they were positively associated with higher reports of gun possession in high schools but negatively associated with reported gun possession in other grade levels ($b = -0.99, p < 0.05$). The number of security guards and guards in uniform were significantly associated with higher incidents of gun possession in high schools, although the number of guards in uniform was negatively related with gun possession in other grade levels. Only one of the armed guardian variables was statistically significant in this model it may be the most controversial finding. Other grade-level schools where there was armed security (firearms) had significantly lower incidences of gun possession ($b = -0.73, p < 0.05$). Among the school security measures, having teachers trained in safety by security personnel and having a hotline for reporting trouble were positively and significantly associated with gun possession in both high schools and other grade levels. In addition, other grade-level schools that employed access controlled doors and used security cameras had significantly higher incidences of gun possession.

Among the school characteristic variables, schools that had daily/weekly reports of bullying, and were located in the city had higher occurrences of gun possession for both grade levels. The number of gang crimes and daily/weekly reports of racial tension were also positively associated with gun possession in other grade levels. Again, the one school characteristic that was significantly associated with lower frequencies of gun possession was if more than 50 percent of the students feel school is important, in both high schools ($b = -0.48, p < 0.05$), and other grade levels ($b = -0.41, p < 0.05$).

Discussion

Given the intense media focus on school shootings in the USA, school administrators, parents, and politicians have all called for actions to keep schools safe. This mission can be accomplished in a variety ways, yet existing research has yielded mixed results on the most effective approaches to school safety. A popular tactic for improving school safety is increasing the number of guardians in the form of law enforcement and security. While some prior research has suggested that SROs have a mitigating effect on crime and violence, the current research demonstrates this might be dependent upon grade level and the type of crime or violence the school is trying to address. The effectiveness of a law enforcement presence had different results in high schools compared to other grade levels. The number of SROs was negatively and significantly associated with lower incidences of attack with weapon and gun possession in other grade levels, but not in high schools. In addition, other grade-level schools that had guards in uniform had a lower occurrence of gun possession, but high schools with guards in uniform had significantly higher incidences of gun possession. In general, 15 of the 24 results revealed that a security presence was positively associated with the measures of violence in this study. This may appear to be a counterproductive result,

but perhaps it is reflective of schools that are already troubled and have employed security personnel in an attempt to solve crime-related problems.

The most controversial security measures of interest for this study involves having an armed presence in the school. There were four armed guardian variables that were negatively associated with the reported measures of violence. Only one of the armed guardian variables was statistically significant for high schools, that was in schools where security was armed with OC spray threatened weapon attacks were significantly lower. Two of the three remaining significant findings were for other grade-level schools where security armed with Tasers was negatively associated with both threatened and actual weapon attacks. One of the most intriguing findings was for other grade-level schools where security possessed firearms. These schools had significantly lower reports of gun possession. As noted in the literature review, there are very few studies on the deterrent effect of armed personnel on school campuses. While our findings are largely consistent with Jennings *et al.* (2011) in that schools with armed personnel typically had a higher incidence of reported violence, the current research findings further illustrate the complexity of school security and the importance of examining safety efforts by grade level and type of violence. While it may seem logical that an armed security presence would deter violence, our findings suggest a more precise application of guardians is needed, and one that may be dependent upon the grade level. It is possible that armed security and other law enforcement measures play an indirect role on school safety such as influencing risk perception and reducing fear of crime among students and staff, as it appears to do in other grade levels. Perceptions of safety and deterrence are subjective measures and are not captured in the current data.

Despite being widely used in many schools districts in the USA, school security measures provided mixed results in the present study. Some of our findings suggest that such measures are associated with increased levels of violence. For instance, having teachers trained in safety by security personnel, a plan for shooting incidents, and the use of security cameras were associated with increased reports of various types of school violence. These results seem logical as perhaps they reflect attempts by administrators and law enforcement to gain control within problematic schools. Contrary to existing research which suggests a limited impact of target hardening measures, the present study found that access controlled doors was associated with a lower incidence of threatened weapon attacks in both grade levels, and weapon attacks in other grade levels.

School characteristics provided some of the most consistent statistically significant findings and provided a helpful context for better understanding school violence. Reports of bullying, schools being located in a high-crime area or a city, gang crimes, and schools experiencing racial tension were all positively related to the different measures of school violence. These results were not surprising. For example, the literature suggests that bullying and racial tensions generate opportunities and exposure to victimization, and opportunities to socialize with delinquent peers (e.g. Tillyer *et al.*, 2011; Augustine *et al.*, 2002). Only one school characteristic yielded consistent negative results or was associated with a lower incidence of violence in schools. With the exception of high schools and reports of serious violence, both high schools and other grade-level schools in which more than 50 percent of students feel school is important experienced lower incidences of all forms of violence examined in the present study. These findings were supported by the literature, most notably Schreck *et al.* (2003) who found that alienation or lack of student involvement might

lead to victimization. Furthermore, studies have also shown that commitment and belief in school, particularly the rules as a means of protection, may lower victimization (Burrow and Apel, 2008).

Limitations and policy implications

There are several possible policy implications that can be taken from the current research, yet there are limitations that must be acknowledged to contextualize our findings. The survey is based on school administrator reports, which may impact both the dependent and independent variables. For example, schools may have different policies regarding recording crimes on campus and some incidents may be handled unofficially, thus leaving no record. There is also an issue with causality and timeline. The survey does not address whether the security measures were implemented due to violent episodes that have occurred, because of fear that these incidents may appear on campus, or at what point during the school year the measures were introduced. Further, without detailed information from each school the data used in the present study cannot capture the rigor and efficiency in which the crime prevention and safety programs were operated.

There is a special consideration that must be addressed for having an armed presence on campus. The policy suggestions of having armed personnel on campus range from the standard of having trained police and security officers to the most controversial of allowing teachers to carry concealed weapons. While a small number of schools have taken steps to arm teachers this was not assessed in the current data. Overall, the current results suggest there may be a small deterrent effect of security armed with less than lethal weapons on campus, but this was not universal across grade levels and measures of violence. There was only one significant negative association between firearms and gun possession, which illustrates the importance of examining grade level in research on school security and the caution that should guide implementing an armed presence in schools. However, concealed weapons among staff may yield different findings. Should the policy of arming staff become more prevalent in the USA, future research assessment will be needed.

We must also use caution with the generalizability of the present findings. Our findings are largely consistent with prior research on safety and crime prevention on campus, though the effectiveness of each measure may vary greatly across jurisdictions, regions, and grade levels. Nonetheless, our findings offer practical guidance for policies that may make schools safer.

Conclusion

As school shootings and other forms of school violence persist, many members of society are typically left upset and searching for solutions. There are many facets to security and safety measures in a school setting, and districts have implemented numerous procedures ranging from the typical target hardening practices of secured access to the extreme measures of having armed personnel. The present study examined the effects of various school crime and violence prevention methods including law enforcement security measures, school security measures, and school characteristics, and identified notable differences in the results of safety practices by grade levels. It is hoped that these findings inform future policy decisions and offer guidance for future research. It should be noted that one size does not fit all when it comes to security, for instance there may be differences in the perception of protection,

or the actual deterrence offered by security tactics by grade level and student age. While the law enforcement measures and the presence of armed guardians had mixed results in this study, there clearly is a role for both to improve campus safety. The variation by grade level is an important finding for future policy-making and consideration of how to best ensure safer schools.

The calls for action in the wake of a high-profile act of violence on a school campus typically focus on technical solutions, including enhanced surveillance, entry control, or dispatching more officers in school hallways. While simple solutions are attractive as they may be implemented quickly, the present findings suggest they may not have the desired benefits, and the search for solutions may be focussed on the wrong areas. Results from the present study noted that school characteristics were generally consistent and important predictors of the very crimes and acts of violence that concerned citizens wish to prevent, and it appears that having students believe school is important is perhaps the most effective means to reduce school violence.

Racial tension, bullying, and high-crime areas are larger societal problems that replicate themselves on school campuses. While there may not be easy solutions to these issues in society, dealing with these problems within the confines of a campus may be better starting points for intervention than ramping up technical security measures. These contextual findings suggest a larger societal-level approach to dealing with school violence may be warranted. Violence on school grounds should not be viewed as being isolated from violence and other forms of crime in the community. Too often, policies are focussed on creating a safe haven on campus while ignoring the larger community context. Attempting to reduce conflict, create mediation programs, and establish anti-bullying strategies both on and off campus may all prove beneficial and could be a more effective use of school and law enforcement resources. Our findings suggest reducing violence on campus is possible and there are promising efforts worth pursuing, but it is not a simple task. While policing and guardians may be a part of the solution, ultimately, we would not suggest making law enforcement or armed security the centerpiece of school safety policy. The mixed findings with some security measures and the consistent predictors of context point to solutions that should be more universal in nature.

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