AMERICAN MASS SHOOTERS AND SUICIDE

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ABSTRACT

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Mass shootings are traumatic events associated with highly publicized and often gruesome homicides that raise public alarm. Yet, researchers know relatively little about shooters and mass shooting events. Therefore, it is important to further extend the research of mass shootings to characterize different types of shooters and how they ultimately perpetrate their attacks. As such, the current study investigated the differences between American mass shooters who commit suicide after their attacks and mass shooters who do not. This study examined shooter vitality in 185 mass shootings in America perpetrated by 194 mass shooters between 2000 and 2016. Each shooter was categorized as having survived the attack or the manner in which they died; whether by self-inflicted suicide or being shot by another person. This revised data about how the mass shooters died was compared with thirty-three different independent variables that looked at the characteristics of the mass shooters as well as the characteristics of the mass shootings using both analysis of variance and binary logistic regression analytic techniques. At the same time, an original version of this dataset was tested alongside the revised dataset to look for similarities and comparisons in the results. The results of the revised dataset showed that mass shooters with a prior criminal record are more likely to survive their attacks and those who kill more victims are less likely to survive their attacks. These results are useful to inform both law enforcement personnel intervening in a mass shooting as well as lawmakers developing policies in an attempt to decrease the number of mass shootings in America.

This thesis is dedicated to Mom and Dad.
Thank you for your continued love and support, and for always believing in me.

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On a pleasant fall night, commemorating the first day of October, thousands of people were enjoying a Jason Aldean concert with friends and family when their lives were instantly changed forever. A 64-year-old man opened fire from his 32nd-floor window at the Mandalay Bay Resort and Casino. He killed 58 people and injured more than 500 before he turned the gun on himself and pulled the trigger (Liston, Wan, Somashekhar, & Davis, 2017). To this day, the 2017 Las Vegas shooting is the deadliest mass shooting in American history and, like other mass shootings, fueled a national conversation about mass shooters, their motivations, and how they can be stopped.

A mass shooting is a large-scale homicide event that involves multiple people dying in one event. After a mass shooting, numerous questions are asked by politicians, media personnel, and the public, wondering how this could have happened, why it happened, and how a similar event can be prevented in the future. While all of these questions are important and worthwhile to answer, people generally do not ask other important questions following a mass shooting, such as, why the mass shooter committed suicide or not, or how mass shooters that commit suicide may be different than those who do not. Are incidents with mass shooters who commit suicide deadlier? Do those who commit suicide and those who do not choose similar targets? Do they have similar backgrounds?

The number of mass shootings in America also appear to be on the rise. Research by the Congressional Research Service found that the prevalence of mass public shootings "…increased in the 1970s and 1980s, and continued to increase, but not as steeply, during the 1990s and 200s, and first four years of the 2010s" (Krouse & Richardson, 2015, para. 5). Mass shootings clearly impact the survivors of such attacks and their families, along with the families of the deceased.

In addition, the effects of mass shootings are potentially amplified by vigorous media coverage of these events. Through different types of media, such as social media, television, and news articles, the public is captivated by the stories of mass shootings, which increases their coverage and sociocultural power. For instance, the constant replaying of a shooting incident could reinforce trauma in the bystanders in the forms of survivor's guilt or post-traumatic stress disorder (PTSD). The severity of these effects may vary with different types of shooters, such as those who commit suicide versus those who do not, but such details remain unknown.

Although a significant social problem, there is little quantitative and empirical research on mass shooters. One important limitation of mass shooting research is the lack of availability of systematically collected data. Indeed, policymakers often base policy recommendations on anecdotal or hastily collected data. There are few datasets available to study this topic, and even fewer that have passed close academic scrutiny. Mass shooting events are difficult to study because they are always examined in retrospect with information drawn from highly limited data sources. Due to the numerous limitations of previous research, there are few studies comparing different types of mass shooters, and only one known study (Lankford, 2015) that compares shooters who commit suicide to those who do not. However, other research in related areas, such as terrorism, provide insight into potential differences between attackers that may apply to mass shooters.

Terrorism is similar to mass shootings in that both of these types of murderers, "…planned their attacks for months or years before finally striking, and some of them also left behind notes or explanations in which they claimed to be fighting for a cause," but differs because these events are ideologically motivated (Lankford, 2014, p. 356). Despite differences, however, the terrorism literature can inform the study of mass shootings because there is more

research examining variation in plots and perpetrators, including difference between attackers who commit suicide versus those who do not. For example, research by Freilich and colleagues (2017) looked at the differences between American jihadist and far right terrorists who did and did not commit suicide in the following their attacks. Researchers showed that, "…suicide mission offenders were nearly 3 times more likely to have served in the military, 13 times more likely to have received movement training, and almost 2.5 times more likely to have a high commitment to their ideology," (Freilich et al., 2017, p. 11) when compared to non-suicide missions. Additionally, researchers found that members of Al Qaeda who committed terrorist attacks were more likely to kill themselves when compared to far-right terrorists. Together, these findings suggest that those who perpetrate terrorist attacks vary in the presence and severity of certain risk factors by suicide status and in the likelihood of committing suicide. More generally, this provides preliminary evidence that perpetrators of mass homicides differ depending on suicidality, a finding that can be applied to mass shooter research.

In sum, it is important to compare mass shooters who commit suicide to mass shooters who do not commit suicide because there are many unanswered questions about shooter suicidality that could reveal differences in risk and/or crime perpetration that could guide prevention efforts for this growing social problem. As such, the current study will explore how mass shooters who commit suicide differ from those who do not. The comparative focus is on whether mass shooter suicide (or not) is affected by the location of the mass shooting, age of the shooter, region of the country, marital status of the shooter, prior criminal record of the shooter, the number of victims, or the number of mass shooters involved in the event. Additionally, some of the issues that will be explored in the current research include the nature of the mass shooter's suicide (such as killing themselves vs. suicide by police, the timing of the suicide) and the

motive for committing suicide (such as wanting to be a martyr for a larger cause). Policy implications and future directions will be discussed.

Literature Review

Defining Mass Shootings

Mass shootings are not a new form of violence, but rather have existed in the United States for over a century. Schildkraut and Elsass (2016) reported that the first mass shooting in the United States occurred at a school in Baton Rouge, Louisiana in May of 1880. Since then, mass shootings have occurred in various locations, such as workplaces, nightclubs, private homes, universities, public streets, and movie theaters, and most people believe that the prevalence of mass shootings is increasing. Given the diversity of events that have been considered a mass shooting, these events have become difficult to define and there is no consensus on a scholarly definition (Schildkraut & Elsass, 2016). Some scholars argue that mass shootings have to involve at least four people being killed—not including the perpetrator—while others argue that only three people need to be killed, or that only three people need to be wounded. Other definitional issues that are debated in the scholarly literature is the length of time between killings, the motivation behind the killing, and whether or not the shootings occur at one location (Schildkraut & Elsass, 2016).

In their review, Schildkraut and Elsass (2016) systematically evaluated how other scholars have defined mass shooters, weighed the pros and cons of different definitions, and provided what is a more inclusive and more complete definition of mass shooting:

> A mass shooting is an incident or targeted violence carried out by one or more shooters at one or more public or populated locations. Multiple victims (both injuries and fatalities) are associated with the attack, and both the victims and the location(s) are chosen either

> at random or for their symbolic value. The event occurs within a single 24-hour period, though most attacks typically last only minutes. The motivation of the shooting must not correlate with gang violence or targeted militant or terroristic activity (p. 28).

This definition identifies several difficult issues in creating a cohesive definition of a mass shooting. By focusing on the issues of the time period around a mass shooting, the motivations behind a shooting that would not qualify as a mass shooting, and the number of mass shooters, this mass shooting definition by these authors could considerably help people understand what a mass shooting is and what it is not. This definition of a mass shooting because is arguably the most amalgamated definition of a mass shooting that can easily be found in the literature. It has been incorporated into published literature, showing that it is reliable in the studying of mass shootings.

Information about Mass Shooters

Though little is known about mass shooters, there are a few noteworthy studies that focus on mass shootings independently of other crime. In this work, the characteristics of mass shooters and how they commit their crimes have been described. For example, Schildkraut and Elsass (2016) identified 304 mass shootings committed by 314 perpetrators in the United States from 1880 through 2016. They found that just over twice as many mass shooters were white than black and that the mass shooters tended to be male (Schildkraut & Elsass, 2016). In another study by Fox and DeLateur (2014), researchers found that the majority of mass shootings are committed with semiautomatic handguns, accounting for approximately 1% of the country's gun homicides.

Mass shootings are considered a type of mass murder, and the majority of available data is in the general mass murder literature. Mass murder is a broad category of homicide that is

defined as, “a number of murders (four or more) occurring during the same incident, with no distinctive time period between the murders,” and may include events involving all manners of death in addition to firearm violence, or mass shootings (Federal Bureau of Investigation, 2008, p. 8). Therefore, research that discusses mass murder, in general, provides a reasonable amount of background information on this topic, one must look to the broader topic of mass murders.

In a recent study of 308 perpetrators of mass murder in America between 2006 and 2014, Lankford (2015) examined the differences between mass murderers who died after their attacks and those that survived. Of these 308 mass murderers, the differences between the perpetrators who lived after their attack and those who died after their attack were examined, with 94 perpetrators dying after their mass murder and 214 living after their mass murder. Findings suggest that perpetrators of mass homicide differed on several measures depending on whether they lived or died after their attack. On average, the age of the perpetrators who died after their attack was 36.5-years-old while the average age of the perpetrators who lived after their attack was 30.2-years-old. Mass murderers who died after their attack killed an average of 5.5 victims while mass murderers who lived after their attack killed an average of 4.6 victims. Perpetrators who died after their attack were less likely to have a co-offender than perpetrators who lived after their attack. Taken together, these results suggest that perpetrators of mass homicide differ in their demographic characteristics, the severity of their attacks, and some situational characteristics (e.g., number of offenders) depending upon whether they live or die after an attack. While this research by Lankford (2015) includes mass shooting events, a more detailed analysis is necessary to replicate findings for mass shooters, specifically, while controlling for other factors, such as the type of location where the mass shooting occurred, the region of the

country where the mass shooting happened, if the mass shooter had a prior criminal record, and the marital status.

Research in the mass murder literature also describes psychosocial factors that contribute to violence risk. For example, Knoll (2012) describe common risk factors across incarcerated mass murderers, including extreme feelings of anger and revenge, social alienation, rumination on violent revenge fantasies, variable psychiatric illness, precipitating social stressors, and significant planning before the offense. In addition, researchers found that the perpetrators were all bullied as children, saw themselves as loners, and often seemed open to death, feeling it as giving them power and infamy (Knoll, 2012). Though this information represents only those who lived after their attack, it is likely that mass murderers who died after their attack also possessed some of these risk factors.

Suicide

At some point in their lives, roughly 9% of people report having significant thoughts of suicide and 3% attempt suicide (Borges et al., 2010). In order to understand why a mass shooter would commit suicide, it is important to understand suicide itself and the factors that could lead anyone to commit suicide. As part of the World Health Organization's World Mental Health Survey Initiative, Borges and colleagues (2010) administered 108,705 surveys to adult participants in twenty-one countries between 2001 and 2007 to determine risk factors for attempting suicide. Researchers found that every mental health disorder in the study was strongly correlated with suicidal ideation (Borges et al., 2010). Some of these disorders are panic disorder, agoraphobia without a history of panic disorder, generalized anxiety disorder, specific phobia, social phobia, and post-traumatic stress disorder, to name a few. It was also discovered that those more likely to display suicidal behaviors were participants of the female sex, were of a

younger age, had a lower education and income, were unmarried, were unemployed, their parents had a history of psychopathology, they dealt with childhood adversities, had the presence of one of the mental disorders aforementioned, and had psychiatric comorbidity (Borges et al., 2010).

Other research has examined the pattern of suicidal behavior across geographical space to determine if different regions of the United States are riskier for suicide. One such study conducted by Kessler and colleagues (2005) investigated trends in suicide ideation, suicide plans, suicide gestures, and suicide attempts during two different time periods; 1990 to 1992 and 2001 to 2003. Researchers found that the region of the country was not statistically significant in their relation to suicidal ideation, plan, gesture, or attempt (Kessler, Berglund, Borges, Nock, & Wang, 2005). This negative result could be because suicidal behavior truly does not differ by region, or it is possible that regional analyses may have prevented finding finer geographical patterns, such as a specific state or county. Thus, the possible relationship between suicide and region of the country should be further reconnoitered.

In addition to the known characteristics of suicidal behavior, research also shows that suicidal individuals interact with the health care system. In their retrospective study of 5,894 individuals during the year prior to their suicide, Ahmedani and colleagues (2014) found that 64% went to a primary care appointment and 62% went to a medical specialty appointment, but none received a mental health diagnosis. Moreover, within the week before their deaths, 25% went to a medical specialist and 21% went to a primary care doctor, but, again, did not receive a mental health diagnosis (Ahmedani, Simon, Stewart, Beck, Waitzfelder, Rossom, Lynch, Owen-Smith, Hunkeler, Whiteside, Operskalski, Coffey, & Solberg, 2014). This is important because medical professionals have the knowledge and resources to intervene in suicide but are still

missing critical prevention opportunities. Overall, these findings reveal a potential novel point of intervention in mass shooting events if suicidality is both important to perpetration and potential shooters to the doctor prior to the commission of their crime.

It is very difficult to know the exact reason why a mass shooter would choose to take his life after he commits a violent act because those who committed suicide are deceased. Sometimes, the reason for a suicide will be left in a letter, social media post, or video, but it is often unknown. In these cases, researches investigate factors associated with shooter suicide. Findings from a study of school mass shooters showed that most of the male mass shooters who committed suicide after their attacks were continually bullied and beaten up because their aggressors believed the shooters were homosexual (Kalish & Kimmel, 2010). It is certain that not all of the school mass shooters in United States have been homosexuals, but the majority of these shooters were said to be different or odd compared to other boys by their peers, which may have lead them to being haphazardly labeled by others according to malicious cultural stereotypes.

Variables for the Current Study

The current study seeks to determine the role of shooter suicidality in mass shooting events and both event and shooter characteristics associated with shooter suicide. For this reason, the current study will examine variables about the mass shootings and variables about the mass shooters in an effort to understand the role of shooter suicidality in mass shooting events. The variables studied will be pulled from the existing literature about mass shootings and suicide.

The primary outcome of interest—and thus, the dependent variable—in the current study is whether or not the shooter in each mass shooting event committed suicide. This variable was created from data regarding shooter vitality and the manner of the shooter's death, if applicable.

This variable was selected to extend previous work in terrorism and mass murder research that suggest differential offender profiles and attack severity depending upon shooter survival status.

In line with previous research on suicide, terrorism, and mass murder, the current study investigates the relationship between shooter suicide and other risk factors for mass shooting perpetration as well as event severity. As such, the mass shooting event independent variables of this study—also referred to as the mass shooting characteristics—include the region of the country, the location type, if multiple shooters were involved, how many people were killed, how many people were wounded, the total number of people killed and wounded, if multiple weapons were used, and the types of weapons used (handgun, shotgun, rifle, or other). The independent variables that focus on the individual mass shooters—denoted as the mass shooter characteristics—include the age of the mass shooter, race, gender, marital status, and whether or not they have a prior criminal record. The decision to focus on these variables was driven by what was readily available in the database and what could be collected reliably. This will be further discussed in the data and methods section of the paper.

Age has a known influence on both the likelihood of committing suicide and dying after a mass murder event (Lankford, 2015). Evidence suggests that certain age groups are more likely to commit suicide compared to others. Specifically, Shah (2012) noted that data from the World Health Organization shows that in almost every country, suicide rates tend to increase as people age. As mentioned in the review of the work of Lankford (2015), the average age of the mass murderers who died after their attack was 36.5 years old, while the mass murderers who survived their attack had an average age of 30.2 years old. Another article noted that in a study comparing adult and adolescent mass murderers, 53% of the adult mass murderers but only 9% of the adolescent mass murderers committed suicide or were killed by the police (Meloy, Hempel,

Gray, Mohandie, Shiva, & Richards, 2004). Therefore, age may be one variable that makes a mass shooter, specifically, more or less likely to commit suicide after their attack.

Though inconsistent, some evidence suggests that geographical location affects the likelihood of suicide, which may also have important implications for mass shooting perpetration. Though Kessler and colleagues (2005) concluded that region did not correlate significantly with suicide, research by Stack (2000) found that community-level economic stressors are strongly related to people committing suicide. The inconsistency between these findings may be related to the size of the geography analyzed with variation masked in the study considering larger regions. In addition, other factors that might vary by region include weather patterns, population density, and unemployment rates. For example, if mass shooters live in regions that are economically deprived, they may be more likely to commit suicide, which may affect the nature of their attack. Therefore, the current study will explore if there is a relationship between geographical region and mass shootings.

Marital status has a known role in suicide risk (Kposowa, 2000), and a potential role in mass murder perpetration as an element of social isolation or psychosocial adversity (Knoll, 2012). Kposowa (2000) found that people who were divorced or separated were more than twice as likely to commit suicide as those who were married. Being widowed or single, however, had no significant interaction with suicide rates (Kposowa, 2000). Given its role in suicide risk, marital status may be correlated with mass shooter suicide.

Criminal history is a known risk factor in suicide risk. Thus, this study posits that a prior criminal record may contribute to the likelihood of a mass shooter suicide. In a large-scale investigation of suicide in South Carolina utilizing multiple data sources, Weis and colleagues (2006) found that 196 of 491 suicides in 2004 involved individuals with a prior criminal record.

Given that nearly 40% of all 491 suicides in the 2004 dataset represented people with a prior criminal history, criminal history needs to be considered as a potential risk factor for suicide, more broadly, and mass shooter suicide.

The size of a mass shooting is depicted by the media based on how many victims were harmed or killed. Therefore, it is noteworthy to examine how many victims there were for a mass shooting event, including victims who were both murdered and injured. In his comparison of mass murderers who survived and those that died after their attack, Lankford (2015) found that mass murderers who did not survive their attack killed an average of 5.5 victims while mass murderers who survived their attack murdered an average of nearly 4.5 victims. Since that study focused on the suicide of mass murderers, and mass shootings are considered a type of mass murder, research should be conducted to determine if the correlations between age and suicide of mass murderers are similar to the age and suicide of mass shooters.

The research from Lankford (2015) was also useful in regard to discussing the number of shooters and suicide of mass murderers. Through a comparison between mass murderers that survived their attack and those that died after their attack, it was divulged that, "Holding all other independent variables constant, for each additional co-offender, a mass murderer was 4.8 times more likely to survive his or her crime" (Lankford, 2015, p. 592). If this result was found in mass murderers, it would be expected that a similar result would be found in mass shooters, which was aforementioned as a type of mass murder.

The final independent variable included in the analysis is the race of the mass shooter. Schildkraut and Elsass (2016) found that, out of all the mass shootings that have happened in the United States between 1880 and 2016, approximately 55% were white, 25% were black, and the other twenty percent of mass shooters were members of racial minority groups. In another study

of the racial make-up of mass murderers and their likelihood to die after a mass murder, researchers found that mass murderers who were white were the most likely to die after a mass murder (Lankford, 2016). While this study broadly categorized mass murderers as alive or dead following their attack and did not consider how a mass murderer died, it would be useful to delve deeper to compare how the mass murderers died with the race of the mass murderers in order for more comparisons to be drawn. The current study will do exactly this, rather with mass shooters instead of mass murderers.

Though there has been some research on the suicidality of mass shooters, this topic is severely lacking an adequate amount of quantitative research. Therefore, the purpose of this study is to analyze factors that differentiate mass shooters who commit suicide after their attack from mass shooters who do not. The factors included in this study are location type, region, how many shooters were involved, the age of the shooter, the race of the mass shooter, the marital status of the shooter, the number of victims, and if the mass shooter has a prior criminal record. Thus, the primary research question of this study asks what differences exist between the mass shooters who commit suicide after their attacks and mass shooters who do not. Below are the five hypotheses, based on the research presented previously in this section, that will be examined through the statistical analysis of the data.

H_1: Mass shooters who commit suicide following their attack are more likely to be older than mass shooters who survive their attacks.

H_2: Mass shooters who are divorced or separated will be more likely to die than survive their mass shooting event.

H_3: Mass shooters who die after their attack are more likely to have a prior criminal record.

H_4: Mass shooters who murder more victims during their attack will be more likely to die afterwards.

H_5: Mass shooters who are white will be more likely to die after their attack than mass shooters of another race.

Data and Methods

Data

To further study what variables are associated with a shooter committing suicide (or not) after a mass shooting, a dataset created by Schildkraut (2014) was used. The original dataset from Schildkraut (2014) included 91 mass shootings that occurred between the year 2000 and 2012, but the updated and expanded version includes cases through 2016. The updated version was used for this study with 226 mass shootings in the database that occurred between the years 2000 and 2016.

The data was collected by obtaining media information about the different mass shootings in the United States through systematic searches on LexisNexis. While there are other datasets that are publicly available, they are often flawed. For instance, the Mother Jones mass shooting spreadsheet only selects a few spree mass shootings to be included in their dataset and fails to explain why. This dataset does not randomly omit mass shooting events and includes thoroughly explained inclusion and exclusion criteria.

Although the dataset presented by Schildkraut (2014) primarily looks at the media's coverage on mass shootings, these data can be used to examine other aspects of mass shootings. The dataset is organized chronologically, and includes the date, city, state, location type, region of the country, name of the shooter, age of the shooter, race of the shooter, gender of the shooter, how many shooters were involved in the event, how many people were killed in the event, how

many people were wounded in the event, if the shooter survived the attack, if multiple weapons were used, if a handgun was used, if a shotgun was used, if a rifle was used, and if another type of gun was used (Schildkraut, 2014, p. 55). This version of the dataset used includes 226 cases between 2000 and 2016.

In Schildkraut and Elsass' (2016) definition of a mass shooting, they do not give a specific number of people who need to be wounded or killed in one specific event for the event to be considered a mass shooting. In the discussion below, these data will be reviewed to as the 'original dataset.' The original dataset consists of 226 mass shootings committed by 236 mass shooters. As there is considerable debate about how many victims should (or should not) be included in the definition, this research will compare the results from analysis with the 'original dataset' with results generated by restricting the number of victims. For comparison purposes, only mass shootings involving, "three or more shooting victims" that are not necessarily fatalities (Stanford Geospatial Center, 2016). This dataset will be referred to as the 'revised dataset.' The revised dataset consists of 185 mass shootings by 194 mass shooters.

In addition, the following variables were added to the original and revised datasets to test hypotheses related to suicidality among mass shooters, including how the shooter died (if applicable), prior criminal record of the mass shooter, and the marital status of the shooter. It is important to get more background information on the shooter(s) so that more precise conclusions can be drawn about suicidality in mass shooters. To obtain the necessary data to include the new variables introduced in this study, searches for each mass shooting incident were conducted using open sources. The searches for the mass shootings began by using Google or LexisNexis. For the mass shootings that were heavily reported, it was not uncommon to see twenty or more articles pertaining to one mass shooting incident. Therefore, when available, articles were

primarily read from *The New York Times*. When articles were not written by *The New York Times* about a particular mass shooting incident, other popular news websites were browsed including *CBS News, Fox News, ABC News, The Los Angeles Times,* and *The Chicago Tribune*. In the rare instance that two different sources varied on a mass shooter's criminal history or marital status, additional sources were read and the answer for that mass shooter that would be chosen would be the answer that was provided the most frequently.

Variables

The dependent variable for this research is ternary coded, consisting of mass shooters committing self-inflicted suicide, mass shooters who died from being shot by another person, and mass shooters who survived their mass shooting. All mass shooters that successfully took their own lives were coded as committing suicide. It could be argued that mass shooters who were killed by the police, or another person, should be included as committing suicide because often they want to die and use suicide by cop as a way of accomplishing death (de Similien & Okorafor, 2017). However, it cannot be assumed that those mass shooters who were killed by someone else wanted to die after their attack because some of these mass shooters may have attempted to flee the scene or others may have been under the influence of alcohol or drugs. Also, not all of the mass shooters who committed self-inflicted suicide or were shot by another person after their attack left behind a suicide note or video to detail their intention to die. Although arguments for suicide by cop are reasonably compelling, to avoid inserting assumptions, those who were killed by another person were given their own category in the dependent variable.

Regarding the creation of the binary logistic regression for the results section of this study, the dependent variable was altered from having three categories (self-inflicted suicide,

shot by another person, and survived) to only consisting of two categories (died or survived). This change was made because the results of the category 'shot by another person' had a small number of cases and thus, it would be difficult to make confident conclusions about that data. It was also determined that the 'shot by another person' category did not yield significant results in the ANOVAs, thus making it unnecessary to include this category in the binary logistic regression. With all of this in mind, the best possible option was to collapse the three categories of the dependent variable into two categories for the binary logistic regression.

In this research, the independent variables are the location type of mass shooting, age, region of the country, marital status, known criminal record, the number of offenders, the gender of the mass shooter, the race of the mass shooter, the number of killed victims, the number of wounded victims, the total number of victims killed and wounded, weapons used (shotgun, rifle, handgun, and/or other type of gun), if multiple weapons were used, and if the mass shooter was deceased after the mass shooting. The dependent variable of this study is how the mass shooter died after their attack, such as through self-inflicted suicide, being shot by another person, or surviving the event.

Several demographic variables about the mass shooters will be explored. The age of the shooter will be a continuous variable, so the mean will be used. For the variable of multiple perpetrators being involved, this will be binary coded as either yes or no. The gender of the shooter will either be coded a male or female with female serving as the reference category. For marital status, four categories will be coded: married, divorced/separated, widowed, or single. Single perpetrators will be the reference category. Relating to this variable is the variable of how the shooter died, with the possible choices of self-inflicted suicide, shot by another person, or survived. The race of the mass shooter will also be included. Race will be coded into six

categories, consisting of white, black, Latino, Asian, Native American, or other. The race category of "other" will be used when a perpetrator is multiracial, the race of the perpetrator could not be found, or when the perpetrator is a race that is not listed in the other categories. White perpetrators will serve as the reference category. Lastly, the prior criminal record of the mass shooter will be binary coded as either no or yes.

The other variables relate to the nature of the incident. The type of mass shooting category consists of specific locations, including the following; school, workplace, place of worship, restaurant/nightclub, residential, shopping/entertainment, government/military, multiple/spree, or other. This variable will be dummy coded with schools serving as the reference category. The region of the country variable consists of the Northeast region, the Southern region, the Western region, and the Midwest region. (U.S. Census Bureau, 2013). The Northeast region will serve as the reference category. The number of perpetrators per mass shooting event will also be collected, along with the number of victims killed, the number of victims wounded, and the total number of victims that were either killed or wounded. The different types of weapons that were used in a mass shooting—including handguns, shotguns, rifles, and other weapons—will all be binary coded as no or yes.

Subjects

This revised dataset study sample, focused on the revised dataset, includes 185 mass shootings that happened in the United States of America from 2000 through 2016. Incidents were included if they conformed to the aforementioned definition of a mass shooting. These 185 mass shooting events involved 194 mass shooters. Additionally, the original dataset information is included, which consisted of 226 mass shooting events occurring from 2000 to 2016 with 236 mass shooters. The descriptive statistics for the variables about the mass shooters and the mass

shootings can be found in Table 1 and Table 2, respectively. This information was broken up into two different tables due to the large number of variables involved in this study. Table 1 observes the following characteristics about the mass shooters: the age, race/ethnicity, the gender, if the shooter had a criminal record prior to the mass shooting, if the shooter died after the mass shooting, and how the mass shooter died, with an option of "survived" for those who did not die after a mass shooting.

Table 1:
Mass shooter descriptive statistics from the revised dataset and the original dataset

	Revised				Original			
Variables	N	Frequency	Mean/Percentage	SD	N	Frequency	Mean/Percentage	SD
Age	194		35.16	14.536	236		35.16	14.934
Race/Ethnicity	194		2.04	1.414	234		2.00	1.443
White		92	47.4%			113	47.9%	
Black		56	28.9%			72	30.5%	
Latino		22	11.3%			25	10.6%	
Asian		7	3.6%			8	3.4%	
Native American		4	2.1%			5	2.1%	
Another Race or Ethnicity		13	6.7%			11	4.7%	
Gender	194			0.187	236		0.96	0.192
Female		7	3.6%			9	3.8%	
Male		187	96.4%			227	96.2%	
Marital Status	194			0.478	236		0.33	0.470
Single		126	64.9%			159	67.4%	
Married		68	35.1%			77	32.6%	
Separated or Divorced	194		0.47	0.770	236		0.44	0.738
Widowed		135	69.6%			167	70.8%	
Shooter Dead Afterwards?		28	14.4%			36	15.3%	
No		30	15.5%			32	13.6%	
Yes		1	0.5%			1	0.4%	
How the Shooter Died	194			0.493	236		0.56	0.498
Self-Inflicted Suicide		79	40.7%			104	44.1%	

Table 1 (cont'd)

Shot by Another Person		115	59.3%			132	55.9%	
Survived	194		0.99	0.910	236		1.06	0.907

The ages of the mass shooters in the revised dataset study ranged from 12-years-old to 74-years-old with a mean age of 35.16-years-old. Approximately 50% of the shooters were white and slightly more than a quarter of the shooters were black. The majority of the mass shooters had no prior criminal record. Almost five times as many mass shooters were found to be single, rather than divorced or separated. After their mass shooting events, roughly 60% of the mass shooters died, whether it was by their own hand or someone else's. Of those mass shooters that died after the mass shooting, 41.8% killed themselves while 17.5% were killed by someone else.

Table 1 also shows the original dataset descriptive statistics of mass shooters. It is presented that, in the original dataset, the mean age of mass shooters was 35.16-years-old. The age of the mass shooter ranged from 12 to 88-years-old. The majority of the mass shooters were found to be white and almost all of them were males, similar to the mass shooters of the revised dataset. Most of the mass shooters in this dataset did not have a prior criminal record and were single; a statistic also seen in the revised dataset. Unlike the revised dataset, more of the mass shooters in the original dataset survived their mass shootings, rather than committing self-inflicted suicide.

The next table, Table 2, shows the descriptive statistics for the 185 mass shooting events that occurred between 2000 and 2016 in the revised dataset, along with the 226 mass shooting events that occurred between 2000 and 2016 in the original dataset. This table includes the following variables about the mass shootings: the region of the country, the location type, the number of people killed, the number of people wounded, the total number of people killed and

wounded, if there were multiple shooters involved, if multiple weapons were used, if a handgun was used, if a shotgun was used, if a rifle was used, and if another gun was used.

Table 2:

Mass shooting descriptive statistics from the revised dataset and the original dataset

	Revised				Original			
Variables	N	Frequency	Mean/ Percentage	SD	N	Frequency	Mean/Percentage	SD
Region	185			1.057	226		2.73	1.050
Northeast		25	13.5%			29	12.8%	
South		58	31.4%			75	33.2%	
Midwest		42	22.7%			49	21.7%	
West		60	32.4%			73	32.3%	
Location Type	185			2.894	226		4.36	2.930
School		30	16.2%			41	18.1%	
Workplace		50	27.0%			62	27.4%	
Place of Worship		7	3.8%			8	3.5%	
Restaurant or Nightlife		17	9.2%			18	8.0%	
Residential		9	4.9%			9	4.0%	
Entertainment or Shopping		15	8.1%			19	8.4%	
Government or Military		10	5.4%			15	6.6%	
Spree		26	14.1%			26	11.5%	
Another Location		21	11.4%			28	12.4%	
Number of Victims Killed	185	696	3.76	5.135	226	733	3.24	4.787
Number of Victims Wounded	185	812	4.39	6.917	226	857	3.79	6.393
Total Number of Killed and Wounded Victims	185	1,508	8.15	10.645	226	1,590	7.04	9.915
Multiple Shooters?	185			0.178	226		0.03	0.161
No		179	96.8%			220	97.3%	
Yes		6	3.2%			6	2.7%	
Multiple Weapons?	185			0.485	226		0.32	0.469

Table 2 (cont'd)

No		116	62.7%			153	67.7%	
Yes		69	37.3%			73	32.3%	
Handgun used	185			0.405	226		0.77	0.419
No		38	20.5%			51	22.6%	
Yes		147	79.5%			175	77.4%	
Shotgun used	185			0.393	226		0.17	0.379
No		150	81.1%			187	82.7%	
Yes		35	18.9%			39	17.3%	
Rifle used	185			0.445	226		0.27	0.443
No		135	73.0%			166	73.5%	
Yes		50	27.0%			60	26.5%	
Another Weapon used	185			0.074	226		0	0.067
No		184	99.5%			225	99.6%	
Yes		1	0.5%			1	0.4%	

The revised dataset descriptive statistics in Table 2 showed that the majority of the mass shooting events occurred in the Western region of the United States, but they were also very likely to occur in the Southern region. 27% of the mass shootings were workplaces shootings and 16.2% of mass shootings took place at a school. The least likely location type for a mass shooting was shown to occur at places of worship, with only 3.8% of all mass shootings occurring there. Per mass shooting event, the average number of victims killed was 3.76 and the average number of victims wounded was 4.39, with an average total of 8.15 people wounded or killed per mass shooting. Approximately 3% of the mass shootings involved more than one mass shooter and 37.3% of the mass shooters only used one weapon to commit their mass shootings. The most common weapon used in a mass shooting was a handgun, which is consistent with previous findings in the literature (Fox & DeLateur, 2014).

Table 2 also shows the descriptive statistics for the original dataset. Unlike the mass shooting descriptive statistics for the revised dataset, the majority of the mass shootings from the

original dataset occurred in the South, rather than in the West. Most of the mass shootings in the original dataset occurred in workplaces and schools; similar to the result found for the revised dataset in Table 2. The mean number of people killed per mass shooting event for the original dataset was 3.24, with an average of 3.79 people being wounded each event. The most common weapon of choice used in the original dataset was a handgun; a finding that also supports the claim by Fox and DeLateur (2014) that the most commonly used type of gun in mass shootings are handguns.

Analysis

The data were analyzed by completing bivariate comparisons and multivariate logistic regression. The bivariate comparisons were completed by running analysis of variance tests, also known as "ANOVAs." The ANOVAs were generated using SPSS. Two different ANOVAs were used to assess the differences in the means of the variables for both datasets; with one ANOVA focusing on the mass shooter characteristics for the revised and original datasets and another ANOVA looking at the mass shooting characteristics for the revised and original datasets. Two different ANOVAs were used due to the large number of independent variables in this study. The first of these ANOVAs looked at the characteristics of the mass shooters in the population and is shown in Table Three. The other type of ANOVA observed the characteristics of the mass shooting events and is located in Table Four.

Table 3:
ANOVA of the mass shooter characteristics for the revised dataset and the original dataset

	Revised			Original		
Variables	Self-Inflicted Suicide (n=81)	Shot by Another Person (n=34)	Survived (n=79)	Self-Inflicted Suicide (n=90)	Shot by Another Person (n=42)	Survived (n=104)
Age *	36.88	37.47%	32.41	37.21	37.69	32.37

Table 3 (cont'd)

Gender (% Male)	98%	97%	95%	96%	98%	96%
Race/Ethnicity						
White	55.56%	35.29%	44.30%	52.81%	42.86%	46.60%
Black	24.69%	32.35%	31.65%	29.21%	28.57%	33.01%
Latino	9.88%	11.76%	12.66%	10.11%	11.90%	10.68%
Another Race	9.88%	20.59%	11.39%	7.87%	16.67%	9.71%
Marital Status						
Single	69.14%	58.82%	74.68%	68.89%	59.52%	76.92%
Married	13.58%	20.59%	12.66%	15.56%	21.43%	12.50%
Separated or Divorced	16.05%	20.59%	12.66%	14.44%	19.05%	10.58%
Widowed	1.23%	0%	0%	1.11%	0%	0%
Prior Criminal Record	27%	38%	42%	24%	40%	37%

º= $p<0.05$ for the "revised dataset" and *= $p<0.05$ for the "original dataset"

The ANOVA, shown in Table 3, did not yield any significant results for the revised dataset. Although none of the results were significant, some of the results highlighted important trends in the outcome variables that may have occurred due to chance. The variable of age shows that younger mass shooters could be more likely to survive a mass shooting compared to the older mass shooters, who could be more likely to be shot by another person or commit suicide. For the variable of race, black mass shooters could be less likely to commit suicide than be shot by another person, if they died. Conversely, white mass shooters could be more likely to commit suicide than be shot by another person. Mass shooters that are single could be more likely to survive a mass shooting than be shot by another person. Being married, separated, or divorced makes a mass shooter potentially more likely to be shot by another person than to survive a mass shooting. Finally, mass shooters with a prior criminal record could be more likely to survive a mass shooting, or be shot by another person, than commit suicide.

The Table 3 ANOVA found one significant result in the original dataset. The results of this ANOVA indicated that at least one mean age is different from the others across the manners

of death. With the mean age of a mass shooting surviving being 32.37-years-old—compared to the ages of committing self-inflicted suicide and being shot by another person of 37.21-years-old and 37.69-years-old, respectively—this result was found to be statistically significant. While age was the only significant result, the other independent variables yielded some interesting trends that were not significant. A white mass shooter could be more likely to commit self-inflicted suicide, compared to being shot by another person or surviving. A mass shooter, whose race is not white, black, or Latino, could be more likely to be shot by another person, rather than commit self-inflicted suicide or surviving their mass shooting. Being married could also make a mass shooter more likely to be shot by another person, rather than committing self-inflicted suicide or surviving. Lastly, a mass shooter with a criminal record could be more likely to commit self-inflicted suicide instead of being shot by another person or surviving.

Table 4:

ANOVA of the mass shooting characteristics for the revised dataset and the original dataset

	Revised			Original		
Variables	Self-Inflicted Suicide (n=80)	Shot by Another Person (n=33)	Survived (n=72)	Self-Inflicted Suicide (n=89)	Shot by Another Person (n=41)	Survived (n=96)
Number of Victims Killed *	4.10	5.06	2.79	3.84	4.22	2.27
Number of Victims Wounded	3.66	5.76	4.57	3.34	4.88	3.75
Total Number of Killed and Wounded Victims	7.76	10.82	7.36	7.18	9.10	6.02
Multiple Shooters?	0%	6%	6%	0%	5%	4%
Multiple Weapons? *	41%	48%	28%	40%	41%	21%
Handgun used	79%	82%	79%	81%	78%	74%
Shotgun used	20%	24%	15%	18%	22%	15%
Rifle used	26%	39%	22%	25%	37%	24%

Table 4 (cont'd)

Another Weapon used	0%	3%	0%	0%	2%	0%
Region						
Northeast	12.35%	8.82%	15.19%	12.36%	7.32%	15.63%
South	25.93%	32.35%	39.24%	28.09%	34.15%	37.50%
Midwest	28.40%	23.53%	16.46%	26.97%	24.39%	15.63%
West	33.33%	35.29%	29.11%	32.58%	34.15%	31.25%
Location Type						
School º *	14.81%	5.88%	26.58%	14.61%	7.32%	26.04%
Workplace º *	37.04%	14.71%	20.25%	39.33%	9.76%	23.96%
Place of Worship	3.70%	0%	5.06%	4.49%	0%	4.17%
Restaurant or Nightlife	6.17%	11.76%	11.39%	5.62%	12.20%	8.33%
Residential *	4.94%	11.76%	1.27%	4.49%	9.76%	1.04%
Shopping or Entertainment	7.41%	8.82%	7.59%	7.87%	7.32%	9.38%
Government or Military *	3.70%	11.76%	3.80%	3.37%	17.07%	5.21%
Spree	11.11%	20.59%	15.19%	8.99%	17.07%	11.46%
Another Location	11.11%	14.71%	8.86%	11.24%	19.51%	10.42%

º= $p<0.05$ for the "revised dataset" and *= $p<0.05$ for the "original dataset"

The ANOVA, shown above in Table 4, did yield two significant results for the revised dataset. First, there was a significant effect of the school location type on the dependent variable of how the mass shooter died at the $p<0.05$ level. There was also a statistically significant difference between the workplace location type and how the mass shooter died at the $p<0.05$ level. While not significant, the ANOVA also detailed some interesting trends across the categories of the dependent variable. The ANOVA showed that the more victims a mass shooter killed, the more likely they could be to be shot by another person, rather than committing suicide. The same was found for the variable of the total number of victims killed or wounded; the more victims killed or wounded, the more likely the mass shooter could be to be shot by another person, compared to suicide. No mass shooters involved in a mass shooting with more

than one shooter committed suicide, and for the mass shootings that involved more than one shooter, they could be equally as likely to survive the mass shooting or be killed by another person. If a mass shooter used multiple weapons, that mass shooter could be less likely to survive than commit suicide or be killed by another person. Few cases involved the use of a rifle, but for the mass shooters who did, they could be more likely to be shot by another person than to survive a mass shooting. The region variables yielded interesting results from the ANOVA. In the South, mass shooters could be almost four times as likely to commit suicide than be shot by another person. School mass shooters could be more likely to survive mass shootings, compared to being shot by another person, mass shooters committing workplace shootings could be more likely to commit suicide than be shot by another, and spree shooters were could be likely to be shot by another person than commit suicide.

The ANOVA in Table 4 generated three significant results for the original dataset. The first of these was that a significant effect exists between the independent variable of the school location type and the dependent variable of how the mass shooter died at the $p<0.05$ level. It was also determined that there was a statistically significant difference between the workplace location type and how the mass shooter died. The final significant result was that there was a significant effect of the government/military location type on how the mass shooter died. Along with the statistically significant results, other trends were exhibited in the ANOVA that may have arisen due to chance and thus, are not significant. Mass shootings that involved multiple shooters could make those shooters less likely to commit self-inflicted suicide, rather than be shot by another person or surviving. The usage of multiple weapons in a mass shooting could make a mass shooter less likely to survive a mass shooting, instead of committing self-inflicted suicide or being shot by another person. A mass shooter that uses a rifle could be more likely to

be shot by another person, compared to surviving or committing self-inflicted suicide. Finally, mass shooters that attack in the Midwest could be less likely to survive than committing self-inflicted suicide or being shot by another person.

Results

Binary logistic regression was used to determine the relationship between the independent variables with the dependent variable. Two factors of the dependent variable—self-inflicted suicide and shot by another person—were collapsed into one category referred to as not surviving. Understandably, those who survived their mass shooting were in the survival category. A binary logistic regression was used instead of a multinomial logistic regression because the case size of the factor 'shot by another person' was diminutive and therefore, could have adversely affected the results. The independent variable of the gender of the mass shooter was excluded because the variable is highly skewed due to the nature of its distribution: which is caused by approximately 96% of the mass shooters being males. The binary logistic regression table is shown below in Table 5. Table 5 displays the binary logistic regression for the revised dataset and original dataset. In these statistics, the reference group of the dependent variable was not surviving and thus, the results are discussed in the terms of surviving a mass shooting. Dummy variables were created to make the variables of white, single, region of the country, and location type from the variables of race, marital status, region of the country, and location type, respectively.

Table 5:
Binary logistic regression using the revised dataset and the original dataset

	Revised		Original	
Variables	B	Exp(B)	B	Exp(B)
Age	-0.013 (0.013)	0.987	-0.013 (0.011)	0.987
White	0.358 (0.420)	1.431	0.426 (0.366)	1.532
Latino	0.370 (0.576)	1.447	0.259 (0.537)	1.295

Table 5 (cont'd)

Another Race	0.496 (0.617)	1.643	0.838 (0.611)	2.312
Separated or Divorced	0.038 (0.496)	1.039	0.040 (0.468)	1.041
Prior Criminal Record	0.829* (0.347)	2.290	0.779* (0.326)	2.180
Workplace	-0.825 (0.564)	0.438	-0.877 *0.493)	0.416
Spree	-0.779 (0.625)	0.459	-1.038 (0.593)	0.354
Restaurant or Nightlife	-0.447 (0.701)	0.640	-0.791 (0.659)	0.453
Another Location	-0.889 (0.529)	0.411	-1.092 (0.471)	0.335
South	-0.141 (0.520)	0.869	-0.327 (0.481)	0.721
Midwest	-1.150 (0.590)	0.317	-1.381* (0.546)	0.251
West	-0.585 (0.539)	0.557	-0.898 (0.509)	0.407
Handgun used	0.057 (0.411)	1.059	-0.111 (0.360)	0.895
Number of Victims Killed	-0.120* (0.054)	0.887	-0.157* (0.057)	0.854

*= $p<0.05$. The standard error is written in parentheses.

The revised dataset's binary logistic regression, seen on Table 5, yielded two significant results. First, the binary logistic regression indicated that mass shooters with a prior criminal record were more likely to survive their attacks, rather than die. This result is pertinent to the third hypothesis of the present study. The statistic also displayed that for every additional victim a mass shooter kills, the more likely the mass shooter is to die than survive their mass shooting. This finding is relevant to the fourth hypothesis of the current study.

The binary logistic regression that was based on the original dataset and presented in Table 5 found three significant results. These statistically significant results are similar to those of the revised dataset. Similar to the revised dataset's binary logistic regression shown in Table 5, this binary logistic regression, based on the original dataset, found that mass shooters with a prior criminal record are more likely to survive their attacks. It was also established that perpetrators of mass shootings in the Midwest are less likely to survive their attacks compared to those in the East. The final significant statistic was that a mass shooter grows less likely to

survive their attack as they kill more victims; another outcome that was also found for the revised dataset.

Discussion

As more mass shootings occur in America, the citizens look to the government for answers about how these atrocities can be stopped. However, how is the government expected to know how to combat these mass shootings with the limited research that is available about them? This is the problem with the previous research on mass shootings; there is just not enough of it. There is also no readily found research available about mass shooters committing suicide, which is part of the reason why it was essential for this study to be completed. By observing the differences between mass shooters who commit suicide and mass shooters who survive their mass shootings, this study highlights the characteristics that set these two types of mass shooters apart. Factors such as the region of the country, the location type, the marital status of the mass shooter, and more, displayed their roles in interacting with what happens to the mass shooter after the shooting.

The inclusion of the data from Schildkraut (2014) with the usage of two definitions of a mass shooting—from Schildkraut and Elsass (2016) and the Stanford Geospatial Center (2016)—to comprise the 'revised dataset' was important because the combination of these two definitions helped form a new definition of a mass shooting that is comparable to a majority of the other common definitions of mass shooting found in the relevant literature (Bjelopera et al., 2013; Krouse & Richardson, 2015). It was also important to simultaneously run Dr. Jaclyn Schildkraut's dataset, only using the definition of a mass shooting from Schildkraut and Elsass (2016) to determine what changes happened to the data with the addition of more cases and of cases involving fewer wounded and killed victims.

Major Findings

As previously mentioned, the binary logistic regression yielded two significant results that are important for the study of mass shooters committing, or not committing, suicide after their attacks. The first major finding from the results of this study is that mass shooters with a prior criminal record were found to be more likely to survive their attacks. It was also revealed that for each additional victim a mass shooter kills, the less likely the mass shooter becomes to survive their attack.

These significant results can be useful for a number of reasons. Particularly, researchers, law enforcement, and mental healthcare workers could use these findings to postulate what will happen to mass shooters after their attacks have been completed, based on their race, the location type, the prior criminal record, and the number of victims killed. While research seems to over exaggerate the number of people who will become mass murderers, thus discrediting the importance of prediction (Knoll, 2012), it is still wise for different places across the country to be prepared for what to do in case of a mass shooting. For example, after the mass shooting at Virginia Polytechnic Institute and State University in 2007, a great deal of colleges across the nation tried to implement strategies to help reduce the amount of harm a mass shooting could cause (Fox & Savage, 2009). While the statistics show that mass shootings are extremely rare events, the schools with plans in place for mass shootings can be basing their plans on the results of studies similar to this one.

Hypotheses

This research study had five hypotheses. The first hypothesis was that mass shooters who commit suicide following their attack are more likely to be older than mass shooters who survive their attacks. The results failed to reject this hypothesis and is shown in the binary logistic

regression. The binary logistic regression showed that for every year a mass shooter ages, the less likely they are to survive, than commit suicide. This result, while not found to be statistically significant, is consistent with the research from Lankford (2015), which showed that mass murderers who committed suicide were an average of 36.5-years-old while mass murderers who survived their events were an average of 30.2-years-old. Therefore, the present study provides support for this result from Lankford (2015).

The second hypothesis was that mass shooters who are divorced or separated will be more likely to commit suicide than survive their mass shooting event. This hypothesis was rejected by the binary logistic regression. Interestingly, the binary logistic regression showed that divorced or separated mass shooters were more likely to survive than commit suicide. Previous research by Kposowa (2000) showed that people who are divorced or separated are twice as likely to commit suicide than those who are married; a finding that was not supported by the binary logistic regression in this study.

The third hypothesis pertained to criminal records, postulating that mass shooters who commit suicide after their attack are more likely to have a prior criminal record. This hypothesis was rejected as demonstrated with the binary logistic regression. The binary logistic regression provided the significant result that mass shooters with a prior criminal record were actually more likely to survive, rather than die, after their attacks. This finding was not consistent with the research from Weis et al., (2006) that showed that 196 out of 491 suicides in South Carolina, during a given time period, were committed by people with a prior criminal record.

Fourth, mass shooters who murder more victims during their attack will be more likely to commit suicide. The results failed to reject this hypothesis by the binary logistic regression. The binary logistic regression showed that for every additional victim a mass shooter killed, the less

likely the mass shooter was to survive than commit suicide. This is important because it supports the research by Lankford (2015) which showed that mass murderers who didn't survive their attacks killed an average of 5.5 victims and mass murderers who did survive their attacks killed an average of 4.5 victims.

Lastly, the fifth hypothesis purports that mass shooters who are white will be more likely to commit suicide than shooters of another race. This hypothesis was rejected by the binary logistic regression. The binary logistic regression showed that white mass shooters were more likely to survive their mass shooting attacks. This is important because a study completed by Lankford (2016) showed that white mass murderers were more likely to commit suicide after their murders, compared to mass murderers of other races. Thus, the present finding about white mass shooters does not support the aforementioned claim by Lankford (2016).

Limitations

With only two of the hypotheses being supported by the results of this study, this research did have its limitations. One of the primary limitations of this research was the lack of information available. To more thoroughly examine the action of mass shooters committing suicide, it would have been more helpful to have prior medical health diagnoses, possible suicide notes of the mass shooters, details about the crimes committed by those with a criminal history, and so forth. Having information that allowed insight into the mental health of these mass shooters would have allowed for more comparisons and conclusions to be made about mass shooters committing suicide, possibly even increasing the validity of the suicide by cop contention.

The credibility of open sources news stories is a limitation of this study. Maier (2005) conducted a study of 4,800 news sources in fourteen different newspapers to look at the accuracy

of reporting and found that 61% of the local news and feature stories contained errors. The finding that over half of the stories reported in the news were inaccurate could easily make one ponder the issue of truth in journalism. Therefore, the use of news stories in this study could be viewed as problematic. However, it was the best source available at the time for this study.

Another important limitation of this study, related to the lack of available data, pertained to the variables of the prior criminal record and the marital status of the mass shooters. Specifically, if no information could be found on these variables in any open sources news article, senior researchers advised to mark a perpetrator as not having a prior criminal record and/or mark a perpetrator as being single. This instruction could have skewed the data and the results obtained by this study. However, if this was not done, then a great deal of data for these two variables would have been left out, which would also cause a problem when it came time to analyze the data. Therefore, more accurate results about marital status and prior criminal records could have been found had this information been available in open sources articles.

The assumptions drawn from the results of this study may be considered more reliable if a larger sample size of mass shootings and mass shooters had been used. With only 185 mass shootings and 194 mass shooters, it is difficult to draw definitive conclusions from the results obtained. The statistical power of the results would have been enhanced had they been based on a larger sample size. This is not to say that the results from this study should simply be discredited, but rather observed as the starting point of the discussion into suicide of mass shooters.

Lastly, the use of the definition of a mass shooting from Schildkraut and Elsass (2016), combined with the definition from the Stanford Geospatial Center (2016) could be viewed as a weakness of this study, as compared to using the definition of a mass shooting according to the

Federal Bureau of Investigation (FBI). The definition of a mass shooting created by Schildkraut and Elsass (2016) was published two years ago and therefore, has not been tested over an extensive period of time, whereas the mass shooting definition from the FBI has existed relatively unchanged for nearly a decade. Another weakness is reflected in the statement about the location of the mass shooting. Simply stating that, "…location(s) are chosen either at random or for their symbolic value," is a very broad way of describing the location choice. The definition also does not state the number of victims that are required to be killed in order for a multiple homicide event to be classified as a mass shooting. The authors argued that they did not include this in their definition because there are a lot of situational factors that can determine whether or not a person dies, such as if the shooting occurs far away from a hospital or if the shooter keeps a victim hostage after they are shot (Schildkraut & Elsass, 2016). This is problematic because without a victim count, shooting events in which two people were shot could be included as mass shootings, and could one easily argue that a shooting in which two people were shot is easily comparable to a shooting in which fifty people were shot? An additional limitation of this definition that could be made about using the definition from Schildkraut and Elsass (2016) is that the definition is too narrow and therefore, restrictive. Lastly, the definition excludes the category of mass shootings related to domestic violence, such as familicides. Although these events meet almost every criterion for a mass shooting, one could easily argue that they inherently different from mass shootings. However, by excluding mass shooting familicides, one who follows this definition would omit a great volume of data, which is unfortunate because having a larger quantity of data would make the conclusions and trends derived about mass shootings more valid. By not including mass shootings that involve domestic and/or family violence, not including a count of victims killed, and being vague about the location type, this

definition could be limiting itself to a minute number of mass shooting cases available to research.

Future Directions

Future work should attempt to find more information about the mass shootings. Gather more information about the crimes committed—which could possibly be done by getting in contact with police departments or performing background checks—that would put certain perpetrators into the category of having a prior criminal record. Obtain copies of marriage licenses or divorce papers for all of the mass shooters to be certain about their marital statuses. Attain police reports of the actual mass shootings, rather than simply relying on news media to make sure that the facts are truthful. More information, gathered through more reputable channels, could make this study more reliable. It could also be more useful to look at a larger sample of mass shootings.

Other researchers who choose to explore this topic should also delve deeper into the dependent variable category of the mass shooter being shot by another person. While none of the hypotheses included this category, results for being shot by another person were shown to be consistent and therefore, should be further researched. It may also be beneficial to break down this category even more. For this study, the category of being shot by another person consisted of people being shot by a police officer or a citizen. Many arguments could be made that those shot by police could be categorized as suicide by cop, however, there was not enough evidence present in the data found for this study to defend that argument. If more information was collected—such as suicide notes or medical files from a mental healthcare worker—then an argument for suicide by cop could be made here, therefore allowing some of those in the shot by another category to be combined with the self-inflicted suicide category.

It would also be important to include a temporal issue into research on suicide and mass shootings. Specifically, mass shootings can happen so quickly that they can end before law enforcement is able to arrive on the scene. Therefore, it may be valuable to look at the rates of suicide by mass shooters before and after the police arrive. The present study was only able to report if a mass shooter survived, committed suicide, or was shot by another person during their mass shooting, but it would have been useful to have temporal information about when the suicides occurred. With this information, it is possible that many implications could be drawn from the research, such as highlighting the importance of quick response times by the police.

The case could also be made to do more in-depth analyses of the mass shooters at specific location types. For example, there may be characteristics of school mass shooters that differentiate them from workplace mass shooters, rather than just their ages and how they typically die or live after mass shootings. A more thorough look the mass shooters in specific location types may potentially help law enforcement and mental healthcare workers create a typecast to help them try to identify mass shooters before they attack. Along with a typecast being useful to categorize specific traits and behaviors to different mass shooters in various location types, this could also be useful in hypothesizing if they would attempt to commit suicide after their mass shootings, which could be an important addition to the results drawn by the present study.

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