School shootings: Making sense of the senseless

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A R T I C L E I N F O	**A B S T R A C T**
	School shootings have altered the patina of seclusion and safety that once characterized public and higher education. Callous and brutal, school shootings seem to make no sense. However, case comparisons and anecdotal reports are beginning to show patterns that provide clues for understanding both the individual factors motivating shooting events and the characteristics of schools where shootings have occurred. We describe these factors and characteristics as the bases for six prevention strategies: (a) strengthening school attachment, (b) reducing social aggression, (c) breaking down codes of silence, (d) establishing screening and intervention protocols for troubled and rejected students, (e) bolstering human and physical security, and (6) increasing communication within educational facilities and between educational facilities and local resources. © 2009 Elsevier Ltd. All rights reserved.

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1. Introduction

Shootings at Columbine High School in Littleton, Colorado, at Westside Middle School in Jonesboro, Arkansas, at an Amish school in Nickel Mines, Pennsylvania, and at dozens of other elementary, middle, and high schools across the country have shaken a fundamental belief that children are safe in school. Coupled with incidents in 2007 at Virginia Polytechnic Institute and State University (hereafter Virginia Tech), where 32 students were killed, and in 2008 at Northern Illinois University in Dekalb, Illinois, where five students died, shootings in educational settings have galvanized media attention. Once thought to be profoundly safe places, schools and universities must now consider the unthinkable — that someone might enter campus and attempt to harm students and faculty.

School shootings are not new phenomena. They date back to at least 1974, when an 18-year-old honor student set off his school's fire alarm and then shot at the janitors and firefighters who responded to the alarm (Vossekuil, Fein, Reddy, Borum, & Modzeleski, 2002). Although rates of school violence declined steadily in the 1990s, several highly publicized school shootings, involving multiple homicides in both public and higher education settings, have raised concerns that current procedures may be insufficient to ensure the safety of school and university environments.

The purpose of this paper is to examine the nature of school shootings, an extreme form of school violence. We place emphasis on public secondary education but, where possible, we draw inferences to shootings in higher education. We discuss the individual characteristics of perpetrators and the vulnerabilities of schools where shootings have occurred. The paper concludes by reviewing plausible prevention strategies.

1.1. The prevalence of school shootings

The School-Associated Violent Deaths Study (SAVD) conducted by the Centers for Disease Control reports that between 1992 and 2006, rates of school homicides involving a single victim decreased, while rates of school homicides involving more than one victim (multiple-victim homicides) remained stable (Centers for Disease Control [CDC], 2008). Other studies report similar declines in single-victim incidents, but note that there was an increase in multiple-victim incidents between 1992 and 1999 (Anderson et al., 2001; Department of Health and Human Services [DHHS], 2001). The SAVD study found that during the period from July 1999 to June 2006, 116 students were killed in 109 school-associated events. Of these homicides, 65% included gunshot wounds, and eight involved more than one victim. Seventy-eight percent of these events occurred on an elementary, middle, or high school campus (CDC, 2008). SAVD did not include homicides occurring on college and university campuses. Although data suggest that shootings are no more prevalent today than 10 years ago, recent mass shooting events resulting in many deaths have drawn attention to the possibility of violence in school settings; and they have heightened public concern that students and teachers are especially vulnerable to violent acts (e.g., Kiefer, 2005).

On balance, school shootings are rare occurrences, and, because they have a low prevalence, they are hard to study using the survey and observational methods that characterize much developmental science and criminology. Based largely on retrospective case analyses, and drawing more broadly on theories of aggressive behavior and delinquency, various perspectives on school violence have been advanced to explain shootings. One perspective suggests that violent messages in popular songs, video games, television shows, and movies increase aggressive behavior, reduce normative constraints, and promote violence (Anderson & Bushman, 2001; Newman, 2004; Robinson, Wilde, Navracruz, Farish Haydel, & Varady, 2001). Another perspective focuses on the intersection of developmental risk factors for aggressive behavior and school environments where policies and practices create—often inadvertently—social dynamics that reinforce exclusion and hostility (Farmer, Farmer, Estell, & Hutchins, 2007; Hyman & Perone, 1998; Thompson & Kyle, 2005). Still other perspectives based on social learning and deviancy training theories argue that media coverage of high profile shooting incidents, such as Columbine and Virginia Tech, creates a contagion effect, stimulating those at risk of perpetrating a school shooting to imitate the actions of other school shooters (Newman, 2004; O'Toole, 2000). Thus, because shootings are low-frequency phenomena, understanding them is often placed in the theoretical context of more prevalent forms of violence.

To be sure, violence in schools is usually defined more than school shootings. During the 2005–2006 academic year (AY), 78% of public schools experienced one or more violent incidents, with 17% experiencing one or more serious violent incidents. Serious violent incidents include rape, sexual battery other than rape, physical attack or fight with a weapon, threat of physical attack with a weapon, and robbery with or without a weapon (U.S. Department of Education, 2007). In a recent report, 6% percent of students ages 12 to 18 years reported that they were afraid of either being attacked at school or on the way to and from school (CDC, 2005a). Fear is more prevalent among younger, urban, and minority students (Cully, Conkling, Emshoff, Blakely, & Gorman, 2006). Often used as an indicator of the risk for school violence, the percentage of students who carry any weapon to school, including guns, increased from 17.1% to 18.5% in 2005 (CDC, 2005b); however, during the same year, students who carried a gun to school decreased from 6.1% to 5.4% (CDC, 2005a). These data included students who carried weapons for self-protection. Therefore, although carrying a weapon poses a greater risk for violence, it may not represent intent to victimize others.

Even though school violence is not rare, acts of serious violence in schools, such as shootings, are infrequent and the risk of violent victimization appears to be decreasing (DeVoe, Peter, Noonan, Snyder, & Baum, 2005). In the AY 1999–2000, 20% of students reported experiencing a serious violent incident (U.S. Department of Education, 2005) compared to 17% in AY 2005–2006 (U.S. Department of Education, 2007). The odds that a high-school student will be a victim of homicide or commit suicide in school are no greater than 1 in 1 million (Vossekuil et al., 2002), and school-related homicides comprise only 1% of all homicides in the United States (CDC, 2006). However, although shootings are statistically rare, polls report that more than 50% of parents with school-age children and 75% of high-school students believe that a school shooting could happen in their communities (e.g., Juvonen, 2001; Kiefer, 2005).

2. Following Columbine

Following the tragedy at Columbine High School in 1999, the U.S. Secret Service and U.S. Department of Education commissioned the Safe School Initiative, a collaborative study that examined 37 shootings occurring in U.S. schools between 1974 and 2000 (Vossekuil et al., 2002). The Safe School final report examined behavioral factors involved in school shootings, and attempted to identify risk factors for

use in efforts toward preempting an attack and strengthening prevention (Vossekuil et al., 2002). An additional report released by the Federal Bureau of Investigation (FBI) focused on the characteristics of perpetrators and assessment of threat (O'Toole, 2000). Both efforts sought to dispel school shooting myths, especially misinformation about the characteristics of school shooters.

These reports suggested that no single risk profile could be used to identify potential school shooters (Vossekuil et al., 2002). Although shooters have some shared characteristics, profiling, the reports argued, would produce many errors. Many more students would fit a putative profile than those at true risk for perpetrating a school shooting, and conversely, some shooters would likely not be identified. For example, a 14-year-old female in Williamsport, Pennsylvania, who shot a classmate during lunch in the cafeteria, would not have been identified as being at risk. Though she was alienated from school, teased by peers, and on medications for depression — all risk factors that elevate the potential for violence — she was not White and male, two risk factors in profiles based on case analyses of the characteristics of shooters.

3. Factors associated with school shootings

Although predicting violence on the basis of individual characteristics is difficult, much has been learned from recent studies of school shootings. Understanding these factors holds the potential to inform the design of school-level prevention programs. At perhaps the simplest plane of analysis, school shootings can be classified by the type of offender. Some shootings, such as those at Westside Middle School and Columbine High School, involve students who act against peers and faculty. However, other shootings have involved adults who used the school as a setting in which to commit violent acts. This was seen in the Amish school shooting in Nickel Mines, Pennsylvania, where a 32-year-old milk truck driver entered a one-room schoolhouse and held five girls hostage, eventually executing them before killing himself. The gunman indicated that his actions were not directly related to the school or to the Amish community, but were motivated instead by a painful incident in his childhood. When adults enter schools and violently victimize students and staff, risk factors differ from incidents that involve student shooters. School and peer factors may influence a student perpetrator, but have little or no bearing on school shootings committed by adults.

Even though shootings committed by students differ from those committed by adults, two risk factors appear to characterize both kinds of events. The first, perpetrators often have had a fascination with weapons and they have all had access to guns. The second is disclosure of assault plans, referred to as *leakage*. The perpetrators of many shootings have provided clues about their plans.

3.1. Access to weapons

All perpetrators of shootings have had ready access to weapons. Shootings could not happen without gun access. When the perpetrator of the Williamsport shooting was asked if she thought that not having access to a gun would have prevented her attack, she replied that having a gun probably contributed (ABC News, 2001). Although limiting gun access would likely not stop those who are committed to an attack, limited access complicates the process and, in many states, brings to bear an added level of scrutiny that may deter a potential shooting.

Funded under the 1993 Brady Handgun Violence Prevention Act, the National Instant Criminal Background Check System (NICS) was created in 1998. The database contains criminal records from all states and mental health records from 22 states. By law, the NICS is to be checked whenever an attempt is made to purchase a weapon from a federal firearms licensee (Federal Bureau of Investigation,

2007). For a potential shooter, the added time required by background checks may promote recovery from a dysregulated (i.e., impaired) mental state and may increase the chances for intervention by peers, parents, or others. However, the NICS is porous and, as in the case of the perpetrator of the Virginia Tech assault, a determined, emotionally regulated killer is likely to find a way to purchase weapons.

3.2. Leakage

School shootings are rarely impulsive. Most school shooters plan their assaults and provide clues or warning signs that they are contemplating an attack (Vossekuil et al., 2002). The perpetrators of the Columbine shooting planned their attack for over a year, during which they gave many warning signs. For example, a story written for an English class by one of the perpetrators described a shooting spree by an assassin in a black trench coat (CBS News, 2001). At Virginia Tech, the violent writings and threatening behavior of the student who ultimately became the shooter prompted an English professor to have him removed from class. More recently, a teenager in Finland killed eight people in an attack on his high school (Cable News Network [CNN], 2007a). Authorities reported that he had posted notes and videos on a public internet video site, referencing the upcoming attack. Leakage is a keystone risk factor for a school shooting, and the CDC (2006b) reports that almost 50% of attackers have given some kind of warning.

4. What is known about school shooters?

Besides access to weapons and leakage of plans, what else is known about school shooters? At the individual level, shooters appear to lack skill in solving social problems. They do not actively cope with adversity and seem to accumulate losses and social failures (O'Toole, 2000). Over time, they develop negative schemata and scripts in which others are perceived as having hostile intent. Feeling rejected and persecuted, they tend to isolate themselves from peers or to associate with other alienated peers (Verlinden, Hersen, & Thomas, 2000). This is a potentially dangerous pattern when coupled with a fascination with weapons, anger at peers, and victimization by bullies or others.

4.1. Fascination with weapons

Among other factors that characterize the perpetrators of school shootings is fascination with guns, bombs, and other explosives. The perpetrators of the violence at Columbine High School appear to have been deeply involved with violent video games and guns. The duo hoarded bombs, explosives, and guns in their homes for a year while they planned their attack. Writings found after the attack contained references to death, violence, superiority, and hate (Meadows, 2006). More recently, acting on a tip from students, police in Plymouth Meeting outside Philadelphia, arrested a 14-year-old dropout who, with his parents' assistance, had amassed swords, pistols, a 9 mm semiautomatic rifle, grenades, bomb-instructional manuals, black powder used in bomb making, and videos of the Columbine attack. According to reports, his anger and alienation were conjoined with plans to attack his former school, and his parents' angst over their son's school failures appear to have produced poor decisions in trying to indulge his fantasies (though his parents did not know of his plans to attack his school; Chernoff & Vitagliano, 2007).

4.2. Depression, anger, and suicidal ideation

Research on school shooters has shown several commonalities in temperament, including poor control of anger, lack of empathy, and a

combined sense of persecution, righteous indignation, and super-iority (O'Toole, 2000; Verlinden et al., 2000). Many school shooters have evidenced symptoms of depression and thoughts of suicide. Indeed, Vossekuil et al. (2002) reported that three-fourths of attackers had indicated thoughts of suicide or attempts at suicide before the attack. In addition, in at least 12 shooting events since 1996, shooters have ended attacks with suicide (Pearson Education, 2006).

4.3. Rejection by peers and failed relationships

Rejection by peers may weakly predict violent behavior, including school shootings. Studies show that peer rejection is a developmental correlate of anxiety, depression, aggression, antisocial behavior, and other poor adolescent outcomes (Dodge et al., 2003; Nansel et al., 2001, Nansel et al., 2004). For example, Dodge et al. (2003) found that peer rejection in elementary school interacts with aggressive behavior to exacerbate antisocial behavior. In addition to rejection by peers, the dissolution of romantic relationships—a form of peer rejection—is correlated with depression and loneliness (La Greca & Harrison, 2005). Retrospective case analyses have identified failed peer relationships and humiliation as precursors of many shooting events (O'Toole, 2000; Verlinden et al., 2000). Indeed, three-quarters of shooters studied in the Safe School Initiative experienced some form of peer rejection (Vossekuil et al., 2002), including romantic break-ups. Leary, Kowalski, Smith, and Phillips (2003) conducted case studies of 15 school shootings that occurred between 1995 and 2001. In 46% of the cases, shooters experienced recent rejection in the form of a dissolved romantic relationship or unrequited love. In half of these cases, the victims of shootings were those who rejected the perpetrator (Leary et al., 2003). To be sure, peer rejection and failed romances are common in adolescence. However, for some high-risk adolescents, experiencing acute rejection may exacerbate an existing problem or contribute to a threshold effect after which normative functioning is compromised.

4.4. Victimization by peers

Overall, student perpetrators tend to have lower social status with peers, and they are more likely to have been victimized by peers. That is, more than being passively rejected or ignored by peers, they have been teased, taunted, or bullied. The Safe School Initiative found that 71% of attackers had experienced bullying and harassment (Vossekuil et al., 2002). In a media interview one month after she shot a classmate, one teen perpetrator claimed she had been taunted and teased by classmates in a previous public school. After her parents removed her from that school, the teasing continued at her new school and may have precipitated the shooting (ABC News, 2001). Leary et al. (2003) found that in 12 out of 15 shooting incidents, perpetrators had been the victims of some form of teasing, ostracism, or rejection by peers. In a similar case study, Verlinden et al. (2000) found that across nine school shooting incidents, all perpetrators had experienced some form of teasing or felt isolated and marginalized by peers.

Although peer victimization is widely reported as a risk factor for many kinds of antisocial behavior, the relative importance of peer victimization in school shootings is unclear (Cully et al., 2006; Dodge et al., 2003; Leary et al., 2003; Verlinden et al., 2000). A specific event could trigger a shooting. On the other hand, because peer victimization is widespread in schools (Nansel, Overpeck, Haynie, Ruan, & Scheidt, 2003; Nansel et al., 2004), peer victimization is probably best thought of as significant contextual risk that elevates alienation and anger. It appears that adolescents who lack capacity to negotiate peer conflicts or to rebound from peer-related traumas may be at greater risk. Thus, if peer victimization functions to elevate risk, it marks high risk school social dynamics that

probably operate in combination with many other risk factors (Farmer et al., 2007).

5. What is known about the schools?

School conditions also appear correlated with shootings. Shootings appear more likely in schools characterized by a high degree of social stratification, low bonding and attachment between teachers and students, and few opportunities for involvement. High risk school cultures are unresponsive to the needs of students, provide rewards and recognition for only an elite few, and create social dynamics that promote disrespectful behavior, bullying, and peer harassment (O'Toole, 2000).

5.1. School bonding

In nearly all school shootings, perpetrators appear to have felt little attachment to their schools, teachers, or peers. School attachment and bonding are often found to predict developmental outcomes. For example, Catalano, Haggerty, Oesterle, Fleming, and Hawkins (2004) found that school bonding, defined as having close attachments to those at school and feeling invested in school, resulted in higher academic achievement and lower incidence of substance use, high risk sexual behavior, and violence. Large and highly socially stratified schools, with hierarchies of students where prestige accrues princi-pally to an in-group, may be at greatest risk. School size can also affect level of connectedness or bonding. Schools that are larger in size face special challenges in engaging students and sustaining a climate that encourages attachment and bonding (Wilson, 2004).

5.2. Codes of silence

Changing a school's climate to promote school bonding may help to reduce *codes of silence*, a term that refers to an unspoken agreement among students that they should not share information about each other with teachers, administrators, or parents. Codes of silence mark environments where distrust prevails. In schools with codes of silence, students feel little sense of involvement with faculty, and they have little sense that they can affect policies or influence programs. Breaking down codes of silence is imperative in opening lines of communication between students, teachers, and staff about possible threats to safety.

6. Prevention and intervention strategies

In response to recent shootings, government agencies, researchers, policy makers, and school administrators have implemented a variety of programs and policies aimed at reducing the threat of school violence. Graphic media coverage combined with the shocking nature of shootings have created a climate of heightened awareness among parents, teachers, and students. Many prevention and intervention strategies—some controversial—have resulted from this wide-spread public concern. For example, one school district in Burleson, Texas implemented its own "counter attack" plan. The district adopted a policy of teaching students to fight back in the event of a shooting. The school district trained students to throw books, pencils, and chairs at an armed intruder (Von Fremd, 2003). After public concern about the strategy, the school district has since changed its policy and no longer implements the training ("Burleson Changes Stance," 2006). In the same vein, however, a bill introduced by a Wisconsin legislator proposed to allow teachers to keep concealed weapons in the classroom (Lasee, 2006). The proposal received only a lukewarm response. Though controversial, these responses illustrate the degree of alarm and the willingness of school districts to consider a broad range of prevention strategies.

School shootings engender deep public concern. They violate strongly held cross-cultural beliefs about the sanctity of childhood and

the obligation of society to protect children from harm. Though shootings are so rare as to make testing alternative prevention strategies very difficult, two main prevention and intervention approaches are beginning to emerge from case studies and discourse among experts. The first aims to influence facility security, create changes in the vulnerability of facilities to intrusion, and to increase the capacity to respond at the moment of threat. The second seeks to transform the school climate and increase school attachment and bonding (Cully et al., 2006).

6.1. Interventions to strengthen security

A disturbing feature of school shootings is that sometimes heavily armed students have succeeded in carrying into schools undetected guns, ammunition, and explosives. As a result, increasing security and limiting access are often identified as high priorities in deterring school violence. Many schools limit access and egress, and many conduct routine or random searches of school bags and lockers. Some schools have installed metal detectors, although these efforts are more common in large, urban schools (Juvonen, 2001). Recent reductions in the numbers of students who carry guns to school (CDC, 2005a) may be a reflection of these changes.

In addition, the introduction of police in the role of school resource officers (SROs) into the school environment is a related effort to increase deterrence; to provide the capability of responding quickly to crises; and to afford a visible sense of security to students, teachers, staff, and parents. At the same time, the activities of SROs are often focused on increasing bonding at schools. Although the presence of a uniformed police officer may help to create a sense of safety at school, it is unknown whether an officer's presence may also contribute to an atmosphere of fear, which could adversely affect the school climate (Juvonen, 2001). Most schools appear to regard SROs as contributing to security, and in at least one instance (Orange High School in Hillsborough, North Carolina) a SRO was credited with disarming a shooter before major injuries occurred (Rocha, 2006).

Complementing changes in the ease of access to schools and the growing presence of SROs, many school districts have adopted policies that concomitantly reinforce prosocial behavior and provide added resources for needy or disruptive students. These policies range from anti-bullying and dress code policies to referral and support for youths who are alienated or victimized. Such policy changes also include an expanded use of suspension or expulsion. Many school districts have developed magnet, alternative, and charter schools that offer educational programs for youths who cannot benefit from routine classroom settings (Quinn, Poirier, Faller, Gable, & Tonelson, 2006). The impact of these programs on school violence is unclear but they provide an additional resource for students.

6.2. Interventions to strengthen the school climate

Interventions aimed at increasing school bonding and connectedness focus on fostering trust between staff and students, increasing student involvement, and eliminating social stratification. Activities often center on reducing peer rejection, strengthening school attachment, and breaking down codes of silence. Although these programs take different forms, they typically include school policies that promote participation in extracurricular activities, rules prohibiting bullying and other forms of social aggression, and protocols for training students and teachers in problem-solving methods to promote conflict resolution. The latter may include programs to mediate disputes among peers, to strengthen social skills, and to promote social or character development. Examples of these programs include *Second Step* (Frey, Nolen, Edstrom, & Hirschstein, 2005), the *Seattle Social Development Project* (Catalano et al., 2004), and *Responding in Peaceful and Positive Ways* (Farrell, Meyer, & Daulberg, 1996).

6.2.1. Second Step

The *Second Step* program uses group modeling, anger management, and group discussion to increase students' social competence, decision-making ability, goal setting, and empathy levels. The program is designed for preschool through middle-school students and is implemented through the classroom (Committee for Children, 2007). Lessons are based on interpersonal situations and include presentation of photographic images depicting specific social situations. Trained facilitators or teachers then guide discussion related to the situation. The program provides training for teachers in administering the program, and both the content and number of lessons are adjusted for student age.

The Committee for Children and the University of Washington collaborated on a 2-year study to assess the effectiveness of *Second Step* in a sample of 15 schools that involved a total of 1253 students in eight intervention schools and seven control schools. The results indicated that students who participated in *Second Step* were 42% less aggressive and 37% more likely to choose positive social goals as compared to their counterparts in the control group schools. Moreover, *Second Step* participants required 41% less adult intervention in minor conflicts, and showed 78% greater improvement in teacher ratings of social competence (Frey et al., 2005). An independent study of the *Second Step* program and five other social and character education programs is currently funded by the U.S. Department of Education, Institute of Education Sciences.

6.2.2. Seattle Social Development Project

The *Seattle Social Development Project* (SSDP) is one of the first elementary-school delinquency prevention projects. A longitudinal research study, SSDP began in 1981. The purpose of the project was to reduce the risk factors that contribute to delinquency and drug use. Classroom based, SSDP promoted social competence, prosocial behavior, and school bonding (Catalano et al., 2004). A longitudinal follow-up study of 605 participants found that, when compared with nonparticipants, SSDP participants who received the full intervention program functioned significantly better on 7 of 8 work and school outcomes: (a) constructive engagement at school or work; (b) high school completion; (c) 2 years or more of college; (d) school integration; (e) employment status; (f) job responsibility; (g) total years at present job; and (h) constructive self-efficacy. Moreover, SSDP participants reported better regulation of emotions and fewer symptoms of social phobia and suicidal thoughts (Hawkins, Kosterman, Catalano, Hill, & Abbott, 2005; Hawkins et al., 2007).

6.2.3. Responding in Peaceful and Positive Ways

The classroom-based *Responding in Peaceful and Positive Ways* (RIPP) program focuses on teaching conflict resolution skills. The problem-solving curriculum was delivered over 3 years to middle-school youth (grades 6, 7, and 8). RIPP curriculum centers on stereotypes, beliefs, attributions, and scripts that contribute to violence (Farrell et al., 1996; Farrell, Meyer, & White, 2001). In the Richmond, Virginia public school system, a sample of 626 sixth graders from three regular education classrooms were randomly assigned into either a treatment condition that received RIPP or comparison (no treatment) condition. The majority of the sample was African American (96%), and both conditions had equal numbers of boys and girls. Compared to students who received RIPP, students in the comparison group were 4.9 times more likely to have an in-school suspension and 2.5 times more likely to have a fight-related injury. Students in the intervention group showed greater knowledge of problem-solving skills (adjusted means = 8.9 vs. 7.0, $p < .001$; Farrell et al., 2001).

A variety of other programs use similar approaches including *FAST Track* (Conduct Problems Prevention Research Group [CPPRG], 2002, 2006, 2007); *PATHS* (Kam, Greenberg, & Kusche, 2004); *Making Choices* (Fraser et al., 2005); and *Life Skills* (Botvin, Griffin, & Nichols, 2006), and have evidence supporting their effectiveness.

Some of these programs involve complex teacher, parent, and school-level elements that require extensive organizational commitments. Other programs are classroom-based curricula that may be adopted by teachers as a part of routine instruction. These classroom-based programs tend to require minimal parent involvement and they have lower school burden. Though they may be as effective as more comprehensive programs (Wilson & Lipsey, 2007), their long-term effects are less certain. The multilayered, more complex programs, such as SSDP, *FAST Track*, and *Life Skills,* have been shown to affect distal outcomes in adolescence and young adulthood (Botvin et al., 2006; CPPRG, 2007; Hawkins et al., 2007). However, although many programs have shown efficacy in reducing aggressive behavior and delinquency, no program effect has been demonstrated effective on relatively rarely occurring events such as school shootings or bombings.

7. Discussion

More is known about school shootings in which the shooter is a student rather than an adult exploiting the vulnerability of the school setting. On balance, adult shooters appear to select a school as a convenient setting in which to commit mass violence. Much of the emerging knowledge about shootings is derived from case studies of shooting events and, because shootings in which a student is the perpetrator are more frequent, we are beginning to make sense of these seemingly nonsensical events.

This emerging body of research, which is primarily characterized by case studies, case comparison, and anecdotal media reports, has given rise to an overarching strategy. As a first step, risk factors that are subject to change by altering conditions and processes within schools and neighborhoods must be identified. Once identified, the second step involves matching these risk factors to procedures designed to affect change, such as strategies that alter school ingress and egress, routines that formalize referral protocols with local mental health authorities with expertise in working with potentially violent students, and processes that open the lines of communication among students, teachers, administrators, and parents. These strategies should be based on the best information currently available and grounded in the literature of prevention science.

A number of malleable risk factors have been identified. Risk factors at the student level include alienation from school, rejection and victimization by peers, access to guns, practicing with guns, and leakage of plans. Furthermore, these individual level factors themselves have known predictors. For example, poor social problem-solving skills is predictive of relational problems with peers, low school involvement is related to alienation, and exposure to violent media is related to views about the use of weapons to resolve disputes (Cauffman, Feldman, Waterman, & Steiner, 1998; Moore, Petrie, Braga, & McLaughlin, 2003; Nansel et al., 2003; Rudatsikira, Singh, Job, & Knutsen, 2007). Risk factors that have been identified at the school level include high social stratification; low school bonding; inconsistent rule enforcement; poor security (including monitoring and communication); norms supporting social aggression (including bullying); and ill-defined response systems (including procedures for teachers who are alarmed by the behavior or work of students). Similar to the process used in the Communities That Care Prevention Operating System (Catalano, 2007), a process of identifying risks and matching those risks to discrete interventions is recommended. This process should produce a multi level response, including collaboration among educational, juvenile justice, and mental health authorities.

7.1. Six strategies to address malleable risk factors

From the literature, six strategies have emerged that could reduce the vulnerability of schools to a shooting event: (a) strengthening

school attachment; (b) reducing social aggression; (c) breaking down codes of silence; (d) establishing resources (e.g., screening, assessment, and intervention) for troubled and rejected students; (e) increasing security; and (f) bolstering communications within the school and between the school and community agencies. If implemented successfully, programs based on these six strategies are likely to reduce social stratification, increase school bonding, and provide early intervention to ostracized and angry students who, if exposed to other risk factors, may have a higher likelihood of violence. However, these six strategies are likely to affect student shooters more than adult shooters, for whom the central school-based deterrent may only be the physical security of a potential target.

7.1.1. Strengthening school attachment

Strengthening school attachment entails increasing the investment of students and staff in the school community. No shooting has involved a student who was attached and committed to school. Large, academically competitive schools with high levels of social stratification appear to be especially vulnerable to poor school attachment. Developing curricular and extracurricular programs with wide participation by students contributes to a sense of belonging, which, in turn, decreases alienation and reduces hostility that can motivate individuals' depression and anger.

7.1.2. Reducing social aggression

Unlike physical aggression, social aggression (e.g., teasing, taunting, humiliation, and bullying) has curried less attention in prevention efforts. However, research suggests that social aggression is an important predictor of developmental outcomes for both victims and perpetrators (Crick & Grotpeter, 1995; Galen & Underwood, 1997; La Greca & Harrison, 2005; Rudatsikira et al., 2007). The impact of social aggression is easily underestimated because of its covert nature. Although social aggression is clearly related to low school attachment, high social stratification, peer rejection, and peer victimization, the question of how to change these social dynamical patterns of aggression remains unanswered.

Some social skills training programs, such as *Making Choices*, have demonstrated positive effects on social aggression in elementary-school students (Fraser et al., 2005), and bullying preventions programs appear to produce positive effects on social aggression in middle- and high-school students (Orpinas & Horne, 2006). Though teachers may witness socially aggressive behavior in the classroom, social aggression occurs more often in informal settings where teachers are not present. Social and character development programs that more broadly address norms for peer relations and expectations for peer-related behavior may offer promise.

7.1.3. Breaking down codes of silence

Codes of silence not only provide protection for potential shooters but also characterize school climates of mistrust. Students are more likely to report concerns about fellow students if (a) a school provides an anonymous mechanism for voicing concerns, (b) students' concerns produce visible action, and (c) disclosures are treated discreetly.

7.1.4. Establishing resources for troubled and rejected students

A concerted effort is needed to address the social and emotional needs of students. Community mental health systems need to work closely with schools to develop protocols for assessing the mental health needs of students, especially those that show evidence of suicidal ideation, depression, and anger. Establishing routine and emergency modes of communication — especially high priority referral protocols — could reduce the likelihood of students falling between the cracks and acting out against the school. Ethical and legal considerations (e.g., what constitutes a breach of confidentiality, and when is that breach necessary) should be clarified in

advance and in writing by schools and mental health agencies. Collaboration among mental health agencies and school personnel can provide students with the resources they need to stay involved in the school environment.

7.1.5. Increasing security

Increasing security by adding to human resources or altering the physical environment can reduce vulnerability and enhance connectedness. Although there are no systematic evaluations of the effects of SROs, anecdotal evidence has suggested that "target hardening" strategies such as altering ingress and egress, installing metal detectors, and increasing security alters perceptions of the threat of detection and produces a deterrent effect. In addition, increasing the human resources dedicated to security may have an indirect effect on vulnerability. As a symbolic representation of school commitment to safety, the presence of a SRO may increase confidence and decrease feelings of vulnerability for teachers, students, and parents (Finn, 2006). This increased perception of school security, in turn, has the potential to bolster school attachment and promote breaking down codes of silence.

7.1.6. Increasing communications within school and between the school and agencies

Because most school shooters leak information prior to an attack, increasing communication within the school and the school community may provide authorities with sufficient early warning to save lives. In the event of an attack, rapid communication can assist in instructing students to take cover or to evacuate safely to secure campus locations. In addition, effective communication may help to identify the location of an attacker and to disrupt a developing event. Ideally, two-way communication is needed but even one-way communication may be effective. For example, during a recent school shooting in a Cleveland high school, the principal used the school intercom to announce a "code blue," meaning that the school was under attack. Students hearing the announcement were able to avoid the shooter by taking cover (CNN, 2007b).

The increased accessibility and use of text messaging via cell phones may also provide a venue to quickly alert the school community of a possible shooting. Mass text message alert systems are under consideration by many colleges and universities in which a large percentage of students, teachers, and administrators own personal cell phones, most with text messaging capabilities. Utilizing a line of communication that is already normative could be a powerful tool in disseminating important lifesaving information.

More broadly, protocols for communicating and assessing threat potential should be established. In universities and high schools, English faculty teach required courses and are often exposed to a majority of students. This interaction allows these faculty unusual opportunities to identify troubled and potentially violent students because essays and compositions can reflect the mental state of the writer. Prior to the Columbine and Virginia Tech shootings, English teachers sought assistance and made referrals that, if properly evaluated, might have averted disasters.

Guidelines should be developed that outline referral and assessment procedures for students whose writings may present leakage or whose class behavior may be alienating or intimidating to either faculty or other students. These guidelines should support teachers in making judgments that must counterbalance privacy and academic freedom with public safety. In addition, the ethical and legal vulnerabilities of teachers who choose not to report need to be described, and an evaluative procedure for assessing teacher referrals should be established. This procedure might, for example, involve discreet and rapid review by a panel of experts from school, juvenile justice, and mental health authorities. Successful implementation depends upon collaboration and creating safe, supportive, and confidential structures for teachers.

8. Making sense of what makes no sense

Fortunately, school shootings are rare events. However, each time one occurs, it displays the unsettling susceptibility of schools and universities to acts of violence. Although events are unique, patterns across events have emerged. From case comparisons, media reports, and expert testimony, we described six strategies to strengthen school bonding, to identify troubled and potentially violent youths, and to respond rapidly in the face of a threat. Much more could be said about rapid response, about Special Weapons and Tactics (SWAT) teams, and about evacuation as efforts to reduce injuries (e.g., Browman, 2001). However, we have focused on the social and psychological conditions that, if addressed, could reduce vulnerability and strengthen school experiences for all children.

References

ABC News. (2001). *Sticks and stones: School shooter explains what drove her to the edge.* Retrieved December 7, 2006, from http://www.antidepressantsfacts.com/2001-03-07-ABC-BethBush.htm.

Anderson, C. A., & Bushman, B. J. (2001). Effects of violent video games on aggressive behavior, aggressive cognition, aggressive affect, physiological arousal, and prosocial behavior: A meta-analytic review of the scientific literature. *Psychological Science, 12*(5), 353—359.

Anderson, M. A., Kaufman, J., Simon, T. R., Barrios, L., Paulozzi, L., Ryan, G., et al. (2001). School-associated violent deaths in the United States, 1994–1999. *Journal of the American Medical Association, 286*, 2695—2702.

Botvin, G., Griffin, K., & Nichols, T. (2006). Preventing youth violence and delinquency through a universal school-based prevention approach. *Prevention Science, 7*, 403—408.

Browman, D. H. (2001). Police adopt 'rapid response' to shootings. *Education Week, 20*, 1—3.

Burleson changes stance on student attack training (2006, October 25). *Dallas Morning News.* Retrieved December 9, 2006. from http://www.dallasnews.com/sharedcontent/dws/dn/latestnews/stories/102606dnmetburleson.736f1085.html.

Cable News Network (2007a). *Finland in mourning after fatal school shooting.* Retrieved November 19, 2007 from http://www.cnn.com/2007/WORLD/europe/11/08/school.shooting/index.html.

Cable News Network (2007b). *Police chief: Teen shoots four, kills self at Cleveland high school.* Retrieved October 11, 2007, from http://www.cnn.com/2007/US/10/10/cleveland.shooting/.

Catalano, R. (2007, August). *Using the research base of prevention science to remove barriers to learning.* Presentation at Office of Safe and Drug Free Schools National Conference, Washington, DC. Retrieved September 27, 2007, from http://depts.washington.edu/sdrg/sdfs8307.pdf.

Catalano, R., Haggerty, K., Oesterle, S., Fleming, C., & Hawkins, J. D. (2004). The importance of bonding to school for healthy development: Findings from the Social Development Research Group. *Journal of School Health, 74*, 252—261.

Cauffman, E., Feldman, S., Waterman, J., & Steiner, H. (1998). Posttraumatic stress disorder among female juvenile offenders. *Journal of the American Academy of Child and Adolescent Psychiatry, 37*, 1209—1216.

CBS News. (2001). *Columbine: Were there warning signs?* Retrieved March 1, 2007, from http://www.cbsnews.com/stories/2001/04/17/60II/main286163.shtml.

Centers for Disease Control and Prevention (2005a). *National Youth Risk Behavior Survey, 1993–2005.* Retrieved November 8, 2006 from http://www.cdc.gov.

Centers for Disease Control and Prevention (2005b). *National Youth Risk Behavior Survey, 1991–2005.* Retrieved November 8, 2006 from http://www.cdc.gov.

Centers for Disease Control and Prevention (2006). *School associated violent deaths.* Retrieved November 8, 2006, from http://www.cdc.gov/ncipc/sch-shooting.htm.

Centers for Disease Control and Prevention (2008). School-associated student homicides—United States, 1992–2006. *Morbidity and Mortality Weekly Report, 57*, 33—36.

Chernoff, A., & Vitagliano, B. (2007, October 12). *Prosecutors: Mom bought weapons for boy.* Retrieved October 15, 2007 from http://www.cnn.com/2007/US/10/12/student.arsenal/index.html?iref=newssearch.

Committee for Children. (2007). *Second Step overview.* Retrieved June 8, 2007, from http://www.cfchildren.org/programs/ssp/overview/.

Conduct Problems Prevention Research Group (2002). The implementation of the Fast Track program: An example of a large-scale prevention science efficacy trial. *Journal of Abnormal Child Psychology, 30*, 1—17.

Conduct Problems Prevention Research Group (2006). Examining clinical judgment in an adaptive intervention design: The Fast Track program. *Journal of Consulting and Clinical Psychology, 74*, 468—481.

Conduct Problems Prevention Research Group (2007). The Fast Track randomized controlled trial to prevent externalizing psychiatric disorders: Findings from grades 3 to 9. *Journal of the American Academy of Child and Adolescent Psychiatry, 46*(10), 1250—1262.

Crick, N. R., & Grotpeter, J. K. (1995). Relational aggression, gender and social–psychological adjustment. *Child Development, 66*, 710—722.

Cully, M., Conkling, M., Emshoff, J., Blakely, C., & Gorman, D. (2006). Environmental and contextual influences on school violence and its prevention. *The Journal of Primary Prevention, 27*, 217—226.

Department of Health and Human Services (2001). *Youth violence: A report of the surgeon general.* Washington, DC: Department of Health and Human Services.

DeVoe, J. F., Peter, K., Noonan, M., Snyder, T. D., & Baum, K., (2005). Indicators of school crime and safety: 2005 (NCES 2006-001/NCJ 210697). U.S. Departments of Education and Justice, Washington, DC: U.S. Government Printing Office. Retrieved November 10, 2006 from http://nces.ed.gov/programs/crimeindicators/crimeindicators2005/.

Dodge, K. A., Lansford, J. E., Burks, V. S., Bates, J. E., Pettit, G. S., Fontaine, R., et al. (2003). Peer rejection and social information-processing factors in the development of aggressive behavior problems in children. *Child Development, 74,* 374–393.

Farmer, T. W., Farmer, E. M. Z., Estell, D. B., & Hutchins, B. C. (2007). The developmental dynamics of aggression and the prevention of school violence. *Journal of Emotional and Behavioral Disorders, 15*(4), 197–208.

Farrell, A. D., Meyer, A., & Daulberg, L. (1996). Richmond youth against violence: A school-based program for urban adolescents. *American Journal of Preventive Medicine, 12*(Suppl.), 13–21.

Farrell, A. D., Meyer, A., & White, K. (2001). Evaluation of Responding in Peaceful and Positive Ways (RIPP), a school-based prevention program for reducing violence among adolescents: A randomized clinical trial. *Journal of Clinical Child Psychology, 30,* 451–463.

Federal Bureau of Investigation (2007). *Response to inquiries on the FBI's National Instant Criminal Background Check System* [Press Release]. Retrieved May 30, 2007, from http://www.fbi.gov/pressrel/pressrel07/nics041907.htm.

Finn, P. (2006, Augustt). School resource officer programs.*FBI Law Enforcement Bulletin, 75*(8), 1–7 Retrieved July15, 2007, from http://www.fbi.gov/publications/leb/2006/august06leb.pdf.

Fraser, M., Galinsky, M., Smokowski, P., Day, S., Terzian, M., Rose, R., et al. (2005). Social information processing skills training to promote social competence and prevent aggressive behavior in the third grade. *Journal of Consulting and Clinical Psychology, 73,* 1045–1055.

Frey, K. S., Nolen, S. B., Edstrom, L. V., & Hirschstein, M. K. (2005). Effects of a school-based social–emotional competence program: Linking children's goals, attributions, and behavior. *Journal of Applied Developmental Psychology, 26,* 171–200.

Galen, B. R., & Underwood, M. K. (1997). A developmental investigation of social aggression among children. *Developmental Psychology, 33,* 589–600.

Hawkins, J. D., Kosterman, R., Catalano, R. F., Hill, K. G., & Abbott, R. D. (2005). Promoting positive adult functioning through social development intervention in childhood: Long-term effects from the Seattle Social Development Project. *Archives of Pediatrics and Adolescent Medicine, 159,* 25–31.

Hawkins, J. D., Smith, B., Hill, K., Kosterman, R., Catalano, R., & Abbott, R. (2007). Promoting social development and preventing health and behavior problems during elementary grades: Results from the Seattle Social Development Project. *Victims & Offenders, 2,* 161–181.

Hyman, I. A., & Perone, D. C. (1998). The other side of school violence: Educator policies and practices that may contribute to student misbehavior. *Journal of School Psychology, 36,* 7–27.

Juvonen, J. (2001). *School violence—Prevalence, fears and prevention. RAND Issue Paper.* Retrieved on December 4, 2006, from http://www.rand.org/pubs/issue_papers/2006/IP219.pdf.

Kam, C. -M., Greenberg, M., & Kusche, C. (2004). Sustained effects of the PATHS curriculum on the social and psychological adjustment of children in special education. *Journal of Emotional and Behavioral Disorders, 12,* 66–78.

Kiefer, H. M. (2005, April 5). *Public: Society powerless to stop school shootings.*: Gallup Poll News Service Retrieved on July 15, 2007, from http://www.gallup.com/poll/15511/Public-Society-Powerless-Stop-School-Shootings.aspx.

La Greca, A., & Harrison, H. (2005). Adolescent peer relations, friendships, and romantic relationships: Do they predict social anxiety and depression? *Journal of Clinical Child and Adolescent Psychology, 34,* 49–61.

Lasee, F. (2006, 0ctober 26). *Lasee's Notes: Sparking an international debate on school safety.* Retrieved on July 15, 2007, from http://franklasee.blogspot.com/2006/10/wisopinioncom-picked-up-my-rebuttal.html.

Leary, M., Kowalski, R., Smith, L., & Phillips, S. (2003). Teasing, rejection, and violence: Case studies of the school shootings. *Aggressive Behavior, 29,* 202–214.

Meadows, S. (2006, July 17). Murder on their minds. *The Columbine killers left a troubling trail of clues* Retrieved March 1, 2007 from http://www.newsweek.com/id/46767.

Moore, M., Petrie, C., Braga, A., & McLaughlin, B. (2003). *Deadly lessons: Understanding lethal school violence.* Washington DC: National Academy Press.

Nansel, T., Craig, W., Overpeck, M., Saluja, G., Ruan, W. J., & Health Behavior in School Aged Children Bullying Analyses Working Group (2004). Cross-national consistency in the relationship between bullying behaviors and psychosocial adjustment. *Archives of Pediatric and Adolescent Medicine, 158,* 730–736.

Nansel, T., Overpeck, M., Haynie, D., Ruan, W. J., & Scheidt, P. (2003). Relationships between bullying and violence among U.S. youth. *Archives of Pediatric and Adolescent Medicine, 157,* 348–353.

Nansel, T. R., Overpeck, M., Pilla, R. S., Ruan, W. J., Simons-Morton, B., & Scheidt, P. (2001). Bullying behaviors among US youth: Prevalence and association with psychosocial adjustment. *Journal of the American Medical Association, 285,* 2094–2100.

Newman, K. (2004). *Rampage: The social roots of school shootings.* New York: Basis Books.

Orpinas, P., & Horne, A. M. (2006). *Bullying prevention: Creating a positive school climate and developing social competence.* Washington, DC: American Psychological Association.

O'Toole, M. (2000). *The school shooter: A threat assessment perspective.*Washington, DC: Federal Bureau of Investigation Retrieved November 29, 2006, from http://www.fbi.gov/publications/school/school2.pdf.

Pearson Education (2006). *A timeline of recent worldwide school shootings.* Retrieved November 30, 2006, from http://www.infoplease.com/ipa/A0777958.html.

Quinn, M., Poirier, J., Faller, S., Gable, R., & Tonelson, S. (2006). An examination of school climate in effective alternative programs. *Preventing School Failure, 51*(1), 11–18.

Robinson, T. N., Wilde, M. L., Navracruz, L. C., Farish Haydel, K., & Varady, A. (2001). Effects of reducing children's television and video game use on aggressive behavior. A randomized controlled trial.. *Archives of Pediatrics and Adolescent Medicine, 155,* 17–23.

Rocha, J. (2006). *School hails two who helped stop gunman.* Retrieved July 14, 2007, from http://www.newsobserver.com/news/crime_safety/castillo/story/490568.html.

Rudatsikira, E., Singh, P., Job, J., & Knutsen, S. (2007). Variables associated with weapon-carrying among young adolescents in Southern California. *Journal of Adolescent Health, 40,* 470–473.

Thompson, S., & Kyle, K. (2005). Understanding mass school shootings: Links between personhood and power in the competitive school environment. *Journal of Primary Prevention, 26,* 419–438.

U.S. Department of Education (2005). Violence in U.S. public schools. *2000 School Survey on Crime and Safety.* Retrieved September 27, 2007, from http://nces.ed.gov/pubs2004/2004314.pdf.

U.S. Department of Education (2007). *Crime, violence, discipline, and safety in U.S. public schools. Findings from the School Survey on Crime and Safety: 2005–06* Retrieved September 27, 2007, from http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2007361.

Verlinden, S., Hersen, M., & Thomas, J. (2000). Risk factors in school shootings. *Clinical Psychology Review, 20,* 3–56.

Von Fremd, M. (2003, October 18). *Texas school district learning to fight back against school gunmen.* Retrieved December 8, 2006, from http://abcnews.go.com/GMA/story?id=2580664&page=1.

Vossekuil, B., Fein, R., Reddy, M., Borum, R., & Modzeleski, W., (2002). The final report and findings of the Safe School Initiative: Implications for the prevention of school attacks in the United States. Washington, DC: U.S. Secret Service and Department of Education.

Wilson, D. (2004). The interface of school climate and school connectedness and relationships with aggression and victimization. *Journal of School Health, 74,* 293–299.

Wilson, S. J., & Lipsey, M. W. (2007). School-based interventions for aggressive and disruptive behavior: Update of a meta-analysis. *American Journal of Preventive Medicine, 33*(2S), S130–S143.