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Mass School Shootings: Predicting the Usage of Firearms in Acts of School Violence

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MASS SCHOOL SHOOTINGS: PREDICTING THE USAGE OF FIREARMS IN ACTS OF

SCHOOL VIOLENCE

by

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ABSTRACT

Due to increased media attention and associated fear, school shootings have become a major concern for the public. Attempts to predict and prevent shootings have been developed by a variety of government agencies such as the Center for Disease Control and Prevention and the Federal Bureau of Investigation. A psychological profile, however, has yet to be established. This study uses demographic and behavioral characteristics of perpetrators and school characteristics to predict the likelihood of a perpetrator's usage of firearms. A total of 345 perpetrators of mass school violence incidents are examined, including 266 who used firearms. White perpetrators and those with fewer co-perpetrators were more likely to use firearms. Results also showed that perpetrators were more likely to use firearms in rural communities compared with urban communities, and in middle and high schools in comparison with elementary schools. Implications include the need for future research on policies that examine school violence prevention and response programs. Active shooter training is important, but responses to other types of weapons should also be examined. The findings show differences in locales for mass school violence events, so gun control legislation should also be tailored to on location. Future prevention programs should take these findings into account, and future research should further examine additional characteristics of schools that experience mass violence.

INDEX WORDS: firearms, school violence, school shootings, school characteristics

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TABLE OF CONTENTS

LIST OF TABLES

CHAPTER 1

INTRODUCTION

Heightened media coverage has transformed school violence, specifically mass school shootings into a societal problem (Haravuori et al., 2011). Sheley and Wright (1998) surveyed school administrators and found 48 of 53 were concerned about violence at their schools. School violence, including minor bullying situations, as well as school mass violence like school shootings, affects everyone in the community with an estimated $2,314,600.00 in costs and losses based on a school's average costs on suspensions, expulsions, dropouts, alternative educational placements and vandalism (Phillips, 2010). School violence can include bullying, school shootings, and a variety of other acts that harm students, teachers, and staff at an educational institution including on school property, or at school-sponsored events (National Center for Injury Prevention and Control, 2010). With events like the mass school shooting in Columbine, Colorado in 1999 and Newtown, Connecticut in 2012, research on school shootings is important to better establish prevention and reaction strategies.

For the purposes of this study, a school mass violence incident is defined as an incident involving one or more victim who is wounded or killed in a school or on school grounds, excluding single homicides, governmental or military actions, militant or terrorist killings, off-campus homicides, and gang or gang-like homicides which include drugs or extra-legal groupings (see Agnich, 2014). Particularly, I examine the use of firearms in these mass school violence events and the perpetrator's choice to use firearms over other weapons, such as explosives, knives, swords, or etc. Many argue that easy access to firearms creates an easier opportunity for perpetrators to commit acts of violence at school (Sheley & Wright, 1998; Mayer & Leone, 2007; Weldon, 2013; Center for Disease Control, 2012; Swezey & Thorp, 2010).

Sheley and Wright (1998) found that fifty percent of juveniles reported easy access to firearms, with family or friends being the primary source. Following high profile school shootings, public discourse often turns to issues of guns, but mass violence is carried out using other weapons as well. For example, in the Columbine High School attack in 1999, the two perpetrators, in addition to using firearms, put bombs in the cafeteria in an attempt to massacre a mass amount of students.

The purpose of this research is to determine what factors affect the likelihood of using a firearm to carry out mass violence in schools. Specifically, demographic and behavioral characteristics of perpetrators, such as the number of weapons used, number of co-perpetrators, hostage-taking, race, gender, age, and the type and location of targeted schools for attacks may be important factors in determining the likelihood of using a firearm in mass school violence incidents. A database of 345 identified perpetrators in cases of mass murder involving the use of deadly weapons at schools in 38 nations between July 26, 1764 and August 20, 2013 will be examined. Data was drawn from news reports, published interviews, television news scripts, publically available police records, the U.S. Census Bureau, and National Center for Education Statistics (Agnich, 2010; Agnich, 2014).

CHAPTER 2

LITERATURE REVIEW

MASS SCHOOL SHOOTING: PREDICTING THE USAGE OF FIREARMS IN ACTS

OF SCHOOL VIOLENCE

FIREARM USAGE

The aftermath of high-profile mass school violence events always brings heightened public and media attention, which normally turns to gun control legislation. After the Sandy Hook tragedy, there were calls for stricter controls on access to firearms. Despite this call for restrictions, there was a rise in the sale of firearms and ammunition, resulting in shortages, such as the ammunition shortage in Georgia (Diamant, 2013). The United States also has the highest homicide rate of any industrialized nation, as well as having more firearms per capita than any other industrialized nation (Fingerhut & Kleinman, 1990; Richardson & Hemenway, 2011). Contrary to the rise in attention to firearms, not all mass school violence events involve firearms; explosives, knives, swords, and even a vehicle have been used to commit mass violence in schools. For example, Andrew Kehoe detonated a combination of pryotol and dynamite in the north wing of a Bath Township school in Michigan killing 38 children, 6 adults, and wounding 58 others (Peters, 2012).

A number of agencies, in particular the Center for Disease Control and Prevention (CDC), have examined the issue of students bringing firearms on school grounds, as well as the threat firearms create when they are brought on school property. Whether students bring firearms to school for protection from threats, or to threaten a peer, the presence of firearms in schools increases the likelihood of accidents and injuries on school grounds (Center for Disease Control, 2011; Center for Disease Control, 2012). In 2011, as derived from a nationally

representative sample from grades 9-12, 5.4% of students reported they have carried a weapon onto school property at least one day, and 7.4% of students reported being threatened or injured with a weapon one or more times on school property (Center for Disease Control, 2011).

Brown, Osterman, and Barnes (2009) attribute bringing a gun to school to a culture of honor, and found a significant relationship between weapons being brought to school and the prevalence of school shootings. Brown and colleagues (2009) define a culture of honor as placing a "high premium on strength and social regard (especially among males) in connection with one's person, family, reputation, and property" based on social and economic factors (p. 1400). Scholars have explained that one loses honor through social marginalization, such as rejection, ostracism and other forms of bullying (Brown, Osterman, & Barnes, 2009). Brown and colleagues (2009) also discuss how variations between United States regions attribute a greater likelihood of a culture of honor in the Western and Southern regions of the United States. These variations are shown through demographic differences in addition to cultural differences found in contrast in Northern and Eastern states of the United States. The United States South and West have a greater emphasis on this culture of honor, which could be due to the concentration of rural communities in the South and West in comparison to regions in the North and East.

After high-profile school violence mass murder events, the public, particularly concerned parents and school administrators often call for policies to address access to firearms, as well as prevention programs and reaction plans by law enforcement and school collaborations (Esposito & Finley, 2014; Lawrence & Birkland, 2004). The Department of Education's report in 1998 stated that a substantial amount of violent deaths are from school shootings creating a strong need for these programs to be implemented (Redding & Shalf, 2001). Differing views create inconsistencies in these programs, however. Mass school violence events spark conflicting views

about gun legislation following media attention garnered through school shootings. The National Rifle Association (NRA) opposes gun legislation (Dwyer, 1999) that restricts ownership and sales. However, some of the public want to restrict the sale of guns and ammunition, while others feel the need to arm themselves which contributes to the rise in sales following school violence incidents (Esposito & Finley, 2014). Despite the rise in sales, there is still media-heightened attention to restricting gun access to keep the problem of school shootings from re-occurring, as well as other violent crimes (Moorehouse & Wanner, 2006). An important note is that researchers have found that stricter gun control legislation does not have any effect on crime (Moorehouse & Wanner, 2006). Further researcher has found that this legislation could create an increase in black markets (e.g. McGoey, 2013). Despite these findings, there are still calls for gun legislation to restrict access to firearms (Esposito & Finley, 2014).

In contrast to the primary ways that firearms are controlled, laws could be tailored to certain communities. The differences found in communities create a unique problem when creating policies in accordance with gun control. While some communities have a greater access to guns such as hunting communities, there is a difference in the way firearms are used. In the urban communities guns are thought to be for protection, in rural communities, firearms are seen to be used as methods for hunting animals usually for a pastime. Redding and Shalf (2001) explain that the differences in problems with gun violence between urban, suburban, and rural areas can be problematic if a general, national legislative action is passed. As community gun violence can spill over into the local schools, there is a need to address certain areas, particularly urban areas, individually, in response to gun violence (Redding & Shalf, 2001). The main issue is that juveniles in some areas of the country have easy access to firearms in comparison to other areas, which are often used as a means of committing school violence (Sheley & Wright, 1998).

The public's assumption is that if there is by reducing this ease of access to firearms for juveniles, violence will be reduced in the schools (Redding & Shalf, 2001). Some community initiatives, as proposed by Redding and Shalf (2001) to tailor gun legislation based on community needs, are ways to reduce juvenile possession of or access to firearms. By targeting access to firearms for juveniles, it is proposed that the school violence can also be reduced. Firearms, however, are not the only means for perpetrators to act violently (Weldon, 2013). School mass violence has also been carried out using explosives, knives, and other weapons.

FIREARMS AND SCHOOL VIOLENCE

The media has framed school shootings as a societal problem, and these incidents have garnered much attention in social science research, which in turn can create fear among the public (Muschert & Carr, 2006; Haravouri et al., 2011; Stein, 2006). Within minutes the media learns of an incident (Stein, 2006) and within a half hour, dozens of local and national media stations are on the scene (Haravouri et al., 2011). The media creates a heightened sense of distress that affects those even if they are distant from the event diminishing social distance (Haravouri et al., 2011). These social panics caused by increased media attention create a fear and need for research to take place in order to understand the phenomenon. With this fear, a psychological "profile" is wanted by the public in order to prevent these acts of violence from occurring; however, this sort of profile does not exist. Risk factors have been compiled by the Federal Bureau of Investigation and the Secret Service, but a definitive profile has not been constructed. Research has concentrated on identifying risky behaviors, such as signs of depression and dehumanizing others, among students in order to create a safe learning environment.

Between the school years of 1992 to 1993 and 2005 to 2006, there were 425 school-based violent deaths; of these, 314 (74%) were shootings (Mayer & Leone, 2007). As schools are thought to be a safe place for children, a need for research on mass school shootings, as well as the development of preventative and action plans is necessary in case of such an event. The CDC (2012) discussed a four-step process on how to deal with public health problems, which included mass school shootings. The need to research the phenomenon of mass school shootings and the risks and causal factors related to the perpetrators are very important in the CDC process for developing a preventative program. The four steps identified include defining the problem, which is ever-evolving through continuously gathering research of school violence including the extent to which it affects people and location, identifying risk factors, as well as protective factors, developing strategies and test the strategies after gathering research on the risk factors, and spreading the information widely for policy adoption through sharing the strategies that the CDC has researched (Center for Disease Control, 2012). As these agencies have discussed the behaviors leading up to the event and their significance, there is a gap in literature looking at the behaviors and factors during the event in relation to the perpetrator's choice of weapons, particularly firearms, to carry out his or her acts of mass school violence.

CHARACTERISTICS OF PERPETRATORS

A school shooting perpetrator profile is very difficult to compose, but many have attempted to identify common characteristics of perpetrators (Moore, 2013; Drysdale et al., 2010; McGee & DeBernardo, 1999). School shootings have been studied in various types of ways, but have primarily been focused on compiling a possible profile of perpetrators including risk factors, such as threatening behavior, increased mood swings, history of violence, poor grades, poor family functioning, and a variety of other behavioral and background characteristics

13

(Center for Disease Control, 2012; Arcus, 2002; McGee & DeBernardo, 1999; Leary et al., 2003; Vossikuil et al., 2000; Moore, 2013; Weldon, 2013; Swezey & Thorp, 2010). These characteristics do not apply to every perpetrator of a mass school violence incident, but can be considered risk factors. McGee and DeBernardo (1999) even named a mass school violence perpetrator as "The Classroom Avenger" associating bullying as a primary motive for committing this type of violence. Indeed, bullying or being threatened as a form of student victimization is a growing concern; however, other research has found that bullying may not be related to school mass violence despite public perceptions that it is a contributing factor (see Agnich, 2014; Cullen et al., 2008).

Several agencies have researched and formulated risk factors to look for in possible perpetrators of school shootings including the Secret Service and the CDC (Vossekuil et al., 2000; Center for Disease Control, 2012; Drysdale et al., 2010; Center for Disease Control, 2011; Daniels et al., 2010). Specifically, Vossekuil et al., (2000) discussed several key commonalities in school shootings that may help identify perpetrators before they engage in violence. First, perpetrators followed a pattern of behavior that can usually be identified and addressed. Secondly, perpetrators had usually told someone about their plans prior to their incident. Perpetrators have had prior access to guns. Situations have not resolved by law enforcement when they arrived at the scene, but have previously stopped by a faculty member or fellow student. In a majority of the cases, other students or peers were involved to some extent, through encouragement or helping obtain weapons. Perpetrators' being bullied has also been found to play a key role in school mass violence incidents. Finally, prior behavioral concerns of the perpetrator were present and noticed by others. These commonalities provide a list of risk factors

that allow school staff to become aware of a possible threatening situation that may arise (Toole, 2000).

There is not one singular profile that researchers have developed to be conclusive for a mass school shooter. Specific physical characteristics, such as race, gender and age, vary across the perpetrators, although White males are over-represented according to most research (Arcus, 2002; Leary et al., 2003; & Vossekuil et al., 2000), and differences regarding other characteristics, such as prior victimization, make it hard for governmental agencies and researchers to create a "profile" for a school violence perpetrator. This lack of consensus for a "profile" opens up room for predicting school mass violence events through other avenues, such as risk factors mentioned above as created by governmental agencies associated with characteristics (Vossekuil et al., 2000) or even, as this research examines, using characteristics of the incident, perpetrator and schools to predict the likelihood of using firearms in a mass school violence event.

PERPETRATORS' BEHAVIORS

While many risk factors are important, the idea that perpetrators have previously "leaked" information about their plans to commit school violence as shown by governmental agency research stated above is extremely important in establishing prevention programs. Vossekuil et al. (2000) stated that in three-quarters of all cases of school shootings, the perpetrator has stated to someone else, usually a peer, and their intention to perpetrate a mass school violence event. Swezey and Thorp (2010) also reported that leading up to the actual event perpetrators "leaked" their intentions to commit school shootings by talking about a plan, talking about threatening behavior towards others, and through escalating behavioral problems. Police have also developed seminars for community members about work-place shooters and how

paranoia and suicidal thoughts are risk factors (Moore, 2013). Prior research predominately focused on behaviors prior to the incident, while little research has been done on perpetrators' behaviors such as the number of weapons used, the number of co-perpetrators, and whether hostages were taken during the incident. In addition, most prior research takes a narrow view of weapon-related violence at schools by focusing solely on firearms.

The majority of research on school mass violence has been limited to how perpetrators obtained weapons, such as firearms, and their previous usage of such weapons (Vossekuil et al., 2000; Sheley & Wright, 1998; Mayer & Leone, 2007). Sheley and Wright (1998) reported that while prior access was low in their study compared to other research, respondents in smaller communities reported possessing more types of firearms more frequently. Access to firearms was reported to be easy for fifty percent of the respondents in which they reported obtaining a firearm by loan or was simply given to them by a family member or friend (Sheley & Wright, 1998; Mayer & Leone, 2007). In 2011, 7.4% of a nationally representative sample of students reported they were threated or injured with a weapon on school property one or more times (Center for Disease Control, 2011). According to this self-report data, 5 out of 100 students reporting carrying a weapon including a gun, a knife, or a club to school as reported by the Center for Disease Control (2011), which is a major concern considering there are about 49.8 million students enrolled in public schools ranging from elementary to secondary (National Center for Education Statistics, 2014). Since most prior research examines the use of firearms on school grounds, there is a lack of research on the use of other weapons, such as explosives, knives, or swords, which also pose a threat to students in schools nationwide.

CHARACTERISTICS OF SCHOOLS

School safety and security is important to criminological researchers in light of high profile school shootings (Weiler & Cray, 2011) as seen in subsequent changes in law enforcement training (Clark, 2011). Security within schools has created conflict between the administration and the school resource officers (SRO) including priorities of punishment. School resource officers are trained police officers taught to arrest criminals, including juveniles; however, school administrators may also consider other penalties outside of arrest and charges. While Weiler and Cray (2011) report that school administrators alone cannot keep the school safe, one issue with the increasing use of SROs is creating schools into gateways to juvenile detention centers or prisons (also known as the school-to-prison pipeline). Zero tolerance programs restrict punishments to mandatory responses to behavioral infractions (Wilson, 2014). Expulsion and suspensions are punishments that remove students performing the undesirable acts from normal education, and referrals to traditional criminal justice processing are used in cases of major incidents such as arson or bringing a weapon to school (Wilson, 2014). These policies were hastily put into practice, and research has shown mixed results for the effectiveness of these programs and reducing school violence. For the relationship between schools and SROs to provide a safe school environment, it must be sustainable and work towards a safer school rather than continuously battle over jurisdiction (Weiler & Cray, 2011; Clark, 2011).

School environments effect on whether perpetrators of school mass violence incidents use of firearms has not been directly studied. De Apodaca and colleagues (2012) found a significant relationship between schools and school shootings in which school shootings, identified as homicides committed using firearms by a member of the school, were three times more common in suburban and urban areas than in rural areas. Additionally, schools with higher

17

enrollment and that were public schools were more likely to have school shootings occur (De Apodaca et al., 2012). In the present study, the type of school (i.e. the grade level of schools targeted for acts of mass violence) is examined along with the type of community in which the school is located (i.e. rural, suburban, urban), to determine if these factors are associated with the type of weapon used to perpetrate violence.

CHAPTER 3

THEORETICAL PERSPECTIVE

SOCIAL LEARNING THEORY

Ronald Akers developed social learning theory in conjunction with Robert Burgess by expanding on Edwin Sutherland's differential association theory. First introduced in 1924 then finalized in 1947, differential association theory posits that differentially organized social groups expose people to patterns of behaviors of law-abiding or law-breaking practices. The overall points of Sutherland's theory are that behavior is learned through associations with intimate personal groups. Criminal behaviors are learned through excess exposure to definitions favorable to criminal activity. Associations with others may vary in frequency, duration, priority and intensity (meaning the extent to which the value of the association). Akers developed social learning theory as an extension of differential association theory in further explaining how basic associations cannot determine needs and values established through learning. Akers concentrated on learning as a means of learning definitions including ways to commit crime, and being able to imitate these crimes while being reinforced through gain or attention.

Akers' theoretical argument was that deviant behavior is learned through association with deviant peers through differential reinforcement and imitation. Socialization with deviant peers and the observation of deviant behaviors are where definitions favorable to deviant behavior are learned and reinforced through gains perceived by the individual, also known as differential reinforcement showing that rewards out-weigh punishments (Akers, 1998). Imitation is the engagement in deviant behavior by the individual through modeling the behavior that was learned and also reinforced by peers and other sources, such as media (Akers and Sellers, 2013; Akers, 2009). The more the behaviors are seen as desirable through differential reinforcement,

the more likely the behaviors are to be modeled or imitated (Akers et al., 1979). In research, the most empirically supported parts of the processes in social learning theory are differential association and definitions (Akers et al., 1979; Pratt et al., 2009). This means associations with others and the definitions learned from these associations are the stronger predictors of deviant behavior in terms of social learning theory. In relation to school mass violence events, definitions of why the perpetrator committed school violence and how the perpetrator committed school violence are important. Specifically associations with Eric Harris and Dylan Klebold of the Columbine, Colorado massacre and how their behavior was reinforced for other perpetrators and glorified through heightened media attention allows subsequent perpetrators to learn from them. This includes how they collected their weapons, such as obtaining their firearms from friends, and making their explosives using instructions from the Internet. In relation to social learning theory, Bandura (1983) and Phillips (1983) discuss the findings that exposure to violence in the media, such as television shows, has a strong effect on violence in real life such as imitative homicide rates. This media coverage reduces the social distance between future perpetrators and the Columbine perpetrators allowing these future perpetrators to identify despite having no direct connection with Harris and Klebold.

The elements of social learning theory can be seen throughout the research of mass school violence, specifically mass school shootings. Further examination of this phenomenon is essential in order to conceptualize how we can intervene and prevent more mass school violence events from occurring. According to Akers and Sellers (2013), differential association is not only identifying directly with groups or individuals, but also indirectly identifying with others. Distal groups, such as those created through mass media attention, have been examined as a reference group playing a significant role in differential associations in social learning theory (Akers,

1998). Both Adam Lanza, the perpetrator of the 2012 Sandy Hook Elementary shooting, and Sueng-Hui Cho, the perpetrator of the 2007 Virginia Tech shooting, reference Columbine, as well as Harris and Klebold, saying they were martyrs. This identification implied by creating a connection or relationship in which one party learns from another.

The Columbine massacre expanded media coverage and social research on school shootings exponentially. Donohue et al. (1999) explains that the media attention has risen and the development of a trend in school shootings exacerbating fears despite how many fatalities occurred, such as in Columbine and a case in Richmond, Virginia with a non-fatal shooting in June 1998 during finals week at a local high school. The significance of this is that heightened media attention follows school violence events without a need for fatalities, particularly school shootings. McCabe and Martin (2005) examined the historical aspects of school violence by looking at the exponential increase in research and programs preventing and reacting to such events. Columbine has been associated with a variety of subsequent mass school violence events and is the event by which others have identified with and imitated. This is important since imitation is key element of the social learning process (Akers et al., 1979; Akers and Sellers, 2013).

Social learning theory can offer a better understanding of mass school violence since there is evidence that copycat school shootings are direct imitations of school shooting events. Social learning theory in application to school massacres, particularly school shootings such as Columbine, provides a framework for understanding how subsequent perpetrators identify, learn and imitate the events through the perception that the garnered media attention reinforced the actions of Harris and Klebold. Research on copycat shootings states the media attention paid to these events has crossed the globe (Coleman, 2004; Muschert, 2007). Coleman (2004) points out

that following Columbine, the nation was under attack with more than four hundred related

incidents being reported the month preceding the April 19, 1999 attack in Littleton, Colorado. A

year after the mass school violence event, reflections were stated that while it was thought

violence was concentrated in the family, it was no longer true based on the amount of mass

school violence occurring (Coleman, 2004). Imitation is a major concern because the idea of the

"copycat" factor (Rocque, 2012) suggests that anyone could be the next perpetrator if they learn

how to retaliate against victimization through identification and imitation of Columbine and

other school shootings. The notion of the copycat, which is the attempt for youth to imitate high

profile school shootings (Rocque, 2012), has gone worldwide (Lindberg et al., 2012) due to the

global coverage of Columbine. Social learning theory examines the process by which potential

perpetrators identify with Columbine perpetrators, learn how to deal with the stressors of being

victimized in their lives, and watch as Harris and Kelbold were glorified in a sense by the media,

which ultimately leads to a perpetrator's own action through imitation of what they idolized in

Harris and Klebold. Rocque (2012) identifies that T.J. Solomon, the perpetrator of the Heritage

High School shooting in Conyers, Georgia in 1999, explained that he had to release his anger in

some way, and that Columbine gave him the idea for the shooting (p. 308). Here there is a direct

link to Columbine in which Solomon saw Harris and Klebold as models, identified with them,

learned from them, saw the benefits they obtained and imitated their actions.

Columbine was seen as the "game changer" of school violence events that sparked

changes in a variety of aspects such as law enforcement response and school policies. Columbine

is simply a name, but has a great impact creating an emotional response upon hearing the word

(Muschert, 2007). The notoriety is in both positive and negative lights depending on what aspect

one is discussing, and one sees it. In terms of social learning theory, seeing that the media covers

perpetrators and events extensively could possibly create the positive reinforcement that is needed for potential perpetrators to act. Prospective perpetrators identify, learn, see the notoriety and imitate in accordance with social learning theory using the Columbine massacre and Harris and Klebold as role models particularly in relation to weapon choice. The idea of using Columbine as a reference on choice of weapon creates an interesting link of how future perpetrators saw faults in Harris and Klebold's tactics as well as the successes. Harris and Kelbold's explosives did not detonate according to plan. However, their use of firearms did work in causing mass carnage creating heightened media attention, which can reinforce future perpetrators in terms of notoriety. This study seeks to examine the factors in the decision to use firearms according to variables of the incident. The model of Columbine has shown to play a role in perpetrators' choices leading up to their mass school violence event and may be a factor in the weapon choice for the perpetrator (Thomas et al., 2014).

CHAPTER 4

METHODS

DATA

The purpose of this research is to identify the factors that affect the likelihood of a perpetrator using a firearm in acts of mass school violence using a database of 345 identified perpetrators of mass murder incidents at schools in 38 nations between July 26, 1764 to August 20, 2013 (Agnich, 2010; Agnich, 2014). The data was derived from news reports, published interviews, television news scripts, publically available police records, the U.S. Census Bureau, and National Center for Education Statistics.

DEPENDENT VARIABLE

The dependent variable of this study is the weapon used in mass school violence incidents. The variable in the dataset was measured for whether a firearm was used in a mass school violence incident, or another weapon, such as explosives or knives. The variable was coded as "1" being a firearm, and "0" as the incident did not use a firearm. There were 266 perpetrators (77%) that used a firearm or multiple firearms, with a standard deviation of 0.42. In this dataset, 79 perpetrators did not use a firearm. Firearm use will be examined as the dependent variable and whether it is affected by the following independent variables.

INDEPENDENT VARIABLES

The independent variables include demographic characteristics of the perpetrator (race, gender, and age), perpetrators' behavioral characteristics (number of weapons, co-perpetrators, and hostage-taking), and characteristics of the school and surroundings (rural/suburban/urban location and the type of school targeted, i.e. grade level).

Characteristics of the perpetrator were measured as race, gender, and age. Race was coded as "1" being White (including those of European decent) and "0" being non-White and non-European decent. Of the 283 perpetrators for which race data was available, 181 perpetrators (64%) were White. Gender was coded as "1" being Male and "0" being Female. Ninety-six percent of the identified cases involved males. Age of perpetrator was coded as ranging 11 through 70 years old as a continuous variable with a mean age of 22.43.

Perpetrators' incident-related behaviors were measured including the number of weapons, co-perpetrators, and if the incident involved hostages. The number of weapons ranged from 0 to 7 with a mean of 1.5 and a standard deviation of 1.35. Co-perpetrators were coded as a continuous variable from 0, meaning the perpetrator acted alone, to 5 meaning the perpetrator had 5 co-perpetrators with a mean of .59 and a standard deviation of 1.12. The number of hostages was coded as yes (1) if there were hostages involved in a situation, and no (0) if hostages were not involved in a situation with a mean of 0.05, and a standard deviation of 0.22.

Characteristics of schools were measured by school location and school type. School location was dummy-coded: rural, suburban and urban. Of the 345 perpetrators in this dataset, 43% (149) committed act of mass violence in schools that were in rural areas, 25% (85) in suburban areas, and 32% (111) in urban areas. School type was dummy-coded into elementary schools, middle schools, high schools, college/universities, and other (including a one room Amish school, a nursery School, a missionary training facility, and an American Civic Center immigration center class). Of the 345 perpetrators, 61 targeted elementary schools (18%), 43 targeted middle schools (13%), 167 targeted high schools (48%), 68 targeted colleges or universities (20%), and 5 targeted other types of schools (1%). The descriptive statistics for the dependent and independent variables being studied are presented in Table 1.

Table 1. Descriptive Statistics for Variables

Variable	Range	Mean	S.D.	N
Firearm Use	0-1	0.77	0.41	345
(1 = the incident involved a firearm)				
Race of Perpetrator	0-1	0.64	0.48	283
(1 = European & White)				
Gender of Perpetrator	0-1	0.96	0.20	345
(1 = Male)				
Age of Perpetrator	11-70	22.43	10.70	320
Number of Weapons	0-7	1.50	1.35	345
Co-Perpetrators	0-5	0.59	1.12	345
Incident involved hostages	0-1	0.05	0.22	345
School Location				
Rural	0-1	0.43	0.50	345
Suburban	0-1	0.25	0.43	345
Urban	0-1	0.32	0.47	345
School Type				
Elementary School	0-1	0.18	0.38	345
Middle School	0-1	0.13	0.33	345
High School	0-1	0.48	0.50	345
College	0-1	0.20	0.40	345
Other	0-1	0.02	0.12	345

HYPOTHESES

This research is primarily exploratory, but several hypotheses can be proposed that will be tested in this research. Whites may be more likely to use firearms in mass school violence incidents because prior research has linked "school shootings" to young, White, males (Arcus, 2002; Leary et al., 2003; and Vossekuil et al., 2000). Likewise, for that reason males may be more likely than females to commit mass school violence incidents involving firearms. Age may be positively related to the use of firearms in mass school violence incidents because being older may create more knowledge on how to use firearms, and provide increased access to obtaining firearms. The number of weapons may be positively related to the use of firearms in mass school violence incidents because perpetrators might amass stocks of firearms and ammunition. The

number of co-perpetrators may be positively related to perpetrators' use of firearms because the more people involved in an incident, the more potential access to firearms perpetrators could have had. Taking hostages in an incident may be related to an increase in the likelihood of perpetrators using firearms in a mass school violence incident because firearms may be likely to instill fear and are commonly used in hostage-taking events (Guide & Brister, 1998). School location may have an effect on the likelihood of using a firearm in mass school violence incidents in the following way: perpetrators targeting urban schools may be more likely to use a firearm because firearms are typically more accessible in urban areas (Wiebe et al., 2009). The type of school targeted may also have an effect on the likelihood of a perpetrator using a firearm in mass school violence incidents. To the best of my knowledge, no research has examined this aspect of mass school violence, so this relationship will be explored in the present study.

ANALYTIC STRATEGY

To determine the effect that the characteristics of perpetrators, their behaviors, and characteristics of targeted schools have on the likelihood of a perpetrator of mass school violence to use a firearm, a step-wise logistic regression model was used to analyze the data. The first model includes characteristics of the perpetrator (race, gender, and age) to determine the effects of demographics on the likelihood of using firearms, as well as the behavioral characteristics (number of weapons, co-perpetrators, and hostage-taking). The second model adds school characteristics (school type and grade level) to determine their effects on the likelihood of perpetrators using a firearm.

The logistic regression formula allows us to account for the binary distribution of our dependent variable of firearm use (which is coded, as mentioned above, as whether a firearm was involved in the incident or not). The dependent variable ($g(x)$) is binary. The independent

variables (βs) in the later part of the equation act individually on the dependent variable. This equation allows us to determine this individual impact of the independent variables within the models on the use of firearms in mass school violence events. Logistic regression can be expressed through the following equation.

$$g(x) = \ln\left[\frac{\pi(x)}{1 - \pi(x)}\right] = \beta_0 + \beta_1 x_1 + \ldots + \beta_k x_k + \varepsilon$$

CHAPTER 5

RESULTS

Two binary logistic regression models are examined to determine the likelihood of a

perpetrator committing school violence using a firearm. In Model 1, characteristics of the

perpetrator and incident behaviors were examined to determine if they were contributing factors

in the likelihood of using a firearm in a mass school violence event. Race (O.R. = 4.05, $p < .01$),

and the number of co-perpetrators (O.R. = 0.52, $p < .01$) were statistically significant factors that

increased the likelihood of a perpetrator using a firearm in a mass violence incident. White

perpetrators had 4.05 times higher odds, when compared to non-White perpetrators, to use a

firearm in mass school violence acts, holding all other variables constant. With all other variables

held constant, for every perpetrator added, the odds of a firearm being used are multiplied by

0.52. Gender, age, the number of weapons, and if hostages were involved in the situation were

not statistically significant. Model 1 explains 24% of the variance in firearm use.

In Model 2, characteristics of schools were added to the logistic regression model to

assess the likelihood of using a firearm. Race (O.R. = 4.74, $p < 0.01$) and the number of co-

perpetrators (O.R. = 0.26, $p < 0.01$) are still statistically significant factors in predicting the

likelihood of using firearms in mass school violence events. White perpetrators, when compared

to non-White perpetrators, are 4.74 times more likely odds of using firearms holding all other

variables constant. For every added perpetrator, the odds of using a firearm decrease by 0.26

holding all other variables constant. Rural schools (O.R. = 0.14, $p < 0.01$) when compared with

urban schools have 0.14 times lower odds to have perpetrators use a firearm in mass school

violence events holding all other variables constant. High schools as targets (O.R. = 9.69, $p <$

0.001) have 9.69 times higher odds to experience mass school shootings when compared to

elementary schools being the target holding all other variables constant. Colleges also have 5.57

higher odds to experience shootings compared to elementary schools (O.R. = 5.57, $p < 0.01$). All

other factors (race, gender, age, bullying, number of weapons, hostages involved, suburban

school location, and middle and other school grade levels targeted) were not statistically

significant. Overall, this model accounts for 47% of the variance in firearm use. Table 2 reports

the results of these regression analyses.

Table 2. Logistic Regression model predicting use of firearms

Characteristics	Model 1					Model 2				
	b	s.e.	p	O.R.	95% CI	b	s.e.	p	O.R.	95% CI
Race of Perpetrator (1 = White)	1.40**	0.40	0.00	4.05	2.84-8.92	1.56**	0.47	0.00	4.74	1.87-11.98
Gender of Perpetrator (1 = Male)	0.63	0.78	0.42	1.88	0.41-8.72	0.35	1.01	0.73	1.42	0.20-10.21
Age of Perpetrator	0.00	0.02	0.82	1.00	0.96-1.03	-0.02	0.02	0.92	1.00	0.96-1.04
Number of Weapons	0.26	0.18	0.15	1.30	0.91-1.85	0.42	0.25	0.09	1.52	0.93-2.49
Co-Perpetrators	-0.66**	0.22	0.00	0.52	0.34-0.81	-1.02**	0.31	0.00	0.26	0.20-0.66
Incident involved hostages	-0.73	0.75	0.33	0.48	0.11-2.11	-0.33	0.93	0.72	0.72	0.12-4.43
School Location										
Rural	-	-	-	-	-	-1.94**	0.62	0.00	0.14	0.04-0.49
Suburban	-	-	-	-	-	-0.92	0.87	0.29	0.40	0.07-2.17
School Type										
Middle School	-	-	-	-	-	1.27	0.88	0.15	3.55	0.63-20.05
High School	-	-	-	-	-	2.27**	0.64	0.00	9.69	2.75-34.13
College	-	-	-	-	-	1.72**	0.61	0.01	5.57	1.67-18.52
Other	-	-	-	-	-	1.46	1.3	0.27	4.29	0.32-57.51
Constant	-0.17	-	-	-	-	-0.30	-	-	-	-
Model X^2	30.56	-	-	-	-	64.27	-	-	-	-
Psuedo R^2	0.24	-	-	-	-	0.47	-	-	-	-

Non-white is the reference category for race; urban is the reference category for school location; Elementary is the reference category for school type.

*$p < 0.05$

**$p < 0.01$

CHAPTER 6

DISCUSSION

Overall, several characteristics of mass violence incidents and school characteristics were found to have an effect on the use of firearms. While not all of the hypotheses were supported, there were some unique findings. Model 1 and 2 show that race and the number of co-perpetrators significantly predict the use of firearms in school violence events where White perpetrators and those who have fewer co-perpetrators are more likely to use firearms. The targeted school being in a rural compared to urban location significantly decreases the likelihood of a perpetrator committing school violence using a firearm. High schools and colleges or universities are more likely to have perpetrators using firearms when compared to elementary schools. Using the combination of perpetrator characteristics, incident characteristics and school characteristics, the likelihood of using a firearm can be shown to increase when perpetrators are White, act alone or with few others, and target high schools and colleges in urban communities. The significance of these findings allows for policy makers and an integrated approach including law enforcement, school employees and the community members to account for differences in locales of schools and grade levels of schools.

Particularly, legislation on gun control should be examined closely. As federal gun control laws require background checks when purchasing from licensed dealers, further exploration should be implemented to provide security against possible planned attacks. There is split public opinion about whether gun control legislation would actually reduce violent crime. Esposito and Finley (2014) state that focusing on managing current gun laws may not be enough, but a systematic social change in American lives is necessary. A change in the value the United States places on firearms is important because of the sheer number of firearms in relation to any

other nation (Fingerhut & Kleinman, 1990). The shortage of ammunition in Georgia following the Sandy Hook tragedy shows the need of Americans to arm themselves despite the tragedy firearms caused. As there are differences in the location of schools that experience attacks with firearms, there is further merit to Redding and Shalf's (2001) claim that tailoring the overall gun laws with local programming will specifically target the needs of a community.

These findings present an interesting new foundation for further research in the school characteristics and their impact on the likelihood of acts of mass school violence. The implications could mean that there is something that teachers, administrators, and educational boards can do in order to prevent or decrease the likelihood of mass school violence. Focusing on school characteristics, such as location and grade level, can have an impact on policy in responses to violent situations, as higher enrollment schools and those in more urban areas have been shown to have a higher risk for experiencing mass school violence events such as mass school shootings (De Apodaca et al., 2012). Agencies should determine how programs could be developed in order to prepare law enforcement as well as school staff in the event of a mass school shooting. According to Redding and Shalf (2001) and in accordance with the findings, gun control should be tailored based on location of school and community rather than a general policy for the total population. The findings show that gun control legislation may affect different communities in different ways. In conjunction with Brown, Osterman and Barnes (2009), the findings of the present can relate to the differences in cultures between regions and how it dictates the meanings attributed to firearms should be considered in policy construction. Legislation could create a general inclusive law in which regions and communities, at a smaller level, can tailor in order to better suit their specific needs, such as their culture for hunting, or emphasis on self-protection. However, an important consideration is that not all school mass

violence events involve firearms, which creates an important point that programs for

preparedness should encompass all types of weapons rather than only "active shooter" situations.

Limitations of this research include a limited number of cases of school violence to have

considered as data. There are few cases in mass school shootings, which is problematic in

determining generalizability of data. Patterns are found and predictive factors are seen; however,

the fewer number of cases limits the statistical power of these findings. Other factors not

examined here could have an effect on the likelihood of firearm usage in school violence acts

such as prior firearm usage, fascination with firearms (Vossekuil et al., 2000). Prior access and

usage of firearms has been shown to be a factor in mass school shootings (Mayer & Leone, 2001;

Sheley & Wright, 1998), but this study did not account for either of these factors.

In relation to social learning theory, the findings do not examine the direct associations or

indirect identifications of perpetrators with Eric Harris and Dylan Klebold or the Columbine,

Colorado massacre. Future research should examine the identification with other school shooters

as a means of weapon choice. Whether or not the perpetrator was reported to have been obsessed

with or interested in some degree with Harris and Klebold or even the Columbine massacre in

general would allow for the further examination of the "copycat" factor (Coleman, 2004).

Through this relationship, future research can examine the choice of weapon modeled after the

Columbine event. The potential implications of this imitation of school violence and weapon

choice can allow prevention measures to expand on the acquisition of weapons by potential

perpetrators.

Future research should examine the future characteristics of schools in relation to the

impact the location of the school as well as the targeted school grade level. In conjunction with

Redding and Shalf (2001), the need to tailor gun control legislation would benefit from further

research of the schools' characteristics and the association with likelihood of school mass violence events. The impact of the usage of other weapons should also be examined further. While firearms are the focus of media attention more frequently, the use of other weapons, such as explosives, knives, swords, and even vehicles, should also be further examined through research.

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