An Examination of School Characteristics, Shooter Characteristics, and Incidental Characteristics of School Mass Shootings

THESIS
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By

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Abstract

School Mass Shootings (SMS) continue to be an ongoing issue for k-12 schools, technical/vocational schools, and on college campuses in the United States. Recent studies have shown that these crimes are increasing in both frequency and lethality. However, SMS are still considered to be statistically rare events making them difficult to study quantitatively. Many extant studies use an exclusive definition of SMS where an incident must have four or more deaths to be categorized as this type of crime. The present study utilizes an inclusive definition of 2 or more deaths, where every four injuries count as a death in order to have a larger dataset for analyses. This study uses a dataset of 60 SMS cases that occurred between 1927-2019. The data were collected from news sources, online journals, etc. as well as Census data. Research questions relate to characteristics of the schools where the shootings occurred, characteristics of the shooters themselves including mental health status, and incidental characteristics. Findings and policy implications are discussed.

Keywords: school mass shootings, gun violence, mental illness, prior warning, threat assessments

Dedication and Acknowledgements

This work is dedicated to all the individuals and communities who have been impacted by mass shootings, to the survivors, to the victims, their families and friends, as well as those who were closest to the perpetrators themselves. These individuals have survived trauma and loss that is nearly incomprehensible to the rest of us.

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Gun violence on school campuses in the United States is an issue that has received much attention over the last 20 years and has recently become a topic for many political platforms. This is largely due to the heavy public interest generated by extensive media coverage on the most extreme cases of gun-related crimes occurring on school property. These specific types of mass shooting incidents have come to be referred to as School Mass Shootings (SMS). However, public mass shootings in general have helped spur growing awareness and concern for public safety when it comes to gun violence in the United States.

While researchers have made much progress in demystifying the phenomena of SMS in the United States, there is still much to learn about these crimes and the individuals who commit them. Although these crimes continue to remain statistically rare occurrences (Agnich, 2015), recent scholarship on this topic suggests that they are increasing in frequency and lethality (Duwe, 2020).

The present study seeks to identify various dimensions of SMS as they relate to school facilities, the shooters themselves, the role of mental status in these crimes, as well as details regarding the individual incidents. There is much debate surrounding mental health and gun control policies regarding preventive measures for reducing the number of public mass shootings in the U.S. For this research project, a broad definition of mental illness will be used to fully examine the role it plays in SMS as well as what the implications are for future legislative policies surrounding gun control.

Furthermore, this research project seeks to examine a unique characteristic that is common among SMS which is prior warning given by the shooter, or in other words, informing others of their planned attack ahead of time (Duwe, 2020). Prior warning may be disclosed to a

variety of bystanders such as classmates, family members, or on social media outlets (Silver, 2020). An examination of the nature of this warning could be valuable for better understanding these crimes, as well as preventing them in the future. Previous scholarship on foiled SMS has found that many averted attacks were foiled due to leaked information by the shooter about their intentions to someone else (Cornell, 2020).

Additionally, while SMS have become a popular topic among researchers in recent years, there are still many gaps in the current literature. For example, first, when it comes to the role of mental health in these attacks, researchers have not used a consistent working definition for 'mental illness', and in fact, there appears to be a debate forming around this issue (Skeem & Mulvey, 2020). Therefore, results have been extremely mixed as to how large a role mental illness plays in these crimes. This research seeks to employ a broader, more inclusive definition of mental illness which will add to the current literature by providing insight into the true scope of mental health issues experienced by the shooters.

Second, although prior warning given by shooters to other individuals about their plans has been found to be a key factor in successfully averting these attacks, there is still little research on this topic or the ways in which prior warning impacts the outcomes for the shooters themselves. It is possible that the shooters give prior warning because they hope to be stopped before the attack takes place. A better understanding of the role prior warning plays could have many implications for the development of future risk assessments and preventative programs implemented by schools.

With these deficiencies in mind, three research questions were developed for the present study to address. First, is there an association between school location (community urbanization level) and other characteristics of the schools where the shootings occurred? Second, what

individual characteristics, including those related to mental health, are associated with prior warning? Third, to what extent does school type (elementary, middle/high school, college, etc.) associate with other incidental characteristics? Before these questions can be answered in order to better understand SMS and the circumstances under which they occur in the U.S. today, it is necessary to look at the extant research devoted to this topic.

Literature Review

Definitional Issues

A commonly used definition for SMS which has been operationalized by many researchers is predicated upon two earlier homicide-related definitions (Huff-Corzine & Corzine, 2020). First, the term "mass violence", which gained popularity in the 1980's and 1990's, is the predecessor for the contemporary term "mass shooting" and is defined as a crime where there are four or more fatalities during one violent episode, in one location, during a short time frame (Huff-Corzine & Corzine, 2020). These crimes occur at any location, whether it be at a private residence or in a public space, and are committed with any type of weapon, or even with brute force in the absence of a weapon (Duwe, 2020).

This definition was then narrowed to describe a "mass shooting", where the crime is committed with a gun, in a single episode, at a single location, in a short time frame, and results in four or more fatalities (Krouse & Richardson, 2015). More recently, the term "public mass shooting" has been coined, which is defined as a single episode of gun violence, committed in any public space (e.g. workplace, shopping mall, night club, movie theater, etc.), in a short time frame, resulting in four or more deaths (Fox & Levin, 2015). Therefore, a SMS is an episode of

gun violence, that takes place on school grounds (whether it be a K-12th grade campus, community college, four year university, or a technical/vocational school), in a short period of time, resulting in four or more fatalities (Duwe, 2020).

The criterion of "four or more" fatalities was originally set by the Federal Bureau of Investigation (FBI) regarding "mass murder", however, it has been utilized for the definition of mass shootings as well (FBI, 2008). Recently this criterion has been called into question and is considered arbitrary by some scholars (Huff-Corzine & Corzine, 2020). There are two reasons for this controversy. First, this criterion does not take into account the number of injuries. For instance, an episode of gun violence that results in two fatalities and 10 injuries, would technically not be considered a "mass shooting" according to the FBI definition that has been adopted by so many. However, the trauma and loss experienced by those present during an active shooter incident is equally relevant regardless of the number of deaths. This is perhaps felt most deeply by the victims, their loved ones, as well as the communities that are traumatized by these crimes.

Second, setting a higher limit for fatalities stifles potential research that would be valuable for better understanding these crimes, the perpetrators who commit them, and the impact they have on victims and communities (Huff-Corzine & Corzine, 2020). Despite the fact that mass shootings are increasing both in lethality and frequency, these incidents remain statistically rare occurrences (Duwe, 2020). Therefore, using a definition that sets a higher threshold for meeting these criteria poses additional challenges for researching these events and excludes cases that would otherwise provide valuable contribution (Huff-Corzine & Corzine, 2020).

The working definition of SMS for this research will include a single criterion which includes public mass shootings that have taken place on school grounds in the U.S., where there were two or more fatalities, and where every 4 injured victims count as one dead victim. For example, if a shooting included one dead victim and five injured victims, for the purpose of this study, it would be counted as two fatalities and then be included in the database. However, once cases were included in the database, they retain the actual numbers of dead and injured victims. Utilizing this broader, more inclusive definition for SMS will allow for a detailed examination of the ways in which gun-related mass violence impacts schools and communities.

School Characteristics

This section will cover descriptive characteristics of the schools where these crimes have previously taken place. There are some discrepancies between what the literature has found regarding SMS and what the media has portrayed of these crimes which will also be discussed here.

School Type

Baird et al. (2017), utilized a sample of 22 incidents of SMS and found that the majority of cases, which was 14, occurred at high schools, six occurred at middle schools, and two occurred at schools that combined middle and high school students. In a larger study conducted by an organization called Everytown for Gun Safety (2015), the focus was on 94 incidents of guns discharged on school campuses in the U.S. The data revealed that 49 of the cases occurred on K-12 campuses, and 45 incidents were on college campuses. Of the incidents that occurred on K-12 campuses, the study found that 29 incidents happened at high schools, 7 were at middle schools, and 12 were at elementary schools (Everytown for Gun Safety, 2015).

State and Urbanization Level of Shooting Location

According to a report published by Reuters (2019), there are discrepancies between the number of school shootings in each state when differentiating between the number of shootings overall and measuring the number of shootings per capita (Trotta & Smith, 2019). When examining the jurisdictions with the highest rates of school shootings from 1970 to 2019 per every one million people the following five jurisdictions had the highest number of shootings: District of Columbia (-32.74), Alaska (13.56), Louisiana (9.66), Delaware (8.27), and Alabama (7.77) (Trotta & Smith, 2019)

Alternatively, when examining the highest number of school shootings overall, from 1970 to 2019, California (158), Texas (133), Florida (90), Michigan (67), and Illinois (64) all had the highest numbers of cases (Trotta & Smith, 2019). Baird et al. (2017), also found in their study of 22 cases of school mass shootings, that over 77 percent of cases occurred in rural or suburban locations. These crimes often occur in schools and communities that are typically perceived to be safe. These are rural and suburban communities that are predominantly White, working or middle class, and seemingly have little youth violence that is often associated with urbanized areas (Harding, Fox, & Mehta, 2002).

Enrollment and Student Demographics

Prior research from Baird et al. (2017) has found that schools with slightly higher than average enrollment numbers are more likely to experience a school shooting than schools with typical enrollment numbers. When it comes to the student body demographics of schools where gun violence occurs, the picture is often different than what the media portrays. Everytown for Gun Safety (2020) published a report that examined the broader context of gun violence on school grounds in the U.S., looking at documented incidents of discharged firearms. They found

that Black students disproportionately bear the burden of school shootings despite the fact that school shooters tend to be White (Everytown for Gun Safety, 2020). The report found that 64 percent of school shooting incidents occurred in minority-majority schools and that Black students, while making up only 15 percent of the U.S. student population, make up 25 percent of student victims of gun violence (Everytown for Gun Safety, 2020).

To summarize, although it is clear that urbanization level and enrollment rates seem to be differentiating factors among schools where SMS have previously occurred, it is difficult to ascertain the nature and extent of these differences based on the current literature. Previous studies have used a smaller number of cases for their test datasets due to the rarity of these events or have incorporated other types of public mass shooting events into their databases along with SMS incidents (Baird et al., 2017; Vossekuil et al., 2002; Follman et al., 2020), and it is likely that the aforementioned definitional issues have played a role in eliminating existing cases from these samples as well.

Furthermore, there are clear discrepancies between urbanization level, and racial demographic makeup of where these crimes occur the most, indicating wide gaps in the extant literature. While previous research utilizing a small sample size has indicated that these crimes primarily occur in rural and suburban schools that are primarily White, other studies that utilize a large sample size and a more inclusive definition of SMS, find that these crimes disproportionally impact minority-majority schools. The current study utilizes an inclusive working definition for SMS as well as a relatively larger dataset compared to some of the aforementioned studies and previous scholarship on rampage mass shootings (Baird et al., 2017; Vossekuil et al., 2002; Lee & McCrie, 2014, Lee, 2019).

Shooter Characteristics

Gender and Race

The vast majority of SMS are perpetrated by males and some researchers have noted that these crimes are often an attempt by young men to assert their masculinity (Langman, 2020; Kellner, 2013; Newman et al., 2004). In a 2002 study completed by the U.S. Department of Secret Service and the U.S. Department of Education, it was found that 100 percent of the 41 cases of targeted school violence were carried out by males that were either school age or young men (Vossekuil et al., 2002). Similarly, Cornell (2020), examined a large sample of 431 school related homicides using data collected by the Center for Disease Control and Prevention (CDC), and found that 94 percent of the perpetrators were male.

When it comes to race, the majority of SM shooters in the U.S. tend to be White, although there is some variation here (Newman et al., 2004; Agnich, 2015). The *Safe School Initiative* found in 2002 that 74 percent of perpetrators were White, 12 percent were Black, five percent were Hispanic, two percent were Native Alaskan, two percent were Native American, and two percent were Asian (Vossekuil et al., 2002). However, when using a more inclusive definition for SMS, there is much more ethnic and racial diversity among shooters than what is depicted when looking at the most high-profile cases (Cornell, 2020).

Shooter Age

Everytown for Gun Safety's 2015 report found that out of 94 cases of firearms discharged on school grounds, that 70 percent of the shooters were minors who obtained their weapons from home. This is consistent with previous findings from a 2002 study that found attackers varied in

age from 11 to 21, with 85 percent of attackers being between ages 13 and 18. (Vossekuil et al., 2002).

Alternatively, in a broad sample of 431 cases that included 609 perpetrators of school related homicides, it was determined that only 56 percent of attackers were age 18 or under, while 23 percent were 19 or over, with the age being unknown for the remaining 21 percent (Cornell, 2020). An international study conducted by Agnich (2015), compared 282 cases of mass shootings and mass killings that occurred at schools and found that the mean age for perpetrators of mass shootings was 24 years old.

Relationship to the School

In a study completed in 2002 by the U.S. Department of Secret Service and the U.S. Department of Education, it was determined that out of 37 incidents of targeted school violence, 95 percent of the attackers were current students at the schools where the shootings occurred, while the remaining five percent were former students of the schools (Vossekuil et al., 2002). Many studies on the topic of SMS have focused exclusively on rampage style attacks and selected cases exclusively where the shooters were current students at the schools they attacked (Langman, 2020; Newman et al., 2004). However, in a study utilizing a much larger sample of cases that included 609 perpetrators who committed school-related homicides, only half of the individuals were students and 37 percent had no ties to the school whatsoever (Cornell, 2020).

Family Conditions

When it comes to family conditions and home environments for SM shooters, there have been some mixed results depending on the sample used. The *Safe School Initiative* found in their sample of 41 cases that 61 percent of shooters came from homes with two parents present (44

percent with two biological parents, and 9 percent with one biological parent and one step parent) (Vossekuil et al., 2002). There were only five percent of cases where the shooter lived in a foster home or with a legal guardian (Vossekuil et al., 2002).

Qualitative research on this topic has found that SM shooters come from homes that are somewhat or slightly dysfunctional in nature (Newman et al., 2004), to severely dysfunctional in nature (Langman, 2009, 2020). In Langman's typology of SM shooters, he describes psychopathic, psychotic, and traumatized shooters (Langman 2009, 2015, 2020). Langman (2020) asserts that these types are not mutually exclusive, but those that fall into the traumatized category come from severely dysfunctional homes where violence, substance abuse, and other criminal behaviors are present.

Personality

When it comes to personality, there are many different factors to consider, but often research in this area has measured personality by sociability and the amount of friendships and acquaintances the shooters had established (Vossekuil et al., 2002). The *Safe School Initiative* found that out of 41 cases of targeted school violence, 41 percent of shooters were considered to be 'mainstream' students or were noted to have socialized with 'mainstream' students (Vossekuil et al., 2002). Alternatively, 27 percent of perpetrators were considered to be part of a 'fringe' group of students, or socialized with students who were (Vossekuil et al., 2002). Finally, 34 percent of the shooters were considered 'loners' either by themselves or by others, and five percent were noted to have no friends at all (Vossekuil et al., 2002).

It has been found that many public mass shooters are distrustful and suspicious of others and believe that people are often "out to get them" which may explain why many have been characterized as "loners" in the past (Duwe, 2007). However, 44 percent of the SM shooters in

the above study were found to be part of some sort of organization either in or out of school such as, extracurricular activities like sports, school clubs, or religious groups (Vossekuil et al., 2002).

Qualitative research has found that SM shooters have a 'Jekyll-and-Hyde' disposition, where they behave one way toward their peers and another way toward adults which is not at all unusual for teens and young adults (Newman et al., 2004). However, the behavioral differences for these individuals are much more disparate than for their counterparts (Newman et al., 2004).

Trigger Factor

Identifying the exact trigger factor for each SM shooter is a difficult task as there is much variation here, and furthermore, in some cases the trigger factor is completely unknown. However, the *Safe School Initiative* has noted that these crimes are typically driven by some type of loss that is experienced by the shooter (Vossekuil et al., 2002). In this study, it was determined that 98 percent of the attackers experienced either a real or perceived significant loss prior to the attack which included loss of social status (66 percent), loss of a loved one or a significant relationship (51 percent), or serious illness experienced by a loved one or the attacker themself (15 percent) (Vossekuil et al., 2002).

Bullying has long been considered to be a common motive for these attacks. In an international study of mass homicides on school grounds, school shootings in particular were more often depicted by media outlets to be motivated by bullying than other forms of mass homicides (Agnich, 2015). According to Duwe (2020), most public mass shooters believe they have been persecuted in some way. Therefore, for these individuals, it seems that carrying out a mass shooting is their way of exacting revenge against those they feel are responsible for their mistreatment.

To summarize, the previous literature clearly indicates that the vast majority of SMS are carried out by males, ages 13-21, who are likely current or former students at the school. The evidence regarding their personality type is mixed but they may have difficulty making friends or 'fitting in' with other students, despite the fact that they may be involved in some sort of extracurricular activity. They may feel that they are persecuted by those around them or by larger social systems in general. Finally, it is likely that they may have experienced a significant loss prior to the attack, either real or perceived, which could be the loss of a significant person, the loss of a relationship, or even the loss of their reputation.

Mental Health of Shooters

Definitional Issues

In addition to definitional issues regarding mass shootings, there have also been definitional issues regarding mental health and a scholarly debate around what should be considered "mental illness" or "serious mental illness" has ensued. Some researchers have asserted that a narrow definition of mental illness is preferable due to the vast number of potential diagnoses found in the DSM V, and the fact that one out of every five Americans suffer with some form of mental illness (Skeem & Mulvey, 2020). Therefore, many researchers have chosen only to consider public mass shooters "seriously mentally ill" if they suffer from some form of schizophrenia-like disorder, bipolar disorder, and occasionally, "clinical depression" will be included as well (Skeem & Mulvey, 2020; Duwe, 2020). Researchers who argue for a narrow definition of "mental illness", choose to exclude history of past trauma, violent victimization, substance abuse, and personality disorders when looking at previous diagnoses or symptoms of mass shooters (Skeem & Mulvey, 2020). Furthermore, Clark et al. (2017) assert that severity of

"serious mental illness" is on a spectrum, and evidence that mass shooters with these types of disorders were suffering from active symptoms at the time of the shootings is practically nonexistent, due to the difficulties presented in gathering such data (McGinty, 2018). To further narrow the criteria for mental illness, some researchers considered an individual "mentally ill" only if they received a formal diagnosis (Skeem & Mulvey, 2020). Although, there is often disagreement among psychiatrists when it comes to diagnosing patients (Vanhuele, 2017).

Researchers in this camp assert the need for a narrow definition of mental illness when researching mass shootings, suggesting there are no causal links to mental illness and mass violence, therefore, they argue blaming these crimes on mental illness serves only to stigmatize mentally ill individuals (National Council for Behavioral Health, 2019).

However, regardless of the specific definition used to measure mental illness among SM shooters, the Secret Service and Department of Education report (93 percent) as well as Everytown for Gun Safety (100 percent), found overwhelming evidence that school shooters displayed some form of behavioral warning signs prior to the shooting, which indicates a need to further explore the mental health symptoms of these individuals (Vossekuil et al., 2002; Everytown for Gun Safety, 2020).

History of Mental Health and Treatment

Duwe (2020), found that slightly over 60 percent of public mass shooters had been either diagnosed with some type of mental illness or displayed symptoms that were noted by those around them to be indicative of some type of mental illness. This number is consistent with previous research findings by *Mother Jones* where 61 percent of shooters presented with potential signs of mental illness (2019). It was found that of the 60 percent of public mass

shooters with mental illness, only one third of them had received treatment prior to the attack (Duwe, 2020).

Given the disagreements over what should or should not be considered as mental illness when developing working definitions for research on SMS, it is currently unclear how large of an impact mental health, or access to mental health care, has on these crimes. However, it is important for scholarship on this topic to continue to strive for a better understanding of these relationships.

Therefore, this study intends to use a broad definition of mental illness that includes issues for which there are currently therapeutic interventions. This includes mental health issues that were reportedly present at the time of the attack as well as known history of past traumas. Such a broad definition serves to provide a deeper understanding of the nature of SMS, as well as inform future interventions and policies for assessing troubled youth and young adults.

Incidental Characteristics

Time

In the Final Report and Findings published by the *Safe School Initiative* (2002), the researchers examined 37 incidents of targeted school violence and found that 59 percent of attacks occurred during the school day (Vossekuil et al., 2002). The Center for Homeland Defense and Security (CHDS) Naval Postgraduate School (2020), has also quantitatively studied incidental characteristics of SMS and found that the majority of these crimes (20 percent) occur during morning classes and ten percent occur during afternoon classes. In this study it was found that slightly less than ten percent of shootings occurred during sporting events (CHDS, 2020).

Deaths and Injuries

The findings for these variables across previous research largely depend on which definition of SMS was used when collecting data. Furthermore, there are many different modes for how these data have been presented. For example, the *Safe School Initiative* reported deaths based on individual cases and found that out of 41 incidents of targeted school violence, in 73 percent of cases the attacker killed one or more students, faculty members, or another person at the school (Vossekuil et al., 2002). In the remaining 27 percent of cases, the attacker injured at least one individual on school grounds (Vossekuil et al., 2002).

Another way to examine deaths and injuries from SMS is to assess them temporally. Lee (2019) examined cases that occurred between 1966 and 2013 and found that the two years with the most victims were 2007 with 36 fatalities and 28 injuries, as well as 2012 where there were 42 fatalities and eight injuries. The CHDS (2020) examined victims of SMS similarly from 1970 to 2020 and found that 2018 had the highest number of people impacted with 51 deaths and 106 injuries.

Weapons

Weapons used in SMS incidents are not necessarily limited to guns, despite the fact that this is what the name of these crimes implies. Other weapon types used include swords, knives and explosives (Agnich, 2015). However, when it comes to guns used in targeted attacks on schools, the majority of shooters do utilize a gun as their primary weapon and 61 percent used a handgun alone (Vossekuil et al., 2002). However, 49 percent of attackers in this study used rifles or shotguns as well. (Vossekuil et al., 2002)

The number of weapons SM shooters use is also of interest to researchers. In the aforementioned study by the *Safe School Initiative*, the researchers determined that 76 percent of

attackers utilized only one weapon during their attacks, but half of them were armed with more than one weapon during the incident (Vossekuil et al., 2002). These findings are similar to that of Agnich's 2015 study, where the range of weapons used in mass homicide attacks on schools was between zero and seven, but the mean number of weapons used was 1.5.

Everytown for Gun Safety (2020) determined that 73 to 80 percent of school shooters obtain their weapon from their own home, or the home of a relative or friend. Lee (2019), found that nearly 60 percent of weapons were not obtained legally by shooters and that 45 percent of weapons were stolen, while seven percent were actually given to the shooters.

Prior Warning

The *Safe School Initiative* found that in 81 percent of cases involving targeted school violence, at least one individual had prior knowledge that the perpetrator was considering an attack on the school (Vossekuil et al., 2002). In 59 percent of incidents, more than one person had prior knowledge of the attack (Vossekuil et al., 2002). In 93 percent of incidents, the individuals with prior knowledge were friends, other students at the school, or a sibling of the shooter, but in two cases there were adults who received warnings of the attacks as well (Vossekuil et al., 2002). Similarly, Everytown for Gun Safety (2020), found that in 77 percent of cases from 2008 through 2017 at least one person knew about the attack ahead of time, and that person was typically a peer.

In qualitative research on the topic of prior warning, details of this knowledge varied widely with vague descriptions that "something big" was going to happen, where in other cases extremely detailed warnings were given regarding the date, time, and exact location that the shooter planned to carry out their attack (Newman et al., 2004).

Previous research focusing on foiled or averted school shootings has found that these crimes were avoided because other students who were aware of the shooter's plans reported the information to authorities (Cornell, 2020). This fact alone warrants more investigation into the nature of prior warning given by shooters, and those who choose to disclose this information.

Duration of Shootings

The amount of time between the first and last person killed can determine whether a homicide is considered a mass murder and can be exclusionary for some datasets (Huff-Corzine & Corzine, 2020). A commonly used timeframe for identifying mass homicides is that all violence occurs within a 24-hour period (Huff-Corzine & Corzine, 2020). When it comes to SMS specifically, they are typically over quickly, however, there have been incidents where the murders occur across a series of locations as in the Laurie Dann case for example (Papajohn & Kaplan, 1988). These incidents can last longer than in cases where all of the victims are at a single location. The *Safe School Initiative* found that nearly half of the incidents in their study were over within 15 minutes or less, while a quarter of them ended within five minutes (Vossekuil et al., 2002). More research is needed on this topic in order to assess how first responders can best prepare to treat SMS victims as every moment counts in these cases (Reeping et al., 2020)

Suicides

Everytown for Gun Safety's 2015 report found that out of 94 incidents of firearm discharge on school campuses in the U.S., that in 16 of the cases, the shooter either attempted or completed suicide. The *Safe School Initiative* found that 13 percent of the cases in their study

resulted in the shooter suiciding (Vossekuil et al., 2002). The CHDS (2020) found that out of their dataset of 1421 shootings, 9.6 percent completed suicide and 1.4 percent attempted suicide.

In summary, just a little over the majority of SMS occur during the school day and are over in 15 minutes or less. They are typically carried out with only one weapon which is most often a handgun. Although the findings have been mixed, many shooters give some sort of prior warning before the attack to someone they knew, and only 10-15 percent of shooters complete suicide. The number of deaths, as was discussed previously, are dependent on the definition of SMS used for each study and how they were measured. However, Densley and Peterson (2019) found after covering 53 years of mass shooting data, that attacks are both increasing in occurrence and becoming deadlier.

Theory

Given the devastating and tragic nature of SMS in the U.S., individuals from many different backgrounds have come forward with their own theory of what causes these crimes to occur and what must be done to stop them from happening. These theories have ranged from blaming heavy consumption of violent media, video games, and rap music (Newman et al., 2004), to false flag theories put forth by right wing conspiracy theorists who believe these crimes are staged by democratic leaders and that the family members of victims are simply "crisis actors" (Trotta, 2019). It seems that nearly everyone has a theory about the cause of these crimes, which is only natural given that current scholarship has yet to offer any empirically supported answers as to the causal nature of SMS.

Due to the fact that SMS are statistically rare events, it is difficult to create datasets that are large enough to empirically test the efficacy of individual criminological theories as they relate to these incidents (Jaymi Elsass, Schildkraut, & Stafford, 2016; Harding et al., 2002).

Therefore, previous scholarship on SMS and theory have presented as discussions of theoretical aspects that pertain to descriptions of relevant cases drawing from risk factor approaches, psychological theories, and cultural/sociological theories (Rocque, 2012). The same is true for the current study. Therefore, the following sections will cover some of the more notable perspectives on how criminological theories apply to the phenomena of SMS incidents in the U.S.

General Strain Theory

Robert Agnew's General Strain Theory (GST), describes strain as the negative pressure one feels when failing to achieve positively valued goals, the removal or threat of removal of positively valued stimuli, and strain as the presentation of negatively valued stimuli (Agnew, 1992). Qualitative research on SM shooters has shown that each of these three types of strain are evident when examining the worldviews of these individuals.

When approaching strain as the disjunction between aspirations, expectations, and actual achievements, there is much overlap between this notion and what we know to be true of previous SM shooters. Agnew describes aspirations as *ideal* goals (1992). Many SM shooters have set their ideal goals quite high, as well as expectations that these goals should be achieved in a timely manner (Newton, 2005). Some examples of ideal goals of SM shooters that were discovered during investigations following these incidents include achieving popularity among peers and gaining admiration, being viewed as attractive to the opposite sex and obtaining a romantic relationship, as well as other achievements that are related to obtaining/sustaining a masculine image (Newton et al., 2005). Still, other SM shooters desire to gain fame and notoriety from their attacks (Lankford & Silver, 2020).

Agnew (1992) suggests in GST that strain is also the disjunction between just or fair outcomes and actual outcomes. In other words, it is the disconnect between what one believes to be a just or fair outcome, and what the actual result may be. Previous studies have found that SM shooters often feel they are continuously treated unfairly by peers, authority figures, opposite sex, etc., and some tend to be "wound collectors", where they keep a running tally of every time they feel they were mistreated (Newton et al., 2005).

The removal of positively valued stimuli also relates to SMS in that previous research has stated that these crimes are largely about loss, either actual or perceived (Vossekuil et al., 2002). As aforementioned, this loss may include but is not limited to, the death of a loved one, the loss of a job, the loss of a relationship, the loss of one's social status and reputation. Further examination of the trigger factors of SM shooters will provide more insight into the ways in which the loss of positively valued stimuli relates to these crimes.

Finally, the actual or perceived threat of encountering negatively valued stimuli also holds true contributing to the strain felt by some SM shooters. The perceived consequences or results of a single event or the culmination of events for individuals who carry out these acts can be motivating factors in their decision to commit these crimes. For example, it could be the fear that their reputation has been destroyed by an event that has transpired, and for some reason carrying out a SMS is the only way to reassert power and masculinity among their peers and those who are close to them (Newton et al., 2005). Although these perspectives can be difficult for an average person to comprehend, each of these examples are based on qualitative sources found during the data collection process, as well as what previous qualitative research has found.

A Sequential Model of Cumulative Strain

Few theories of SMS have offered a comprehensive theoretical framework to describe these crimes and have typically focused on individual, unrelated aspects such as mental illness alone or a copycat/imitation effect (Roque, 2012). It is difficult to identify a single theory that can explain all SMS given the variation between the shooters themselves and their home environments. However, there is one integrated theory that is noteworthy.

Drawing on the works of Merton and Agnew, Levin and Madfis (2009) posited that SMS could be best explained by incorporating multiple criminologies into a five-stage sequential model of Cumulative Strain. The researchers drew from Strain theory, Control theory, and Routine Activities Theory to describe the various stages of the process that shooters go through leading up to the commission of a SMS. The five stages that make up the Cumulative Strain sequential model include: Chronic Strain, Uncontrolled Strain, Acute Strain, the Planning Stage, and finally, the Massacre (Levin & Madfis, 2009).

This theory describes a psychological process of change that occurs as the shooter leads up to his crime that is methodical in nature. The theory assumes that these individuals experience an increased amount of strain to begin with, compared to typical individuals (Levin & Madfis, 2009). As various events occur, they lose the ability to cope with chronic strain where it then becomes uncontrolled. This then turns to acute strain, not dissimilar to the concept of acute pain, that must be dealt with immediately. This is where the planning stage begins, as the shooters start to plot out their methods of attack and acquire the weapons they need. The last stage is then the massacre which is the SMS incident.

Methods

Purpose of the Study

The purpose of this study is to collect data from public mass shooting incidents that have occurred on American public and private educational properties in order to analyze them with the intent of providing potential root causes of deadly school violence in the U.S. Policy implications will be determined based on the research findings from this study and presented so they may inform future proposals for evidence-based school safety programs.

In order to address questions regarding SMS, one must first begin by identifying the three major dimensions of these crimes that make up the focus of this study. From there, the dimensions are used to develop more specific research questions relating to each one, and each variable is listed with its corresponding code name for information gathering.

Data Collection Process and Units of Analysis

Sampling

The current research project uses a non-probability purposive sampling because SMS incidents are rare in frequency and tend to receive a large amount of media coverage and attention when they occur. However, not all cases receive an equal amount of attention and coverage. The goal was to identify and locate as many cases as possible with essential information, using various data sources. Here, a sampling unit is a single incident of mass shooting and/or low-profile gun-related homicides on U.S. school grounds which served as the basis for identifying and collecting as many possible cases, such that they met criteria. This

process was the initial step in locating the cases from various written qualitative data sources, as mentioned in the previous section.

Units of Analysis

The unit of analysis is each individual incident of school mass shootings and/or gun-related homicides on school grounds in the United States. Three major dimensions were identified, and then three research questions were determined based on each research topic regarding these cases. Individual variables were identified according to each individual case. The following section will describe the chosen variables.

Data Sources

Since occurrences of SMS in the U.S. are uncommon incidents, it is difficult to assess them in an official capacity. This research required use of multiple sources to identify cases and collect relevant details for building a master table of school mass shootings that resulted in two or more total fatalities, with every four injuries counting as one fatality. The information collected here, via content analysis, was qualitative in nature.

Open Sources. Research was conducted by using currently available, archival resources as an initial starting point for identifying cases. Newspapers (including weekly magazines), and media outlets served as useful and convenient sources for this while the university's libraries, accessible databases, and internet-based search engines (e.g. google news) were also used to identify cases of school shootings in American schools (grades K-12, college campuses, and vocational schools) for the use of this study. All of these materials are text-based, qualitative content. Each data source was thoroughly assessed before being utilized to produce the master list of all possible incidents that met case criteria.

Variables and Research Questions

Dimensions

The three major dimensions of SMS that were identified for this study include:

(1) School characteristics

(2) Shooter characteristics and mental status

(3) Incidental characteristics

These three dimensions have been used to develop three research questions and identify corresponding variables that will be used to run an analysis to answer each question. Below, Table 1 depicts each dimension with its corresponding research question, along with the selected variables needed to analyze each question. This table is meant to illustrate the process of using a single dimension, developing a question from that topic, and then selecting dependent and independent variables that will be used to answer the research question while ultimately relating back to the original dimension of SMS. The variables where then recoded to have either two or three categories each so they would be appropriate for running Chi Square analyses.

Table 1

Lists of major dimensions, research questions, and variables

Dimension	Research Question	Variables
School characteristics	Is there an association between location (urbanization level) and other characteristics of the schools where shootings occurred?	Dependent: location category Independent: school category, student demographics, enrollment numbers, security application
Shooter characteristics and mental status	What individual characteristics, including those related to mental health are associated with prior warning?	Dependent: prior warning Independent: age, race, personality, trigger factor,

		history of mental illness, treatment, prior symptoms
Incidental characteristics	To what extent does school type associate with other incidental variables?	Dependent: school type Independent: time of day, duration, suicide status, moa, shooter relationship to school, weapon obtainment

Research Question 1: School Characteristics

Research Question 1 (RQ1). Is there an association between location (urbanization level) and other characteristics of the schools where the shootings occurred? *Table 2 provides a chart of each variable that corresponds to research question one, as well as the level of measurement and the values for each category that are discussed here*.

Variables. The variables that were tested in order to answer RQ1 includes the dependent variable, which is coded as **loccat**, and refers to the urbanization level of each community where the shootings took place. This variable is dichotomous and of nominal level measurement. It is divided into two categories which include **urban** and **rural/suburban**. Each city was classified as belonging in either category based on either current or historical U.S. Census Bureau data corresponding to the year each shooting occurred (U.S. Census Bureau, 2020).

The independent variables for testing RQ1 include **schoolcat**, which refers to the type of school where the incident occurred, whether it be **elementary**, **high school**, or **college/technical/vocational** school. This variable is ordinal in measurement and is categorical.

The second independent variable is **studemcat**, which indicates the racial demographic majority of the schools where the shootings occurred. This variable is nominal in measurement and dichotomous. The values include **Majority-White** and **Majority Non-White**.

Enrollment category is the third independent variable, and it is coded as **enrolcat.** This refers to the enrollment numbers of each school at the time of the shootings. It is ordinal level data and is divided into three categories, **700 or less**, **701-8,000** students, and **8,001-41,000** students.

Security applications utilized by schools in the dataset is the last independent variable. This is a nominal variable, and it is coded as **securecat**. It has three values which include **single app**, **multiple apps**, and **no security**.

Table 2

List of variables for RQ1, level of measurement, and categorical values

Research Question	Variables	Level of Measurement	Values
Is there an association between location (urbanization level) and other characteristics of the schools where shootings occurred?	Dependent:		
	loccat	nominal	urban rural/suburban
	Independent:		
	stype	ordinal	elementary high school college
	studemcat	nominal	majority White majority non-White
	enrolcat	ordinal	700 or less 701-8,000 8,001-41,000
	securcat	nominal	single app multiple apps no security

Hypothesis 1 (H_1). The hypothesis for research question one is that there is a significant association between school location and racial demographics of the student body.

The null hypothesis (H_0) for RQ1 is that there is no significant association between school location (urbanization level) and racial demographics of the student body.

Research Question 2: Shooter Characteristics and Mental Health

Research Question 2 (RQ2). What individual characteristics, including those related to mental health are associated with prior warning? *Table 3 provides a chart of each variable that corresponds to research question two, as well as the level of measurement and the values for each category that are discussed here*.

Variables. The variables that were used to answer RQ2 include prior warning status of the shooter as the dependent variable, which is coded as **priorwarnstat**. This variable is nominal level data and is dichotomous. The values include **yes** or **no**, depending on whether the shooter gave prior warning of their attack before-hand.

The first independent variable used to test RQ2 is **age** of the shooter at the time of the attack, which is ordinal level data and has been divided into the following categories **18 and under**, **19-25**, and **26 and over**.

Second, is **race** of the shooter. This variable is dichotomous, nominal level data. The two categories for shooter race are White and Non-White.

Third, is the independent variable personality of the shooter which is coded as **personcat**. This category is nominal level data and has three categories, **quiet/loner/moody**, **aggressive/threatening**, and **social/outgoing**. All data for this variable were collected from newspaper and journal articles about the individual SMS incidents.

The fourth independent variable developed to answer RQ2 is trigger factor of the shooter, which has been coded as **trigcat**. This variable is nominal level data and includes three categories **death of family/divorce/mental break**, **bullied/feud/loss of reputation**, and **loss of opportunity/job/rejection.** All data for this variable were collected from newspaper and journal articles about the individual SMS incidents.

History of mental illness is the fifth independent variable for RQ2, and it is coded as **menthist**. It is categorical and nominal level data. There are three values for this variable, which include **professional diagnosis**, **observed behavior/trauma/abuse**, and **none**. All data for this variable were collected from newspaper and journal articles about the individual SMS incidents.

The next independent variable is treatment history of mental health care, which is coded as **treat**. This variable is dichotomous and nominal level data. The values include **yes** or **no** depending on whether or not the shooter had a reported history of receiving mental health treatment. The data for this variable were collected from news articles and journals that reported on the SMS incidents included in the dataset. For a case to receive a designation of **yes** for mental health history, there had to be a report of previous inpatient stays, outpatient services including one-on-one therapy sessions and counseling services, or a mention of psychiatric medications being taken which would have had to be prescribed by a physician, indicating that the shooter was under a physician's care.

Finally, the last independent variable developed to answer RQ2 is previous mental health symptoms displayed by the shooter. These symptoms were reported to news outlets by family members, teachers, other students, etc. This variable is coded as **priorsymp** and it is dichotomous, nominal level data. The categories include **yes** for presence of symptoms and **no** if there were none reported. A case received the designation of **yes** if there were reported

symptoms that an individual could seek treatment for from a mental health professional, which included but was not limited to depression, suicidal ideation, past suicide attempts, homicidal ideation, aggression and violence, delusions, audiovisual hallucinations, paranoia, explosive rage, etc.

Table 3

List of variables for RQ2, level of measurement, and categorical values

Research Question	Variables	Level of Measurement	Values
What individual characteristics, including those related to mental health are associated with prior warning?	Dependent:		
	priorwarnstat	nominal	yes no
	Independent:		
	age	ordinal	18 and under 19-25 26 and over
	race	nominal	White Non-White
	personcat	nominal	quiet/loner/moody aggressive/threatening social/outgoing
	trigcat	nominal	death of family/divorce/mental break bullied/feud/loss of reputation loss of opportunity/job/rejection
	menthist	nominal	professional diagnosis observed behavior/trauma/abuse none
	treat	nominal	yes no
	priorsymp	nominal	yes no

Hypotheses 1 (H_1). There will be a significant association between age of shooter and the dependent variable prior warning.

The null hypothesis (H_0) here is that there is no significant association between age of shooter and the dependent variable prior warning.

Hypothesis 2 (H_2). There is a significant association between mental health treatment history and the dependent variable prior warning.

The null hypothesis (H_0) here is that there is not a significant association between mental health history and the dependent variable prior warning.

Research Question 3: Incidental Characteristics

Research Question 3 (RQ3). To what extent does school type associate with other incidental variables? *Table 4 provides a chart of each variable that corresponds to RQ3, as well as the level of measurement and the values for each category that are discussed here*.

Variables. To answer RQ3, the dependent variable selected is school type and is coded as **stype**. School type is categorical and ordinal level data. The categories for this variable are **elementary** school, **middle/high school**, and **college/technical/vocational**. The data for this variable were collected from online news sources and journals that covered these incidents at the time they occurred.

The first independent variable developed to answer RQ3 is the time that the SMS incidents occurred, and it is coded as **timecat**. This variable is nominal and dichotomous. The two categories are **before/after school** hours and **during school hours**. The data for this variable were collected from newspaper and journal articles that covered the shooting incidents in the dataset.

Second, is the independent variable, duration of the shooting, which is coded as **duratcat**. This variable is ordinal level data and has been divided into three categories, **10 mins or less**, **11-30min**, and **31 mins or more**. The data here were collected from newspaper and journal articles that reported on the SMS incidents.

The third independent variable used to answer research question three is shooter suicide status. This variable is coded as **suicidestat** and is nominal level data. The categories are divided by **yes**, **no**, and **suicide by cop**. The cases were designated by category based on whether the shooters suicided during their attacks or not, or if they engaged in fire with law enforcement and were killed. Here, the data were collected from news articles and journals that reported on the shooting incidents.

The fourth independent variable created to answer RQ3 is the shooter's method of attack and it is coded as **moacat**. This variable is nominal level data and is divided into three categories which are **targeted shooting**, **random shooting**, and **targeted/random**. This was determined based on whether the shooter indicated that they had a specific victim or multiple victims as their intended target, or if the attack was unfocused and random. The third category is for shooters who indicated there was a specific, targeted victim(s), but they also intended to harm random others as well. These data were collected from reports of the shooting found in newspaper and journal publications.

The next independent variable used to answer RQ3 is the shooters' relationship to the school, which is coded as **statuscat**. This variable is nominal and has three categories which are **current**, **former**, and **others**. Each case was designated as such based on how the shooter in each incident was, or was not, affiliated with the targeted school.

Finally, the last independent variable selected for answering research question three is how each shooter obtained their weapon(s). This variable is coded as **obtaincat** and is dichotomous, nominal level data. The values for this variable are **purchased** and **stolen/given**. The values are dived as such based on the availability of the weapon in either the shooters home or the home of someone they knew, versus the shooter having to formally purchase their weapon(s).

Table 4

List of variables for RQ3, level of measurement, and categorical values

Research Question	Variables	Level of Measurement	Values
To what extent does school type associate with other incidental variables?	Dependent:		
	stype	ordinal	elementary middle/high school college/technical/vocational
	Independent:		
	timecat	ordinal	before/after school during school hours
	durationcat	ordinal	10 mins or less 11-30min 31 mins or more
	suicidestat	nominal	yes no suicide by cop
	moacat	nominal	targeted shooting random shooting targeted/random
	statuscat	nominal	current student former student others
	obtaincat	nominal	purchased stolen/given

Hypothesis 1 (H_1). There is a significant association between school type and the independent variable, weapon obtainment.

The null hypothesis (H_0) here is that there is no significant association between school type and the independent variable, weapon obtainment.

Analyses and Findings

Descriptive Analysis of the Data

There are general descriptive characteristics of the present dataset of SMS cases that offer valuable insight into these crimes overall. These will be discussed here, before continuing with the specific research questions. The present dataset contains 60 cases of SMS incidents that took place across a period of 92 years in the U.S.

Table 5, shown below, provides a breakdown of SMS cases by year from 1927 to 2019 and depicts how many shootings occurred during each year. Additionally, this table describes how many fatalities and injuries occurred each year, by combining the totals for each shooting incident. The year with the highest number of fatalities was 1927 where 45 deaths occurred. This was also the year with the highest number of injuries. The years where the highest numbers of incidents occurred were 2012 and 2018, with four SMS taking place in each year.

Table 5

Number of incidents and victims of SMS by year, 1927-2019

Year	Incident	Death	Injured	Year	Incident	Death	Injured
1927	1	45	58	1999	1	15	23
1966	1	18	32	2001	1	2	13
1974	1	3	11	2002	2	7	3
1976	1	7	2	2003	1	2	0
1979	2	4	14	2005	1	10	7

1981	1	2	0	2006	3	11	8
1984	1	3	12	2007	1	33	23
1985	1	1	6	2008	2	9	21
1988	2	4	15	2010	1	3	3
1989	1	6	30	2012	4	41	7
1991	1	6	1	2013	2	8	4
1992	3	8	14	2014	2	12	15
1993	1	2	0	2015	1	10	9
1995	1	2	1	2016	3	11	14
1996	2	6	1	2017	3	12	19
1997	3	8	14	2018	4	31	48
1998	2	9	32	2019	3	6	15
				TOTAL	*60*	*357*	*475*

Below, Figure 1 provides a visual representation of the data displayed in Table 5.

Figure 1

Number of Incidents and Victims of SMS by Year

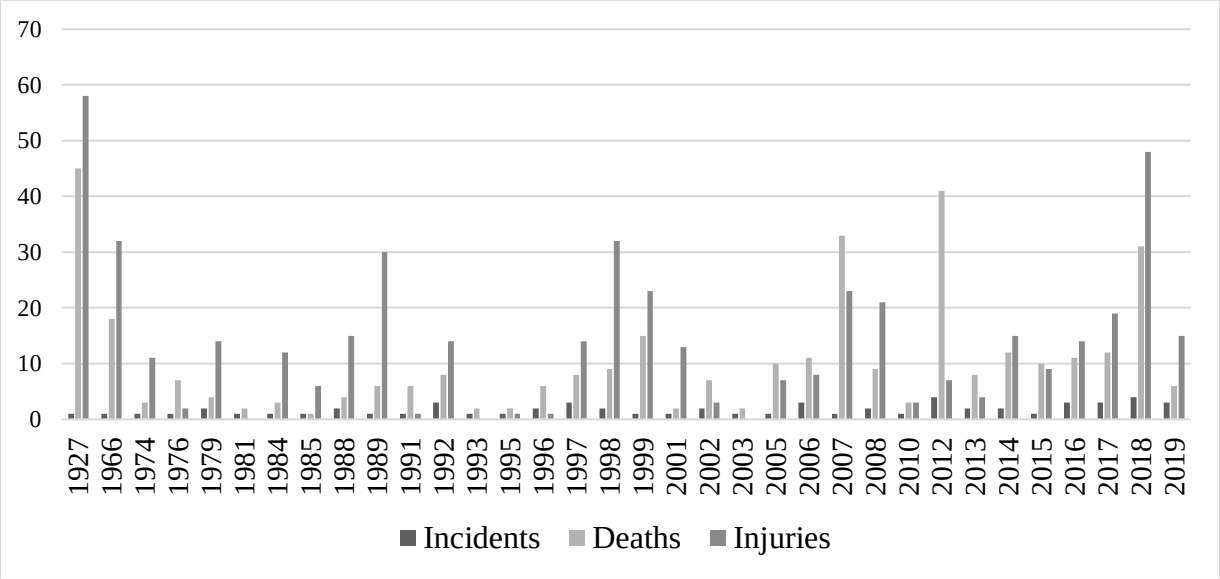

Table 6, depicted below, displays the number of SMS from the research sample divided by state. Additionally, the table shows the percentages of the cases in the sample based on the states they occurred in. California has the highest number of cases by far with fourteen incidents containing 23.3 percent of all SMS in this dataset. The table shows data for 30 U.S. states which had SMS that met criteria for this study, while the remaining 20 U.S. states and 14 U.S. territories were not included in this dataset.

Table 6

SMS incidents by state, 1927-2019

State	Number	Percent	State	Number	Percent
Alaska	1	1.7	Mississippi	1	1.7
Alabama	1	1.7	North Carolina	1	1.7
Arkansas	1	1.7	New Mexico	1	1.7
Arizona	1	1.7	New York	3	5.0
California	14	23.3	Ohio	1	1.7
Colorado	2	3.3	Oregon	2	3.3
Connecticut	1	1.7	Pennsylvania	1	1.7
Florida	2	3.3	South Carolina	3	5.0
Iowa	1	1.7	Tennessee	1	1.7
Illinois	2	3.3	Texas	3	5.0
Kentucky	3	5.0	Virginia	2	3.3
Louisiana	1	1.7	Vermont	1	1.7
Massachusetts	1	1.7	Washington	2	3.3
Michigan	3	5.0	West Virginia	1	1.7
Minnesota	2	3.3	Wyoming	1	1.7
			TOTAL	60	100.0[1]

[1] Total percentage may not be 100.0 percent due to rounding off

Table 7 shows the number of SMS incidents in the dataset based on what month each shooting occurred. The month of February has the highest number of incidents with nine SMS, making up fifteen percent of the cases in the dataset. The months with the least number of shootings, not surprisingly are June and July, where most students are out of school for the summer break. Between these two months, only five shootings occurred and those were at college level institutions.

Table 7

SMS incidents by month, 1927-2019

Month	# of SMS	Percent
January	5	8.3
February	9	15.0
March	4	6.7
April	6	10.0
May	7	11.7
June	3	5.0
July	2	3.3
August	4	6.7
September	4	6.7
October	6	10.0
November	5	8.3
December	5	8.3
Total	60	100.0[1]

[1] Total percentage may not be 100.0 percent due to rounding off

Below, Figure 2 provides a visual representation of the information displayed in Table 7.

Figure 2

SMS Incidents by Month

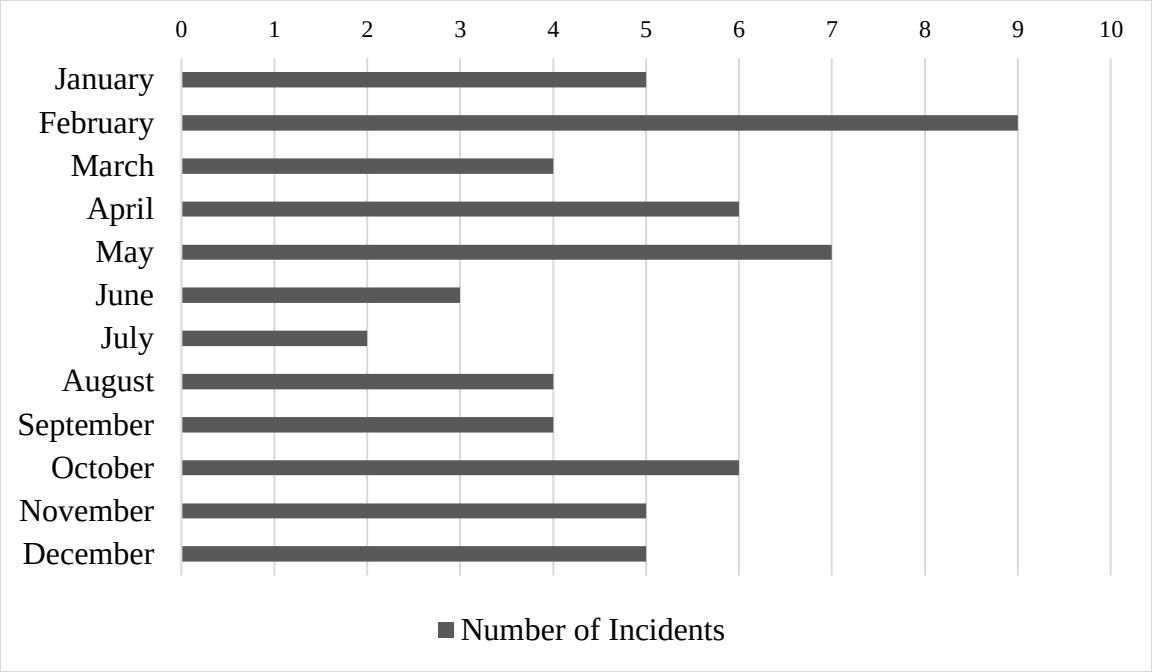

Table 8 depicts all SMS cases included in the sample by the day of the week each shooting took place. Friday had the highest number of cases with 17 shootings which made up 28.3 percent of the sample. The day with the second most occurrences were Mondays, with fifteen cases and 25 percent of the sample. Zero shootings occurred on Sundays in the current sample.

Table 8

SMS incidents by day of week, 1927-2019

Day	# of SMS	Percent
Sunday	0	0.0
Monday	15	25.0
Tuesday	8	13.3
Wednesday	11	18.3
Thursday	7	11.7
Friday	17	28.3
Saturday	2	3.3
Total	60	100.0[1]

[1] Total percentage may not be 100.0 percent due to rounding off

Below, Figure 3 provides a visual representation of the data displayed in Table 8.

Figure 3

SMS Incidents by day of week

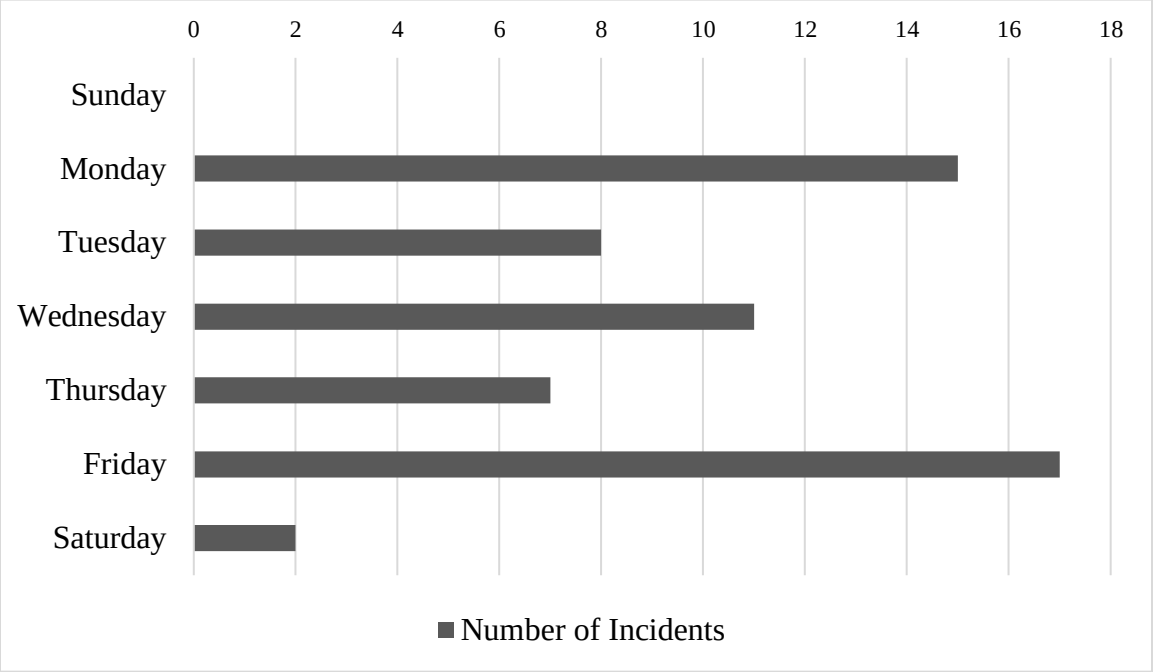

Table 9 depicts demographic characteristics of the individual shooters from the sample based on gender and race. The overwhelming majority of incidents were perpetrated by males, making up 93.3 percent cases. Only four shooters from this sample were females.

Additionally, Table 9 displays the racial demographics of the shooters from this sample. The majority of shooters were White, accounting for 61.7 percent of shooters. 16.7 percent of the shooters were Black, 11.7 percent were Asian, five percent were two or more races, 3.3 percent were Native American, and 1.7 percent were Hispanic.

Table 6

Shooter characteristics by gender and race, 1927-2019

	Variable	Number	Percent
Gender	Male	56	93.3
	Female	4	6.7
	Total	60	100.0[1]

Race	White	37	61.7
	Black	10	16.7
	Hispanic	1	1.7
	Asian	7	11.7
	Native American	2	3.3
	Two or more races	3	5.0
	Total	60	100.0[1]

[1] Total percentage may not be 100.0 percent due to rounding off

Below, Figure 4 provides a visual representation of the data in Table 9.

Figure 4

SMS perpetrators by race

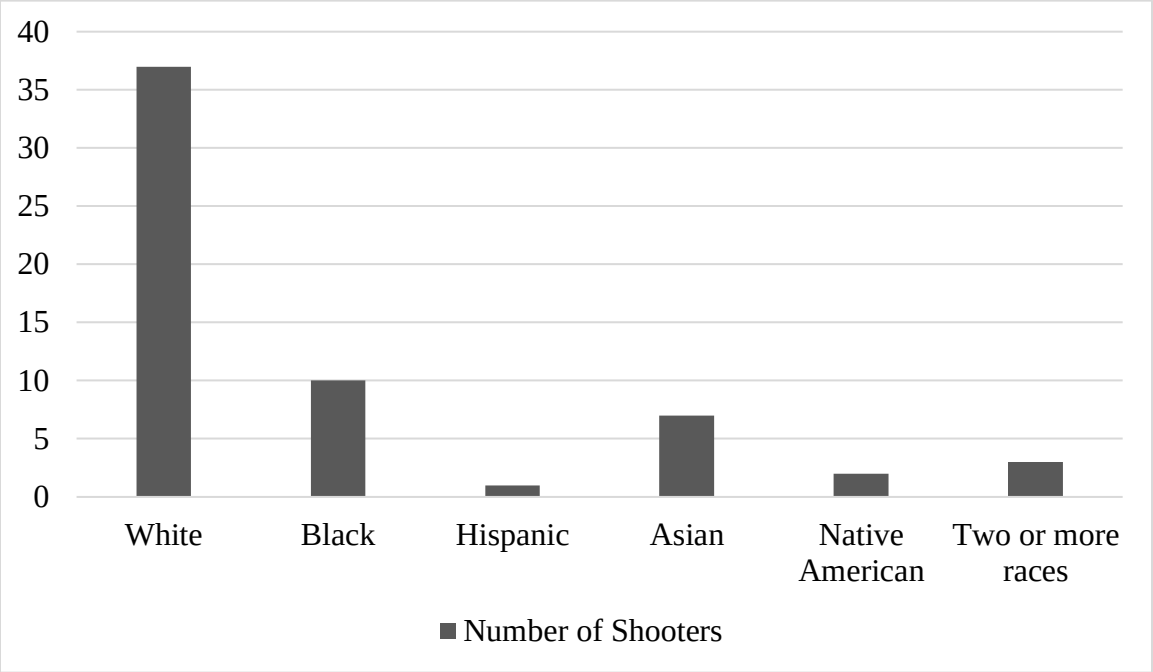

Table 10 describes the number and percentages of each individual shooter based on their status in relation to the schools where the incidents occurred as well as age ranges for the shooters. The majority of shooters were current students at the school where they carried out their shooting, making up 60 percent of the cases. 16.7 percent of the shooters were former students and 23.3 percent had no relationship to the school.

When it comes to age ranges of the individual shooters included in this dataset, the majority were 26 years old or older, accounting for one third of the dataset. 26.7 percent of shooters were age 19-25 years old, 31.7 percent of shooters were age 15-18, and 8.3 percent were 11-14 years old.

Table 70

Number of SMS by shooter status and age, 1927-2019

Variable		Number	Percent
Status	Current student	36	60.0
	Former student	10	16.7
	Other	14	23.3
	Total	60	100.0[1]
Age	11-14	5	8.3
	15-18	19	31.7
	19-25	16	26.7
	26 and above	20	33.3
	Total	60	100.0[1]

[1] Total percentage may not be 100.0 percent due to rounding off

The type of schools where the shootings in this sample occurred are displayed below in Table 11. The majority of cases is this sample occurred at universities, community colleges, and vocational/trade schools, making up 40 percent of the dataset. High schools had the second largest number of incidents accounting for 36.7 percent of the dataset. 20 percent of the cases occurred in elementary schools, and 3.3 percent took place at middle schools. This is consistent with what previous studies have found, as was aforementioned in the literature review (Baird et al., 2017; Everytown for Gunsafety, 2015).

Table 11

Number of SMS by type of school, 1927-2019

Variable		Number	Percent
School Type	Elementary	12	20.0
	Middle School	2	3.3
	High School	22	36.7

	College/Trade School	24	40.0
	Total	30	100.0[1]

[1] Total percentage may not be 100.0 percent due to rounding off

Mode of Entry (MOE) is also a topic of heavy interest when it comes to studying these crimes and the incidental characteristics of each SMS. Table 12 describes the variable MOE, where it was revealed that 86.7 percent of shooters in this dataset simply walked into the building where the incidents occurred. The remining 13.3 of shooters carried out their assaults while outside of the building. This makes some logical sense when considering that many of the perpetrators are current students at the schools or are young enough to blend in with students. Additionally, many of the cases occurred prior to the Columbine shooting, at times when schools were not prioritizing security applications the way many do today.

Table 12

Mode of entry, 1927-2019

Variable		Number	Percent
MOE	Walked in	52	86.7
	Outside of building	8	13.3
	Total	60	100.0[1]

[1] Total percentage may not be 100.0 percent due to rounding off

Chi Square Analyses

In order to answer the research questions and test the associated hypotheses that were developed for each dimension of SMS, Chi Square analyses were used. Below, each research question is listed along with the corresponding hypotheses and the crosstabs that were used to test the association between selected variables. This section focuses on the hypotheses for each research question as well as other notable Chi square analyses that correspond with each

dimension. The following discussion section contains a complete chart of all 18 crosstabs that were ran, along with their results, and will be discussed in the next section.

Research Question 1

RQ1: Is there an association between location (urbanization level) and other characteristics of the schools where the shootings occurred?

H_1: *There will be a significant association between school location and racial demographics of the student body.*

H_0: *There will not be a significant association between school location and racial demographics of the student body in the schools where SMS occurred.*

Table 13

Crosstab between location and student demographics[1]

	Student Demographics		
Location Category	Majority White	Majority Non-White	Total
Rural/suburban	41 (82.0)	9 (90.0)	50
Urban	9 (18.0)	1 (10.0)	10
Total[2]	50 (100.0)	10 (100.0)	60

[1] $p < .54$ (Pearson Chi Square value =.384, df = 1)

[2] Total percentages may not be 100.0 percent due to rounding off

Table 13, seen above, depicts the crosstab between school location and student demographics of the schools where the SMS occurred. There were 60 valid cases (n = 60) for this Chi Square test of association. Each variable, both dependent and independent were dichotomous. The Pearson Chi Square value for this test was .384, with one degree of freedom (df = 1). The asymptotic significance for this test was .54 ($p < .54$), which is not statistically significant.

There was no statistical significance resulting from the Chi Square analysis between school location and student demographics for the cases in the dataset. This indicates that there is no significant association between these two variables, and RQ1, H_1 is incorrect. Therefore, the null hypothesis is accepted which is H_0: *There is not a significant association between school location and racial demographics of the student body in the schools where SMS occurred.*

Other notable crosstabs that were ran in order to answer RQ1 can be seen below in tables 14 and 15. Table 14 displays a crosstab that was ran between school location category and school type. There were a total of 60 cases (n = 60), that were valid for this Chi Square analysis. The Pearson Chi Square value is 8.400, with two degrees of freedom (df = 2). The asymptotic significance for this test is .015 ($p < .015$), which is significant at the .05 alpha level. This indicates there is a significant association between the variables, location category and type of school where SMS occurred.

Table 8

Crosstab between location and school type[1]

Location Category	School Type			
	Elementary	Middle/High School	College	Total
Rural/suburban	8 (66.7)	24 (100.0)	18 (75.0)	50
Urban	4 (33.3)	0 (0.0)	6 (25.0)	10
Total[2]	12 (100.0)	24 (100.0)	24 (100.0)	60

[1] $p < .015$ (Pearson Chi Square value = 8.400, df = 2)

[2] Total percentages may not be 100.0 percent due to rounding off

Table 15, seen below, displays a crosstabulation between school location and security apps of the individual schools from each case in the dataset. There were a total of 60 valid cases for this Chi Square test (n = 60), and the results yielded a Pearson Chi Square value of 9.514 (df

= 2). The asymptotic significance was .009 (p = .009) which indicates the association between these two variables is significant at the .01 alpha level.

Table 15

Crosstab between location and security applictions[1]

Location Category	Security Apps			
	Single App	Multiple Apps	None	Total
Rural/suburban	19 (86.4)	19 (100.0)	12 (63.2)	50
Urban	3 (13.6)	0 (0.0)	7(36.8)	10
Total[2]	22 (100.0)	19 (100.0)	19 (100.0)	60

[1] p < .009 (Pearson Chi Square value = 9.514, df = 2)

[2] Total percentages may not be 100.0 percent due to rounding off

Research Question 2

RQ2: What individual characteristics, including those related to mental health are associated with prior warning?

H_1: *There will be a significant association between age of shooter and the dependent variable, prior warning.*

H_0: *There will be no significant association between age of shooter and the dependent variable, prior warning.*

Table 16, displayed below, shows the crosstabulation between prior warning given by the shooter and the age category the shooters fall into. There were a total of 60 cases (n = 60) included in this crosstab and the results indicated a Pearson Chi Square value of 2.835, (df = 2). The asymptotic significance of this test is .242 (p < .242), which indicates there is no association between these two variables. Therefore, H_1 for RQ2 is incorrect and the null hypothesis must be accepted.

Table 16

Crosstab between prior warning and age category[1]

	Age Category			
Prior Warning	18 and under	19-25	26 and over	Total
Yes	16(69.6)	12 (52.2)	6 (42.9)	34
No	7 (30.4)	11 (47.8)	8(57.1)	26
Total[2]	23 (100.0)	23 (100.0)	14 (100.0)	60

[1] $p < .242$ (Pearson Chi Square value = 2.835, df = 2)

[2] Total percentages may not be 100.0 percent due to rounding off

H_2: *There is a significant association between mental health treatment history and the dependent variable prior warning.*

H_0: *There is no significant association between mental health treatment history and the dependent variable prior warning.*

Table 17 shows the crosstab used to test RQ2, H_2. All 60 cases were included in this crosstab analysis (n = 60) and the results yielded a Pearson Chi Square value of .625 (df = 1). The asymptotic significance from this crosstab result was .428 ($p < .428$), which indicates that there is no significant association between the variables, treatment history and prior warning. Therefore, the null hypotheses must be accepted which can be seen above.

Table 17

Crosstab between prior warning and treatment history[1]

	Treatment History		
Prior Warning	Yes	No	Total
Yes	11(50.0)	23 (60.5)	34
No	11 (50.0)	15 (39.5)	26
Total[2]	22 (100.0)	38 (100.0)	60

[1] $p < .428$ (Pearson Chi Square value = .625, df = 1)

[2] Total percentages may not be 100.0 percent due to rounding off

Research Question 3

RQ3: To what extent does school type associate with other incidental variables?

H_1: *There is a significant association between school type and the independent variable, weapon obtainment.*

H_0: *There is no significant association between school type and the independent variable, weapon obtainment.*

Table 18 displays the crosstabulation that was used to test R3, H_1. There were 56 valid cases (n = 56) in this statistical test and the Pearson Chi Square result was 19.168 (df = 2). The asymptotic significance from this analysis was $p < .001$, indicating that there is a significant association between the variables, school type and weapon obtainment. Therefore R3, H_1 was correct and the null hypothesis was rejected.

Table 18

Crosstab between school type and weapon obtainment[1]

	Weapon Obtainment		
School Type	Purchased	Stolen/Given	Total
Elementary	5 (16.7)	7 (26.9)	12
Middle/High School	6 (20.0)	17 (65.4)	23
College/Tech/Vocational	19 (63.3)	2 (7.7)	21
Total[2]	30 (100.0)	26 (100.0)	56

[1] $p < .001$ (Pearson Chi Square value = 19.168, df = 2)

[2] Total percentage may not be 100.0 percent due to rounding off

Other notable Chi Square analyses that were performed in order to answer RQ3 are found below in Tables 19 and 20. Table 19 depicts a crosstabulation between the variables school type and suicide status. All 60 cases (n = 60) were valid in this test and the Pearson Chi Square value

was 12.794, (df = 4). The asymptotic significance for this crosstab was .012 ($p < .012$), which is statistically significant at the .05 alpha level. This finding indicates that there is a statistically significant association between the two variables, school type and suicide status.

Table 19

Crosstab between school type and suicide status[1]

School Type	Suicide Status			
	Yes	No	Suicide by cop	Total
Elementary	8 (34.8)	4 (11.8)	0 (0.0)	12
Middle/High School	5 (21.7)	19 (55.9)	0 (0.0)	24
College/Tech/Vocational	10 (43.5)	11(32.4)	3 (100.0)	24
Total[2]	23 (100.0)	34 (100.0)	3 (100.0)	60

[1] p < .012 (Pearson Chi Square value = 12.794, df = 4)

[2] Total percentages may not be 100.0 percent due to rounding off

Table 20 displays a crosstabulation between the variables, school type and shooter status. All 60 cases (n = 60) were included in this analysis and the Pearson Chi Square value was 26.006 (df = 4). Both variables had three categories each and there were a total of 36 current students, 10 former students, and 14 individuals who had no affiliation with the schools. The asymptotic significance was $p < .001$, indicating a statistically significant association between the two variables at the .01 alpha level.

Table 20

Crosstab between school type and shooter relationship to school[1]

School Type	Shooter Status			
	Current	Former	Others	Total
Elementary	1 (2.8)	2 (20.0)	9 (20.0)	12
Middle/High	20 (55.6)	3 (30.0)	1(7.1)	24
College	15 (41.7)	5 (50.0)	4 (28.6)	24
Total[2]	36 (100.0)	10 (100.0)	14 (100.0)	60

[1] $p < .001$ (Pearson Chi Square value = 26.006, df = 4)

[2] Total percentages may not be 100.0 percent due to rounding-off

Discussion and Policy Implications

Summary and Discussion

In addition to the aforementioned Chi Square tests of association, other Chi Square analyses were conducted in order to answer RQ1, RQ2, and RQ3. Table 21 (see below) displays all 18 Chi Square tests that were ran, along with which dimension of SMS they were associated with, the crosstab variables, and the findings from each test. Although some of the results yielded from these Chi Square analyses showed statistical significance, the size of the dataset (n = 60) remains problematic for interpreting these results as there is less statistical power.

Table 21

List of all Chi-squares analyzed with results by dimension

Dimension	Crosstab Variables	Valid Cases (% of cases)	df	Pearson Chi Square Value	Asymptotic Sig. (2-sided)
School Characteristics	Location*school type	60 (100.0)	2	8.400	$p < .015^{*}$
	Location*student majority demographic	60 (100.0)	1	.384	$p < .535$
	Location*enrollment category	60 (100.0)	2	4.008	$p < .135$
	Location*security apps	60 (100.0)	2	4.744	$p < .009^{**}$
Shooter Characteristics:	Prior warning*age category	60 (100.0)	2	2.835	$p < .242$
	Prior warning*personality	60 (100.0)	2	5.076	$p < .079$
	Prior warning*trigger category	59 (98.3)	2	2.642	$p < .267$
	Prior warning*mental history	60 (100.0)	2	3.477	$p < .176$
	Prior warning*treatment	60 (100.0)	1	.629	$p < .428$
	Prior warning*prior symptoms	60 (100.0)	1	1.144	$p < .978$

	Prior warning*race	60 (100.0)	1	.268	p <.604
	Location*age	60 (100.0)	2	8.862	p <.012*
Incidental Characteristics	School type*time category	60 (100.0)	2	2.308	p <.315
	School type*duration	54 (100.0)	4	4.230	p <.376
	School type*suicide status	60 (100.0)	4	12.794	p <.012*
	School type*moa	60 (100.0)	4	4.468	p <.346
	School type*shooter status	60 (100.0)	4	26.006	p < .001**
	School type*weapon obtainment	56 (93.3)	2	19.168	p < .001**

* indicates significance at the .05 alpha level

** indicates significance at the .01 alpha level

The variables that had the most significant association related to school characteristics were school location and school type (p < .015), as well as school location and age of the shooter (p < .012). As was depicted in Table 14, majority of SMS overall took place in rural/suburban communities (50) while only 1/6th (10) cases occurred in urban areas. Although this is consistent with common narratives perpetuated by the media about these crimes, some cases occurring in urban areas were excluded from this dataset due to lack of detailed information relating to the crimes. This is discussed further in the limitations section below. However, 24 cases from the sample occurred in rural/suburban middle schools and high schools, and there were twice as many shootings at elementary schools in rural/suburban areas as in urban elementary schools.

To examine characteristics of the schools themselves, one must look outside of common sociocultural community attributes that are often used to explain these crimes, and assess if there are other factors that make these schools more vulnerable in comparison to schools in urban districts. The crosstab between location and security application indicated a statistically significant association (p < .009) at the .01 alpha level. Interestingly, when examining the crosstabulation there were the same number (19) of rural/suburban schools with a single security

application (e.g., CCTV only, or security guard only) as there were with multiple security applications, and 12 rural/suburban schools with no security programs outside of traditional locks on doors. It should be noted that technology and funding for security programs in schools has changed overtime and many earlier cases occurred prior to the advent of the internet and during time periods before mental detectors and surveillance technology existed. However, it is interesting to consider that as technology and funding for security has improved overtime, incidents of SMS have still increased in frequency and lethality.

Another interesting finding relating to location is the age of the shooters themselves. Nearly all cases of SMS where the shooter was age 18 or under, occurred in rural/suburban communities rather than urban communities. Similarly, nearly all cases where the shooter was age 26 or older also took place in rural/suburban communities. In urban communities, the most prevalent age range for shooters was 19-25, making up 80 percent of cases in this type of community. This could be because urban SMS often occurred at colleges, and many college students fall into this age bracket. However, that does not explain why so few school age individuals perpetrate these crimes in urban settings, yet so many *do* perpetrate them in rural/suburban settings.

When it comes to mental health characteristics of the individual shooters and prior warning, the findings were somewhat surprising. These variables resulted in the least significant associations out of all Chi Square tests which can be seen above in Table 21. When it came to crosstab analysis between the variables prior warning given by shooters and prior symptoms of mental health there was no association ($p < .978$). Meaning that based on this analysis, it cannot be said there is a relationship between shooters' mental health characteristics and tipping anyone off about their attacks beforehand. The same is true for the crosstabs between prior warning and

mental health treatment history ($p < .428$). This finding was somewhat disappointing because in some ways, it would make sense that shooters who have received mental health treatment in the past would be more likely to reveal their intentions to others, perhaps as a cry for help. However, this was not the case and according to the findings in this study there is no association between prior warning and mental health factors. Moreover, this means that statistically, receiving mental health services alone has little impact on whether a shooter chooses to disclose information of their planned attack ahead of time.

Additionally, when it comes to incidental characteristics of SMS the crosstab between school type and whether the shooter suicided indicated that the association between these two variables was statistically significant at the .05 alpha level ($p < .012$). Although in over half of the cases in the dataset (34) the shooter did not suicide, the majority of shooters who did end their life did so more often during attacks on colleges (ten) and elementary schools (eight). Meanwhile, there were five cases where the shooter suicided during attacks on middle/high schools, and three cases where the shooter committed suicide by cop during attacks on college campuses. The common public perception of SMS is that most shooters either do or intend to commit suicide. However, the results here reveal something different. Given the young age of many shooters and the prevalence of delusions observed during data collection, it is difficult to ascertain whether or not those who were reported as "suicide by cop" actually intended for this to happen. It is plausible that given the ages and skewed perceptions of reality that some of these shooters experience, they may truly believe they will be able to survive these attacks and escape without getting caught.

Other incidental characteristics that were found to be significant upon crosstabulation were school type and the shooters' relationship to the school ($p < .001$). In the majority of cases

in this dataset (36), the shooter was a current student at the school where the incident occurred. Among those, 20 were at attacks on middle/high schools, and 15 were at attacks on colleges, while only one elementary school attack was perpetrated by a current student. There were a total of ten attacks that were perpetrated by former students, five at colleges, three at middle/high schools, and two at elementary schools. The school type with the most number of attacks perpetrated by individuals with no relationship to the school was at elementary schools, where nine such incidents (nearly $1/6^{th}$ of the total cases) occurred. Which is disturbing to say the least.

Finally, the crosstabulation between school type and how the weapon(s) were obtained indicated a significant relationship ($p < .001$) between these two variables. Perhaps not surprisingly, the incidents where weapon(s) were obtained by the shooters via purchase occurred at colleges (19). Alternatively, the incidents where the weapon(s) were either stolen or given occurred at attacks on high schools (17). In attacks on elementary schools, there were five incidents where the weapon(s) were purchased and seven where the weapon(s) were stolen or given. The following section will discuss policy implications of these findings.

Policy Implications

Previous sections briefly mentioned a division among American policy makers regarding "the solution" for solving the issues of SMS as well as other public mass shootings in the U.S. In one camp, there is a group who believes that "fixing the mental health care system" will put an end to this phenomenon. In the other camp is the opposing group who believes that the true issue behind these crimes is the ready availability of firearms. The fact of the matter is that both of these "policy solutions" work well to activate both conservative and liberal constituents during an election season because to the general public, these crimes are traumatic and many parents and students live in fear of SMS happening in their community.

However, there is often no logistical policy proposal attached to these ideas and it is unclear whether or not expanding access to mental health care or restricting firearms would impact the number of SMS or public mass shootings in the U.S. That is not to say that these ideas have no merit or efficacy whatsoever. The point is simply that enacting one or even both of these policies may not put an end to these tragedies, as they are complex issues that seem to be at least partly rooted in issues related to sociocultural norms and individual identity (Newman et al., 2004; Langman, 2020), regardless of how politically unpopular this reality is. Additionally, not all of these attacks are committed with firearms and Agnich (2015), found using a global dataset of attacks on schools that while 70 percent of cases utilized firearms, 30 percent were carried out with explosives or bladed weapons. Therefore, restricting firearms alone is not a hard and fast solution to this problem.

Nonetheless, important scholarship has emerged in recent years exploring the ways in which firearm restrictions may impact public mass shootings overall. One study suggests that laws requiring licensing through background check processes which utilize fingerprinting are effective for reducing mass shootings (Webster, McCourt, Crifasi et al., 2020). However, this policy would only be effective for mass shooters who obtain their weapons through legal channels, which as was discussed in the result section, is not the case for many SM shooters. Additionally, another important aspect of firearm restriction that has received much focus is banning or restricting large-capacity magazines for handguns, semiautomatic firearms, and assault weapons. Koper (2020) found that high capacity semiautomatic weapons are used in 20-58 percent of mass murders overall in the U.S. as well as a large number of public mass shootings. Both of these studies assert that restricting or banning weapons that use large capacity magazines is an important step toward reducing the number of deaths and injuries in public mass

shootings. Furthermore, Koper (2020) suggests that the number of mass shooting deaths could be reduced by 11-15 percent, and the total number of victims could be reduced by up to 25 percent.

Threat assessments as a means of preventing violence in schools generally, as well as SMS, have become a popular and widespread measure for preventing these incidents. Although there is no reliable pattern of behaviors or characteristics that can be used to identify individuals who will commit future SMS and who will not, some traits have been identified as common among school SM shooters and have been used to create assessments that can be utilized in schools (O'Toole, 2000). Contemporary threat assessments in schools have moved away from a predictive nature and are oriented toward school violence prevention (Cornell, 200). Currently the implementation of these programs has not been mandated across schools in the U.S. In schools who do utilize this approach, a multidisciplinary threat assessment team (which consists of a school administrator, mental health professional, and a law enforcement representative) is established to investigate reports of threats and develops interventions for each case (Cornell, 2020). Silver (2020) advocates for the widespread adoption of these programs as a means of preventing these crimes and to encourage bystander reporting (Silver, 2020). However, this intervention does nothing to prevent shooters who are not current students at the targeted schools.

When it comes to mental health, based on this data there was no statistically significant relationship between symptoms of mental illness, treatment history, or presence of mental illness and giving prior warning or reaching out for help beforehand. Therefore, based on these findings alone, addressing issues with our mental health care system may not have an impact on these crimes. This may be because many of the symptoms exhibited by the individual shooters were related to personality disorders which may be difficult to treat, and these shooters may be quite

resistant to treatment. Additionally, shooters who are minors do not have the autonomy to seek out therapy or counseling on their own and must have a parent's permission to see a psychologist or psychiatrist.

Assuming that it is, in fact, possible to solve the problem of SMS in the U.S, from this researcher's perspective, it is going to take a multipronged approach that includes but is not limited to: restrictions on fire arms and explosives; expanding access to mental health care, destigmatizing mental illness and seeking treatment, developing interventions that are effective for treating personality disorders; and addressing the legacy and consequences from idealizing an extremely toxic and narrow view of masculinity for the last 200 years in the United States.

Limitations of the Study and Future Research

There are several limitations to this study that must be mentioned. First, this collection of cases (n = 60), is still not large enough to yield results with the ideal amount of statistical power. Therefore, the results from the Chi Square analysis must be interpreted with this in mind. This issue is due to the rarity of SMS events, making it difficult to obtain a large enough sample size to examine these events to the desired extent by performing higher level statistical analyses.

Second, using news sources as a data collection source has its own set of limitations. Such as, relying on second, or even third, hand information about the shooters themselves and their potential mental health struggles. Additionally, the news media does not cover all cases of SMS equally, and while some cases receive heavy coverage nationally or even internationally, there are other low-profile cases that are only covered locally in one or two articles. This makes it extremely difficult to gather enough information on some cases that may have been valuable for studying this topic.

Furthermore, the findings revealed that only 1/6th of cases from the dataset occurred in urban areas. While this is consistent with the common narrative of SMS which is often touted by the media, it should noted that this researcher observed upon data collection that SMS occurring in schools where the perpetrator and victims were Black received far less coverage than other incidents that occurred at Majority White schools. Unfortunately, data on these incidents were too limited and incomplete to ultimately be included in the dataset. From this researcher's perspective, this is an issue that must be addressed by mainstream media outlets, as they are ultimately the ones who are limiting coverage of these cases, while at the same time, perpetuating a narrative that these problems primarily exist in suburban and rural schools. Although one can make assumptions as to why this bias is present in media coverage of SMS, the reality is that this lack of inclusion of these relevant cases in the present dataset, as well as other datasets created from news sources, may have skewed the results. Future scholarship will benefit from the inclusion of SMS that occur in urban settings if researchers are to truly gain insight and understanding into these incidents.

Finally, the working definition of SMS that was used as a criterion for data collection of cases has not been tested for efficacy in researching these crimes. The working definition was intentionally broad in order to examine SMS beyond the most high-profile cases and examine these incidents of violence in a more inclusive sample. Likewise, when it comes to working definitions for mental health symptoms, these data were collected from second and third hand news sources rather than physicians or mental health professionals, so there are clear issues with reliability. Furthermore, the criterion of mental health symptoms was intentionally set broadly to gain insight into the range of psychosocial problems experienced by the shooters themselves. This meant looking further than only the most serious mental illnesses, such as psychotic and

mood disorders. It is imperative that future research on SMS include trauma history, developmental disorders, and anxiety disorders when studying these crimes. Threat assessment models, which function both as a preventative measure and intervention for averting these crimes, will benefit from this knowledge.

Conclusion

Although mass shootings in the U.S. are considered to be a statistically rare occurrence, there is evidence to suggest that they have increased in both lethality and frequency over the past ten years (Duwe, 2020). Therefore, more research is needed on the topic of public mass shootings, especially those occurring in schools. The three dimensions of SMS that were identified in order to guide this research project were characteristics of the schools where the shooting occurred, characteristics of the shooters and mental health factors that were present, as well as characteristics of the individual incidents. Additionally, the role of prior warning in these incidents was examined as well.

The aim of this study was to explore these three dimensions by identifying a research question for each, and then identifying a series of variables that relate to each question. Additionally, four hypotheses were then developed from the research questions. Chi square analyses were conducted for 18 different variables in order to assess the associations between various aspects of the three dimensions of SMS, test the four hypotheses, and answer the three research questions. This study adds to the current literature on SMS by identifying the statistically significant associations between school location and school security applications, school location and age of shooters, school location and school type, school type and suicide status of the shooter, school type and shooters relationship to the school, and finally, school type

and weapon obtainment. Furthermore, the lack of association between prior warning and mental health factors was identified.

Additionally, this study extended the current literature on SMS by utilizing a broader definition of SMS and a broader definition of mental illness. Utilizing an inclusive approach allowed more cases to be included in the dataset and offered broader perspective for testing the variables that related to the three dimensions of SMS. Overall, this informs researchers on how a variety of communities within the U.S. are impacted by these crimes versus looking exclusively at the most high-profile cases.

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