Understanding School Rampage Shooters: Implications for Police Use of Force

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Abstract

In recent decades, police administrators and trainers have devoted resources to training and planning for active shooter episodes with a particular emphasis on those occurring at schools and colleges. While policy decisions have, in many cases, been informed by anecdotal experiences from real shooting episodes, there remains a paucity of empirical literature on which to form training and develop policy. The present study, which was originally published in more detailed form as the author's doctoral dissertation, involves a comprehensive analysis of data regarding school rampage shooters operating in the United States and Canada over a thirty-year period from 1988 through 2017. Looking specifically at the on-scene behaviors of the shooters, this study addresses the issue of police use of force and the manner in which school rampage shooters have been stopped both by police and by citizens, as well as cases in which the shooters terminated their rampages of their own volition. The results of the study show that rapid intervention is required to reduce the numbers of the deaths and injuries, and often that intervention occurs before police even arrive at the scene.

Background

On April 20, 1999, in an unincorporated portion of Jefferson County, Colorado, high school students Eric Harris, 18, and Dylan Klebold, 17, perpetrated a 49-minute massacre at Columbine High School killing 13 students and teachers and wounding 24 others before taking their own lives (Cullen, 2010; Erickson et al., 2001). The incident affected American society so deeply that the name "Columbine" has become synonymous with the phenomenon of school rampage shootings. "[T]he 1999 Columbine tragedy," wrote Fox and Savage (2009), "was the watershed event in terms of national consciousness about school violence" (p. 1474). But whatever effect the massacre had on American society, Columbine brought law enforcement to a crossroads: the aftermath of the tragedy revealed the utter failure of police to respond appropriately, to rescue the wounded, to stop the perpetrators, and to save lives. Instead, people watched in horror the live news broadcasts showing dozens, perhaps even hundreds, of police staged outside the school while victims lay dying inside, never to be rescued. Disgusted citizens and victims' family members chided police for their apparent inaction and lack of coordination. Law enforcement officials stonewalled the press and refused to cooperate with a governor's inquiry, citing mounting lawsuits and "an on-going investigation" (Cullen, 2010; Erickson et al., 2001).

Reports surfaced of the ineffectual response by law enforcement. Deputy Neil Gardner, Columbine's school resource officer, was called by staff to the parking lot, but he had no idea what was happening. After Eric Harris fired multiple shots at him, Gardner returned fire, but missed. Harris and Klebold then ran inside the school, and, consistent with protocol, Gardner did not pursue them. At the time, 11 of the 13 murdered victims were still alive. It was later alleged that Gardner was not wearing his prescription eyeglasses, though what effect that had on his ability to engage Harris in a gunfight remains unclear (Cullen, 2010; Seibert, 2000).

Within two minutes, Harris exchanged fire with another deputy, and within a few more minutes, dozens of law enforcement officers had arrived, but none would enter the school until several SWAT teams

arrived and eventually went in, long after the gunmen had committed suicide. The strategy had been one of "containment" and "setting up a perimeter" (Cullen, 2010, p. 56). In the wake of the shootings, law enforcement trainers and administrators came to understand that "tactical loitering" was no longer an acceptable policing strategy when facing an active shooter; such incidents would, from Columbine forward, require a paradigm shift in policing policy, one that would mandate that the first arriving officers take immediate action (Remsberg, 2013; see also Martinez, 2012; Police Executive Research Forum, 2014).

In 2002, the Jefferson County Sheriff's Office settled a lawsuit brought by the daughter of Dave Sanders, a Columbine High School teacher who allegedly bled to death because deputies refused to allow paramedics to enter the scene and treat the dying man for hours after the shooting was over, even after law enforcement commanders were aware that both Harris and Klebold were dead. Refusing to dismiss the lawsuit, a federal judge ruled that police officials had "demonstrated a deliberate indifference toward Dave Sanders' plight shocking the conscience of this federal court" (quoted in "Columbine teacher's family settles lawsuit," 2002).

Sadly, law enforcement officials had not learned the lessons from an incident a decade prior: the massacre perpetrated by Marc Lépine at Canada's École Polytechnique de Montréal. On December 6, 1989, Lépine killed 14 people and wounded 14 others at the college before taking his own life. Police arrived within 12 minutes of the first 911 call but waited another 14 minutes before entering, following their protocol of securing the perimeter and waiting on specially armed and trained tactical officers. While it is unclear how many lives might have been saved if police had entered sooner, Lépine was still roaming the school's halls while officers waited outside. Though he eventually killed himself, a coroner's report on the episode was highly critical of the police response pointing out that Lépine still had 60 rounds of ammunition on him when he committed suicide. Had he chosen to, he could have killed many more victims (Wilton, 2014).

Where Columbine set a new bar for law enforcement protocols, Sandy Hook raised the argument that even the new standard was insufficient. On December 14, 2012, 20-year-old Adam Lanza went to Sandy Hook Elementary School in Newtown, Connecticut, and opened fire, killing 20 children and six adults before committing suicide. Lanza shot his way through a floor-to-ceiling glass panel adjacent to a locked, glass door before killing the principal and school psychologist and wounding two other staff members. He went into the school office but did not notice several staff members who were hiding. Lanza then went a short distance down the hall to classroom 8 where he killed two teachers and all 15 children in the room. Moving to the next classroom—number 10—he killed two more teachers and five children before killing himself. His rampage lasted fewer than 11 minutes (Sandy Hook Advisory Commission, 2015; Sedensky, 2013).

Where law enforcement had, following Columbine, learned to rapidly amass multiple officers and enter a school or other venue quickly to proactively engage an active shooter, Sandy Hook forced law enforcement trainers to face a new question: can police spare even precious seconds waiting on backup when a shooter is actively killing innocent people, particularly young schoolchildren? The first officer arrived at the school two minutes and 41 seconds after being dispatched, but no officer entered the building until nearly six minutes later (Montminy, Crowley, Manage, & Reed, 2013). The tragedy has prompted law enforcement trainers and policy makers to advocate for solo-officer entry: get there, get in, stop the shooter (Police Executive Research Forum, 2014; Remsberg, 2013; Wylie, 2013). Clearly, when it comes to law enforcement response to active shooter incidents—especially at schools—there exists a learning curve.

Unfortunately, police may not be as far around that curve as the repercussions from the Columbine massacre would suggest that they should now be. On February 14, 2018, gunman Nikolas Cruz killed 17 people and wounded 15 others at Marjory Stoneman Douglas High School in Parkland, Florida. In the aftermath of that tragedy, it was learned that the school's resource officer, an armed Broward County sheriff's deputy, waited outside the school for several minutes while gunfire was ongoing, never taking direct action to stop the shooter. Three more deputies arrived after the shooting, but still none of them entered the school until several police officers from nearby Coral Springs arrived, bypassed the deputies, and entered the school to start

rescuing victims (Berman, 2018; Elsesser, DiPentima, & Winston, 2018; Karimi & Lynch, 2018; Merelli, 2018; Wamsley, 2018).

Before the massacre at Sandy Hook, American law enforcement officials had been seemingly oblivious to the prospects of a shooter killing children at an elementary school despite the 1996 Dunblane massacre in which 43-year-old Thomas Hamilton shot and killed 16 children and one teacher inside a gymnasium at Dunblane Primary School in Scotland (Wilkinson, 2013) and the 1989 murder of five first graders by 24-year-old Patrick Purdy on an elementary school playground in Stockton, California (Levin, 2014). Perhaps even police have difficulty accepting the possibility of such a horrible tragedy.

Prevalence

Each year in the United States, there are an average of 18 incidents of mass murder by firearm with an average of 85 victims killed plus many more wounded (Fox & Levin, 1998; Yount & Poston, 2012). While shocking, these incidents account for less than one percent of all homicides by firearm annually. The 35-year total from 1976 through 2010 equates to about two-and-a-half month's worth of firearms homicides overall. Duwe (2007) found only 116 public mass shootings between 1900 and 1999. Dorn and Dorn (2013) calculated that any given K-12 school in the United States will experience a violent, on-campus death once every 7,150 years. Killingbeck (2001) pointed out that the Columbine massacre was responsible for only two-hour's worth of the total U.S. homicides in 1999. Still, rampage shootings engender an inordinate level of fear, concern, and political attention. Recent mass shooting incidents have reignited a national debate on gun control, school security, and mental health.

For law enforcement, responding to a rampage shooting incident presents unique challenges. Mass shooting incidents often take place quickly and may be completed in a matter of minutes, providing police precious little time to respond and take action to prevent casualties. Mass shootings also challenge many of the traditional tactical deployment protocols employed by law enforcement agencies because, paradoxically, traditional, sound tactics—designed to prevent deaths and injuries—result in increased casualties because of the delayed response. To some law enforcement trainers, years of emphasizing officer survival above all other considerations has caused police agencies to fail at preventing casualties in a number of active shooter cases (Remsberg, 2013).

In response to Columbine, many law enforcement agencies implemented active shooter training in which patrol officers were instructed to gather in small groups, enter the scene, and make their way quickly toward the shooter. Still, recent shootings have brought some in law enforcement to question the soundness of such a plan with regard to mitigating loss of civilian life, especially in light of the recent Sandy Hook Elementary School massacre. While the ongoing killing of innocent citizens must be dealt with quickly, when the victims are young school children, expediency is paramount, even if it risks the lives of responding officers. The dilemma of an officer facing a rampage shooter actively firing on young children is literally one of life or death. Officers must decide whether to await the arrival of backup before entering or quickly enter and confront the shooter; to wait means to risk the lives of others, and to enter means to risk the officer's own life. After Sandy Hook, many officers realized the answer to the question must be to risk everything to stop the shooter or forever live with the guilt of having stood outside while first graders were being slaughtered just feet away.

With such significant policy implications on the line, law enforcement managers and trainers need empirical evidence to guide their decisions, including both a reality check as to the magnitude of the problem and an effective outline of response and investigative strategies for proper planning and training.

For the purposes of this research, the terms "mass shooting," "rampage shooting," and "active shooter" are effectively synonymous, though with some distinctions. A "mass shooting" is defined as a shooting incident in which multiple victims suffer gunshot wounds, though, other than an arbitrarily-defined value, there seems to be no specific threshold minimum number of victims by which to establish inclusion criteria. However, one key criterion would be that more than one victim was specifically targeted.

While rampage shooting events are extremely rare, law enforcement officials must still train for them in order to respond effectively. Training for rare events is nothing new for police, who regularly train for deadly force encounters, something that the vast majority of police officers will never experience (Fairburn & Grossman, 2000).

From the law enforcement perspective, key duties at the scene of a rampage shooting include: (1) stop the shooter; (2) rescue wounded victims; (3) prevent further violence; (4) remove students and staff from the crime scene; (5) secure the crime scene and protect physical evidence; and, (6) investigate the incident thoroughly. In keeping with established incident command protocols, clearly defining areas of responsibility for police, medical, and school officials serves to mitigate the potential for miscommunication or implementation of conflicting response protocols (Cannaday, Wright, Cox, Cave, & Cundiff, 2007).

Police response time has been a topic of concern in a number of studies that have looked at multiple-victim shooting incidents at schools (Drysdale, Modzeleski, & Simons, 2010; Ergenbright & Hubbard, 2012). Studying the on-scene behaviors of 48 school shooters, Langman (2015) determined that 81% of incidents ended with the offender either committing suicide, being killed by police, surrendering, or being apprehended on site. Fifteen percent fled the scene but were quickly apprehended, and only 4% were on the run for an extended period of time. Langman also found that 44% of the shooters took their own lives. Only one shooter in the sample—Charles Whitman—was killed by police. Twenty-three percent of perpetrators in Langman's sample surrendered to police, 15% were apprehended by citizens, 13% surrendered to citizens, and 8% were apprehended by police. Studying 34 adolescent and 30 adult mass murderers, Meloy, Hempel, Gray, Mohandie, Shiva, and Richards (2004) found that 66% of the adult but only 14% of adolescent perpetrators committed suicide or were killed by police. Similarly, a report by the Pennsylvania State Police (n.d.), evaluating rampage shooting incidents occurring in the U.S. between 2002 and 2012, showed that 45% of active shooters were apprehended, 43% committed suicide, 8% were killed by law enforcement, and 4% escaped.

A report by the Police Executive Research Forum (2014) took the issue further looking at offender outcome as a function of police response. Studying 84 active shooter incidents from 2000 to 2010, the researchers separated offender outcome based on whether or not police arrived prior to the rampage ending and found that 51% of the incidents ended after police arrived while 49% ended prior to police arrival. In cases in which the shooting ceased prior to police arrival, 51% of the attackers committed suicide, 10% fled the scene, 7% were shot by victims or bystanders, and 32% were subdued. In cases in which the shooting ceased after police arrived, 30% committed suicide, 14% surrendered, 40% were shot by police, and 16% were subdued.

Langman (2015) explained that, while the rate of police-resolved incidents was nearly equal to the rate of civilian-resolved incidents—31% and 28%, respectively—many of the perpetrator suicides occurred only after police had arrived at the scene, and in some cases police had exchanged gunfire with the perpetrator. Accounting for these cases, Langman concluded that police were involved in resolving 56% of the active shooter incidents. A significant number of shooters engaged police with gunfire: 23% fired at police; 8% wounded or killed a police officer. In 19% of the attacks, police fired at the perpetrators.

It is important that law enforcement and school officials learn to differentiate between types of shooting events and react accordingly (Greenburg, 2007). For example, on November 10, 2015, when a student at a high school in Lecanto, Florida shot himself in front of a teacher and more than 20 fellow students during

an English class at the school, officials responded with a total lockdown of the school, and police employed active shooter response protocols that included bringing an armored vehicle to the campus (Salinger, 2015; Solomon, 2015; Zogbaum, 2015). Such a response is disproportional to the isolated nature of the event. Indeed, suicides occur frequently at all sorts of locales, yet the response in this case was heavily dictated by the fact that it occurred on a school campus amidst a heightened national fear of school rampage shootings. Officials apparently were concerned that another shooter might be on campus, but such an occurrence would be entirely unprecedented: rampage shootings involving multiple perpetrators are an extremely rare subset of an already rare population, and an incident in which a shooter commits suicide without threatening or shooting anyone else in conjunction with a rampage shooting simply does not exist in the literature on mass shootings. "We went into active shooter mode right when *we knew what was going on*," a police spokeswoman said in reference to how police handled the incident. "We definitely train for this" (Solomon, 2015, emphasis added). Despite knowing "what was going on," police "went into active shooter mode." Clearly, when it comes to official response, the mere idea that a shot has been fired in a school engenders the fear of an active shooter, even though most school shootings are not associated with rampage shooters.

Methodology

The target population for this research consisted of offenders who have perpetrated shooting rampages at primary, secondary, or post-secondary school campuses, facilities, or events. The extremely small population of offenders meeting these criteria precluded the effective use of random sampling, but did make possible the employment of a sample size that approached the actual population size. Albeit non-random, the sample is likely closely representative of the actual population because of the inclusion of nearly all of the population of offenders meeting the research criteria.

To obtain the sample, multiple existing databases[1] were queried and vetted for inclusion criteria. To assure the completeness of the sample, the various databases were cross-referenced under the assumption that multiple, independent databases are unlikely to have ignored large numbers of relevant cases simultaneously. Omissions from the databases stem from differing sampling methodologies, and, therefore, differ to some extent, but do not differ systematically, thereby mitigating systematic sampling errors.

Once the sample of offenders was established, each offender's case was researched via publicly available sources to build a comprehensive database with over 100 fields (variables) per offender. Sources used included available government and official reports relating to the incidents; journal articles in which the incidents have been cited and discussed; reputable journalistic sources including national and local print and online news sources; books written by known scholars on the topic of mass shootings; and books written by reputable journalists on specific cases. The majority of the fields in the database were coded dichotomously with boolean true/false values to indicate the presence or absence of specified behaviors, actions, or conditions relevant to the research. A code book defining criteria for each field was developed to provide the researcher with appropriate guidelines for defining data.

Data Analysis

The non-random sample selected for this research included 78 school rampage shooters and 76 rampage shooting episodes that resulted in 257 victims killed and 387 wounded in the United States and

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[1] The databases queried for this research include ones maintained by Stanford University, the Brady Campaign to Prevent Gun Violence, Dr. Peter Langman, Mother Jones, www.shootingtracker.com, and Wikipedia. The databases were used to identify cases for inclusion in this research, and all data were cross-referenced with other sources to confirm validity.

Canada. Two of the events—the 1998 rampage at Westside Middle School in Jonesboro, Arkansas, and the 1999 massacre at Columbine High School in Littleton, Colorado—were perpetrated by two offenders each. An average of three people were killed and five wounded per shooter. Shooting episodes were most likely to result in only one death and two injuries by gunfire. Some shootings resulted in no deaths, and others resulted in no victims wounded. One shooting ended with 32 victims killed, another with 31 victims wounded (Figure 1). The 17 shooters that killed no victims wounded between one and six ($\mu = 2.7$).

Casualties

	Killed	Wounded
Total	257	387
Mean	3	5
Median	2	3
Mode	1	2
StdDev	5	6
Min	0	0
Max	32	31

Figure 1. Overall casualties.

The sample was limited to a 30-year timespan to mitigate the likelihood that including events more distant in time would create sampling bias issues based on the apparent paucity of information related to older cases. Therefore, cases occurring between January 1, 1988 and December 31, 2017 were included in statistical calculations involving temporal trends. However, two cases from 2018—the January 23, 2018 shooting rampage at Marshall County High School in Benton, Kentucky, and the February 14, 2018 massacre at Marjory Stoneman Douglas High School in Parkland, Florida—were included in the dataset due to their relevance as current shooting events, but both were excluded from calculations involving temporal trends because of sensitivity of those calculations to inclusion of a partial year.

In order to focus on school rampage shootings, certain criteria were implemented for screening cases for inclusion in the dataset:

1. All shooting episodes in the sample occurred, at least in part, on a school campus[2] or at a school event that took place off campus.

2. Shooting incidents were included only if (1) they involved two or more victims being shot ($n = 72$)[3], (2) the perpetrator(s) fired shots with apparent intent to shoot multiple victims ($n = 5$), or (3) the perpetrator(s) fired random shots with the apparent intent to shoot multiple victims ($n = 1$).

3. While other studies have set thresholds on number of victims killed or higher thresholds on total number of victims, the threshold was set at two victims (if based on victim count) in order to

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[2] School campus criteria included elementary, middle, and high schools, as well as colleges/universities, and trade/technical schools. One episode occurred at a non-school venue where an ESOL class was being taught because the shooter, a former student, specifically targeted that class.

[3] Cases were eliminated when, though more than one person was shot, the circumstances of the shooting made clear that the shooter's intent was to target one individual but others were hit with errantly fired bullets.

exclude more common acts of single-victim homicides but not reject large victim count episodes that could be representative of cases in which rampages were mitigated by intervention.[4]

4. Acts of politically-motivated terrorism and acts of targeted domestic violence that did not involve additional randomly-selected victims were excluded from the data set. Acts apparently related to gang violence, drug activity, or criminal enterprise were also excluded.

Shooting incidents occurring in the United States and Canada were included as it became apparent during the research process that obtaining reliable English-language reports on cases outside of the two countries might pose a sampling bias issue. While Canada's firearms laws are generally more strict than those in the United States, cultural and geographic similarities made inclusion of Canadian school rampage shooting cases plausible and reasonable. In all, the sample included 72 shooting episodes in the United States and four in Canada (Figure 2).

U.S. vs. Canada

	Number of Shootings	Killed	Wounded	Population in 1988 (M)	Population in 2018 (M)	Average Population (M)	Rate of Shootings per 1M Population	Rate Killed per 1M Population	Rate Wounded per 1M Population
USA	72	237	352	244.5	366.8	305.65	0.236	0.775	1.152
CAN	4	20	35	26.9	37.0	31.95	0.125	0.626	1.095

Figure 2. Descriptive statistics of shooting episodes in the United States versus Canada showing number and rate of shootings, victims killed, and victims wounded. The population average was estimated by taking the mean of the estimated populations in 1988 and 2018 (i.e., linear interpolation).

During the sample period, the United States suffered 237 people killed and 352 wounded in school rampage shootings. Canada suffered 20 people killed and 35 wounded. While the United States had 18 times the number of school rampage shooting episodes as Canada during the sample period, the per capita rate of shooting episodes for the United States was just under twice the rate for Canada. In the United States, the per capita rates of people killed and wounded were 1.2 and 1.1 times the rate for Canada, respectively. In other words, while school rampage shootings were nearly twice as likely to occur in the United States, the rates of casualties, both killed and wounded, were only slightly higher in the United States than in Canada.

Canadian school rampage shooters closely mirrored U.S. shooters in terms of casualties. In the United States (*n* = 74), there were a mean of 3.2 people killed per shooter and 4.8 people wounded. In Canada (*n* = 4), there were a mean of 5.0 people killed per shooter and 8.8 wounded, 1.6 and 1.8 times the U.S. averages, respectively. However, the differences in the number killed (*p* = 0.605) and wounded (*p* = 0.450) were not statistically significant.

The vast majority of school rampage shooting episodes in the sample were low-casualty incidents. Out of 78 shooters[5], 68 (87.2%) killed between zero and five victims, five (6.41%) killed between six and ten victims, two (2.56%) killed between 11 and 15 victims, and three (3.85%) killed 16 or more victims. Similarly, 57 (73.1%) shooters wounded between zero and five victims, nine (11.5%) wounded between six and ten victims, six (7.69%) wounded between 11 and 15 victims, and five (6.41%) wounded 16 or more victims. None killed more than 32 victims nor wounded more than 31.

School rampage shootings were most likely to occur on high school campuses. Out of the 76 rampage shooting episodes in the data, 35 (46.1%) occurred on high school campuses, 22 (28.9%) occurred at colleges, 10 (13.2%) occurred at middle schools, seven (9.2%) occurred at elementary schools, and three (3.9%)

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[4] Limiting the cases to those involving four or more victims killed, for example, would have reduced the number of shooters in the dataset from 78 to 20.
[5] The numbers of victims killed and wounded during the two episodes in which shooters acted in pairs were tabulated separately.

occurred at other schools.

Although more shooting episodes occurred at high schools, rampage shooters on college campuses were somewhat deadlier. Shooters on college campuses killed a mean of 4.9 victims while shooters on high school campuses killed a mean of 2.3 victims. However, the difference was not statistically significant on a 95% confidence interval ($p = 0.101$).

In comparison to the overall sample, there was no difference in the number of victims killed or wounded except with respect to middle school shooters, who killed and wounded fewer victims on average than were killed and wounded by the shooters overall.[6]

School rampage shooters have consistently been overwhelmingly male. Of the 78 shooters in the sample, 73 (93.6%) were male and only five (6.4%) were female. Males killed more ($\mu = 3.4$ versus $\mu = 1.4$, $p = 0.0211$) and wounded more ($\mu = 5.2$ versus $\mu = 2.2$, $p = 0.496$) victims than females.

With respect to ethnicity, non-Hispanic Whites were not overrepresented in the sample with a representative factor of 1.02.[7] Blacks and Hispanics were underrepresented with representative factors of 0.67 and 0.36, respectively. Native Americans, Asians, and other ethnicities were overrepresented with representative factors of 4.93, 2.25, and 4.27, respectively.

Ethnicity

	Number	Percent	Percent of Pop.	Rep. Factor
White	49	62.8%	61.3%	1.02
Black	7	9.0%	13.3%	0.67
Native American	5	6.4%	1.3%	4.93
Hispanic	5	6.4%	17.8%	0.36
Asian	10	12.8%	5.7%	2.25
Other	2	2.6%	0.6%	4.27

Figure 3. Ethnic breakdown of shooters.

While the mean and median ages of the shooters were 23 and 18, respectively, the shooters in the sample were most likely to be 14. The youngest was 11, and the oldest was 62.

To consider the temporal trends with respect to the rates of school rampage shooting episodes, rates of victims killed, and rates of victims wounded in the United States, the 70 shooting episodes that occurred between January 1, 1988 and December 31, 2017 were calculated on a per capita basis with the estimated U.S. population for each respective year (shootings per one million population). Two of the 30 years (1990 and 2000) experienced no school rampage shootings. A number of years experienced only one per year. The maximum number of school rampage shootings per year was six (2014). The mean number of shootings per year was 2.3, and the median number was 2.0. The per capita rate of school rampage shooting episodes trended

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[6] The catch-all "other" category included two schools: the West Nickel Mines Amish school where Charles Roberts killed five students and wounded five others and the American Civic Association in Binghampton, New York, where adult English-as-a-second-language students were attacked by former student Jiverly Wong who killed 13 people and wounded four.

[7] Representative factors were calculated by dividing the percent of shooters in the respective ethnic category by the percent of the current U.S. population in that category.

slightly upward over the 30-year period ($R = 0.137$). When broken down by decade, the per capita rate of school rampage shootings climbed during the first decade ($R = 0.408$), declined over the second decade ($R = -0.050$), and climbed again over the most recent decade ($R = 0.240$).
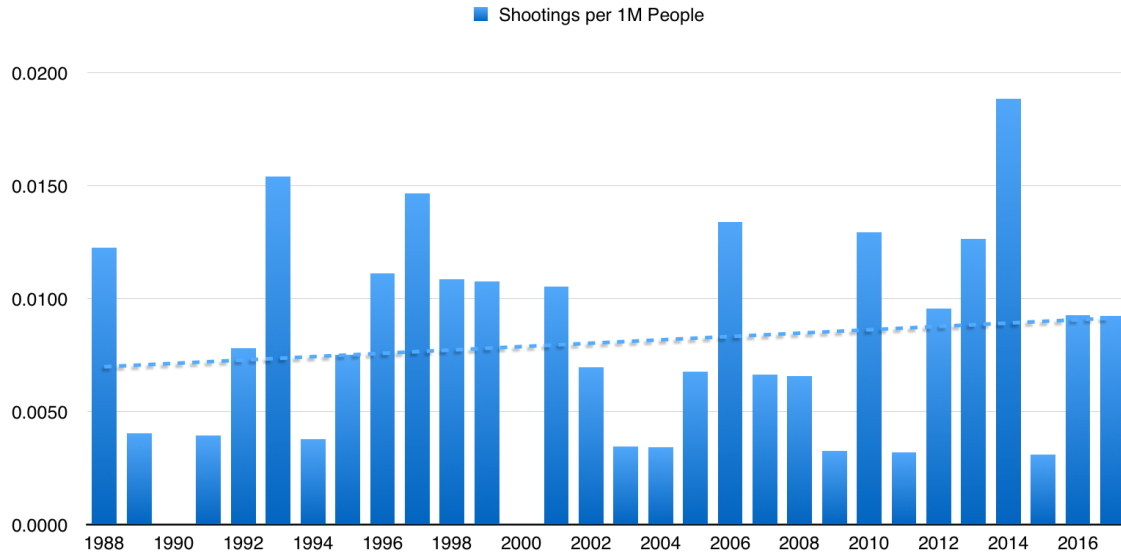

Figure 4. The rate of school rampage shootings in the United States from January 1, 1988 through December 31, 2017 ($R = 0.137$).

There were a total of 218 people killed by school rampage shooters in the United States during the 30-year period with three years (1990, 2000, and 2004) experiencing no deaths due to school rampage shootings. The highest number of people killed in one year was 36 (2012), the year in which Adam Lanza killed 20 children and six faculty members at Sandy Hook Elementary School. The per capita rate of victims killed by school rampage shooters annually has trended upward ($R = 0.262$) across the full 30-year sample period, but when broken down by decade, the rate climbed over the first two decades but declined slightly over the most recent decade ($R = 0.295$, $R = 0.381$, and $R = -0.115$, respectively).[8]

At first blush, one may be tempted to correlate the increase in the fatality rate with the perceived increase in the prevalence of what the media have termed "assault rifles," but the data simply do not bear such a conclusion out. Broadly defining the term "assault rifle" for the purpose of this research to mean any centerfire, semiautomatic rifle[9], only 15 shooters (19.2% of shooters of the 78 shooters in the U.S. and Canada) used an assault rifle (13 in the United States and two in Canada). Across the 30 years of the sample, the rate of assault rifle usage increased at best only slightly ($R = 0.087$). Nine shooters (11.5%) used other types of rifles, 13 (16.7%) used shotguns, and 49 (62.8%) used handguns. Some shooters used more than one type of firearm.

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[8] When assessing the deadliness of school rampage shootings over time, it is important to consider Charles Whitman's massacre at the University of Texas at Austin in 1966. Though, having occurred over 50 years ago, the rampage was not included in the dataset for this research, it stood as the deadliest school rampage shooting until the 2007 Virginia Tech massacre, and today remains the third deadliest school rampage shooting in U.S. history (Ahmed, 2018).

[9] Centerfire rifles use larger caliber ammunition, including the .223 Remington cartridge used in the now-infamous AR-15 rifle. The common usage for the term "assault rifle" is generally more narrowly defined to certain types of semiautomatic rifles. For this research, small caliber, rimfire rifles were placed in the generic "rifle" category because, in many cases, it was difficult to discern if a .22 caliber rifle used by a particular shooter was semiautomatic, lever-action, or bolt-action.

While the rate of assault rifle usage ticked only slightly upward, the rate of rifle usage declined significantly (R = -0.240), and the rate of shotgun usage increased modestly (R = 0.076). In stark contrast, however, the rate of handgun usage climbed significantly (R = 0.275). The use of semiautomatic handguns increased most significantly (R = 0.337), indicating that semiautomatic handguns played a much greater role in the increased lethality of school rampage shootings than did semiautomatic rifles. None of the shooters in the sample used a fully-automatic firearm.

Though the rate of semiautomatic rifle usage did not correlate to the rate of fatalities, shooters who used such firearms killed and wounded more people than shooters who did not. Shooters who used semiautomatic centerfire rifles (n = 15) killed a mean of 6.1 victims and wounded a mean of 8.3, while shooters who did not use such weapons (n = 63) killed a mean of 2.6 people and wounded a mean of 4.2. While shooters with semiautomatic centerfire rifles killed nearly two-and-a-half times and wounded nearly twice as many people on average as did shooters who did not use such firearms, on a 95% confidence interval the differences were not statistically significant (p = 0.104 and p = 0.0993, respectively).

Most of the shooters (n = 43, 55.1%) brought only one firearm, 19 (24.4%) brought two, eight (10.3%) brought three, and eight brought four or more.[10] Six (7.7%) of the shooters brought firearms to the scene that they did not carry with them. No shooter carried more than five. Twelve (15.4%) shooters discharged two firearms[11], two (2.6%) discharged three firearms, and only one shooter discharged four firearms. None discharged more than four.

Thirty-two (41.0%) of the shooters reloaded their firearms during their rampages. Shooters who reloaded killed more victims than shooters who did not (μ = 5.8 and μ = 1.6, respectively; p = 0.00358) and wounded more victims (μ = 8.7 and 2.4, respectively; p = 6.76×10^{-5}). Seventy-five percent of the shooters who reloaded used semiautomatic firearms while 56.5% of the shooters who did not reload used semiautomatic firearms. Shooters who reloaded were more likely to carry (53.1% versus 34.8%) and discharge (31.3% versus 10.9%) multiple firearms than were shooters who did not reload. Shooters who reloaded were less likely to be stopped by an unarmed citizen than were shooters who did not reload ($\hat{p}$ = 12.5% and $\hat{p}$ = 41.3%, respectively; p = 0.0127).[12] Shooters who reloaded were no more likely to be stopped by police intervention than were shooters who did not reload ($\hat{p}$ = 31.3% and $\hat{p}$ = 23.9%, respectively; p = 0.646) Likewise, shooters who reloaded were not more likely to end their rampages by committing suicide than were shooters who did not reload ($\hat{p}$ = 40.6% and $\hat{p}$ = 21.7%, respectively; p = 0.122).

Of the 78 shooters, 23 (29.5%) fired between one and five shots, 21 (26.9%) fired between six and 10 shots, 19 (24.4%) fired between 11 and 25 shots, three (3.8%) fired between 26 and 50 shots, six (7.7%) fired between 51 and 100 shots, and six fired between 101 and 200 shots. No shooter fired more than 200 shots.[13] Five shooters (6.4%) staged weapons, ammunition, or gear.

The research data paint a clear picture that police intervention saves lives in school rampage shootings. In cases in which the shooter was stopped by police intervention (i.e., by gunfire, physical force, or confrontation),

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[10] Andrew Golden and Mitchell Johnson, who together perpetrated their massacre at Westside Middle School in Jonesboro, Arkansas in 1998, brought 13 firearms between them.

[11] Some of the shooters who discharged two firearms, such as Adam Lanza who massacred 20 children and six faculty members at Sandy Hook Elementary School, used the second firearm only to commit suicide.

[12] One of the arguments that has been made with respect to limiting the capacity of firearms magazines has been the contention that forcing a shooter to reload more often would increase the likelihood that someone could overpower the shooter. The data contradict such a premise.

[13] Because reports were not always specific as to the number of shots fired, the ranges denoted were used to operationalize the variable.

rampage shooters on average killed one-third as many victims as they did when they terminated their massacres by suicide, flight, or weapon issues (i.e., a malfunction or depletion of ammunition), with average death tolls of six victims versus two, respectively. Out of the 78 shooters in the sample, 21 (26.9%) were stopped by police intervention, having killed an average of two people, whereas 23 (29.5%) committed suicide having killed an average of three people; six (7.7%) fled or simply stopped having killed an average of five people; and three (3.8%) experienced a firearm malfunction or ran out of ammunition having killed an average of seven people.[14]

Shooters who were stopped by police intervention ($n = 21$) killed a mean of 2.4 victims while shooters who were not stopped by any form of intervention ($n = 32$) killed a mean of 6.3 victims. On a 95% confidence interval, there was a statistically significant difference in the numbers of victims killed ($p = 0.030$). However, when it came to the number of victims wounded, the difference was less apparent. Shooters who were stopped by police intervention wounded a mean of 4.8 victims, while shooters whose rampages were not stopped by any form of intervention wounded a mean of 6.3 victims ($p = 0.357$).

Police intervention, however, was not the winner with respect to saving lives: intervention by unarmed citizens was. Unarmed citizens stopped 23 (39.5%) shooters, as many as stopped their rampages by committing suicide. However, when unarmed citizens intervened, the shooters killed an average of only one person. When school rampage shooters ended their rampages voluntarily or by firearm malfunction or ammunition depletion, they killed six times as many people on average as did shooters who were stopped by the intervention of unarmed citizens.

Shooters who were stopped by unarmed citizens ($n = 23$) killed a mean of 1.0 victims while shooters who were not stopped by any form of intervention ($n = 32$) killed a mean of 6.3 victims. The difference was statistically significant ($p = 0.00169$). With respect to victims wounded, the difference was less pronounced. Shooters who were stopped by unarmed citizens wounded a mean of 3.3 victims while shooters who were not stopped by intervention wounded a mean of 6.3 victims ($p = 0.0779$).

Intervention by unarmed citizens saved lives when compared to intervention by police. Shooters who were stopped by police intervention killed twice as many people as shooters who were stopped by unarmed citizens ($\mu = 2.4$ and $\mu = 1.0$, respectively; $p = 0.0410$) but did not wound significantly more victims ($\mu = 4.8$ and $\mu = 3.3$, respectively; $p = 0.335$).

Two shooters (2.6%) were stopped by armed citizens, having killed an average of two people. One of those shooters, Andrew Wurst, killed one person and wounded three others at an eighth-grade dance at a private venue before being stopped by the venue's owner who was armed with a shotgun. Another shooter, Luke Woodham, killed three people and wounded seven before he was stopped by an assistant principal who retrieved a pistol from his vehicle and confronted the gunman. Neither citizen fired a single shot. Shooters who were stopped by an armed citizen ($n = 2$) killed a mean of 2.0 victims while shooters who were not stopped by any form of intervention ($n = 32$) killed a mean of 5.6 victims. The difference was not statistically significant on a 95% confidence interval ($p = 0.0644$).

While police intervention led to significantly fewer fatalities than did suicide, flight, or firearms issues, shooters stopped by police intervention had the highest time values of the sample, suggesting that fatality rates are not as strongly linked to police intervention as average killed numbers suggest but instead indicate that cases in which police were able to intervene involved shooters who carried out their rampages at a slower pace than

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[14] In what has become one of the pivotal and most notorious school rampage shootings, Nikolas Cruz, who killed 17 people at Marjory Stoneman Douglas High School in Parkland, Florida, fired 150 rounds from his AR-15 semiautomatic rifle before it malfunctioned, rendering the firearm inoperable. Cruz discarded the weapon, along with 180 rounds of live ammunition, and fled the scene after blending in with students ("Shooting suspect Nikolas Cruz had swastikas on ammunition magazines," 2018; Nehamas & Smiley, 2018).

shooters who committed suicide. However, looking at the numbers of wounded victims helps solidify this conclusion. Shooters who were stopped by police intervention wounded a mean of 4.8 victims and shooters that committed suicide wounded a mean of 6.5. Shooters who were stopped by unarmed citizens carried out their rampages for significantly less time than did shooters who were stopped by police intervention and wounded a mean of 3.3 victims. Therefore, shooters who were stopped by police intervention were no more likely to wound victims than were shooters who were stopped by suicide ($p = 0.382$) or by unarmed citizen ($p = 0.335$).

In all, 46 (59.0%) shooters were taken into custody, 28 (35.9%) committed suicide, and five (6.4%) were killed by police. Though 10 (12.8%) shooters fled the scene of the of their rampage, none escaped alive. Four (5.1%) shooters fled the scene but later committed suicide at another location.[15]

Rampage Terminated

	Number of Shooters	Percent	Killed	Average Killed	Wounded	Average Wounded	Time Range	Shots Fired Range
Suicide	23	29.5%	141	6	149	6	2.0	3.3
UnarmedCitizen	23	29.5%	24	1	76	3	1.3	1.7
ArmedCitizen	2	2.6%	4	2	10	5	2.0	2.5
Firearm	3	3.8%	22	7	32	11	1.7	3.7
Fled	6	7.7%	16	3	20	3	1.0	1.8
Police	21	26.9%	50	2	100	5	2.2	2.8

Intervention vs. Non-Intervention

	Number of Shooters	Percent	Killed	Average Killed	Wounded	Average Wounded	Time Range	Shots Fired Range
Intervention	46	59.0%	78	2	186	4	1.8	2.3
No Intervention	32	41.0%	179	6	201	6	1.6	2.9

Figure 5. Statistics with respect to how each shooter's rampage was terminated. Note that the time and average number of shots fired variables were operationalized from ranged values (see discussion above).

Of the 21 shooters who were stopped by police intervention, ten (47.6%) were shot by officers, five of them fatally. Three of the shooters who were shot by police subsequently committed suicide, and the other two were taken into custody. Additionally, police fired shots at three of the shooters who were stopped by police intervention, one of whom subsequently committed suicide. In all, police gunfire stopped 13 of the 21 shooters (61.9%). None of the shooters who were stopped by police intervention escaped.

In cases when police intervention stopped the shooter, whether the police fired upon the shooter or not, there was no statistically significant difference in the number of victims killed or wounded. Shooters who were fired upon by police ($n = 13$) killed a mean of 2.5 victims while shooters who were not fired upon by police ($n = 8$) killed a mean of 2.1 victims ($p = 0.686$). Similarly, shooters who were fired upon by police wounded a mean of 5.1 victims, and shooters who were not fired upon by police wounded a mean of 4.3 victims ($p = 0.708$).

Conclusion

The data in this research establish the importance of rapid intervention with respect to saving lives in

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[15] These numbers are independent of the numbers with respect to how each shooter's rampage was ended. One shooter fled and four committed suicide after intervention by police, and one shooter committed suicide after intervention by an unarmed citizen.

school rampage shooting episodes. Because shooters overwhelmingly operate alone, solo officer entry and confrontation have not been shown to expose officers to an unreasonably high risk of death of injury versus awaiting the arrival of multiple officers before attempting to confront a shooter. The data also show that physical use of force—in most cases, use of deadly force—is almost assured when confronting school rampage shooters, though mere police presence may precipitate suicide or surrender. Training on the judicious use of force in school rampage shooter response is warranted, particularly given the chaotic nature of such events wherein the possibility of a mistaken identification of a bystander may occur, necessitating proper identification of the shooter by responding officers before engaging in gunfire. Clearly, school rampage shooting episode response marks a departure from traditional police response strategies that have emphasized officer safety above all other considerations. When responding to a potential school rampage shooting, police officials must react appropriately, even when that means departing from the tactics normally employed by officers in other types of cases. Still, it is important that police responses be well-tempered and proportionate to the level of violence being exhibited by the perpetrator.

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