Are We Sheep? An Examination of Victims Fighting and Fleeing in Mass Shootings

by

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ABSTRACT

Since the Aurora Theater and Sandy Hook Elementary School incidences, mass shootings have recently gained popularity in discussion circles, in particular, ways to prevent mass shootings. Yet, the discussion neglects the unwarranted mass casualties in mass shootings. The purposes of this study were to test the fight-or-flight response by relating the number of deaths and injuries to fighting and fleeing for victims, and by comparing fighting and fleeing in terms of the number of deaths and injuries for victims in mass shootings. Ninety-two cases between 1966 and 2012 were obtained from the New York City Police Department's 2012 edition of *Active Shooter: Recommendations and Analysis for Risk Mitigation*. The reactions of victims were reviewed with 307 newspaper and magazine articles acquired from LexisNexis Academic, Academic Search Complete, and Google Search.

The number of deaths was fairly lower than the number of injuries. Twenty-two percent of the victims fought the assailant, whereas 78% of the victims fled. The number of deaths and the number of injuries were positively correlated and statistically significant. The number of deaths and victim response were negatively correlated and not statistically significant. Equally, the number of injuries and victim response were negatively correlated and not statistically significant. No difference was found in the number of deaths between victim responses. In contrast, there was a significant difference found in the number of injuries between victim responses. Results of this study suggested that fighting is the better measure against the assailant. Suggestions for further research are also included.

University. Bringing practical experience and theoretical knowledge in and out of the classroom is inexpressible. I earnestly owe them my appreciation for contributing to this thesis, whether directly or indirectly.

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The clock reads six o'clock and the alarm sounds. Abraham slams his hand on the buzzer. He wakes up for another day of work. Same old tune different day. Still in sleep mode, he manages to pull himself out of bed. He walks over to the window, bumps his toe on the bedpost, hops around for a minute or so, and opens the window blinds. As beaming light momentarily blinds him, he notices the bright sun crests over the horizon. The sun's rays puncture through the clouds, and the beauty of the painted canvas in the heavens marvels him. A lustrous palette of red, yellow, and orange pulls him in. He quickly snaps back to reality and now it is time to get ready for work. He remembers today is a special meeting.

Abraham has an important presentation before the company board, which may lead to a major promotion. He wears his best suit and makes himself razor-sharp to impress. He grabs something quick to eat, drinks a cup of Joe, gathers belongings, kisses his wife good-bye, and is off to work. He is pressed for time and catches every red light along the way. He becomes irritated, upset, and shouting profanities; yet, he astoundingly manages to make it through morning traffic. He drives to park in his favorite parking spot and behold, it is taken. Frustrated, he drives around the parking lot to find another spot — eventually he finds one. He rushes to the boardroom and arrives just in the nick of time.

Abraham's cologne plugs the room and suffocates the board members. The meeting is called to order. He is summoned by the chief executive officer to present. He takes a deep breath. This is it, all or nothing. As he breathes in before speaking — SLAM! The door opens quickly slamming into the wall. He and the board members

discover an angry employee bearing firearms. The crashing sound shocked and horrified everyone into silence. The room is so silent that a needle can be heard if dropped. The disgruntled employee begins to rant about his unhappiness with the company and certain board members. The enraged employee points a firearm at Abraham and, abruptly, he sees his life flash before him. "Am I going to live? What do I do?" is repeated in his mind.

The above hypothetical scenario is an example of what may become a mass shooting leading to multiple deaths and injuries. In wake of the Century 16 theater shooting in Aurora, Colorado and Sandy Hook Elementary School shooting in Newtown, Connecticut, the general intuition of the public is that mass shootings are on the rise (Follman, 2012; Sullivan, 2012). In contrast, James A. Fox, a criminologist and professor at the Northeastern University, informed that there is neither an increase nor pattern concerning mass shootings (O'Neill, 2012). Likewise, Grant Duwe, a criminologist and Director of Research at the Minnesota Department of Corrections, claimed that mass shootings have dropped in the 2000's (O'Neill, 2012).

One possible explanation for the drop in mass shootings is a mixture of ". . . plummeting crime rates, demographic changes, greater numbers of police, increased use of incarceration, and decreased social tolerance for crime and violence" (Duwe, 2013). He observed that mass shootings rose between the 1960's and 1990's, but they were at their highest in the 1920's. He mentioned, "Mass shootings provoke instant debates about violence and guns and mental health and that's been the case since Charles Whitman climbed the tower at the University of Texas in 1966. It becomes mind-numbingly repetitive" (O'Neill, 2012). Though mass shootings are decreasing, which is

commendable, the dialogue neglects to notice the issue of mass casualties in mass shootings.

Problem Statement

In an ideal world, mass shootings would not exist. The problem of mass shootings has dismally affected survivors, families, and communities because of the "psychological consequences of directly experiencing or witnessing a mass shooting . . ." and ". . . communities and nations resent the media intrusion" (Norris, 2007, p. 3). Unfortunately, mass shootings are a reality and a problem therein is the mountainous number of victims (i.e., high number of fatalities and injuries). According to Kepple, Loehrke, Hoyer, and Overberg (2013), from 2006 to 2013, there were more than 900 victims in 146 mass shootings throughout the United States of America. Similarly, from 1982 to 2012, data from Follman, Aronsen, Pan, and Caldwell (2012) showed more than 1,000 victims in 62 mass shootings throughout the U.S.A. From 1982 to 2011, there were more than 350 victims in 14 mass shootings in Australia, Canada, Finland, France, Germany, Nepal, New Zealand, Norway, South Korea, and United Kingdom (Reuters, 2012). A possible source of the mass casualties may be the fight-or-flight response in the victims.

Purpose of and Need for the Study

The purposes of this study are to test the fight-or-flight response by relating the number of deaths and the number of injuries to fighting and fleeing for victims, and by comparing fighting and fleeing in terms of the number of deaths and the number of injuries for victims in mass shootings. To date there has been little, if any, formal inquiry of how the response of victims play a role in mass shootings has been addressed. Limited studies (Borsch, 2009, 2010a, 2010b; Blair et al., 2013) have inspected victim responses

in mass shootings; however, whether victims fighting or fleeing from the assailant did or did not have an influence on the number of deaths and injuries remained open. Perhaps a correlation analysis and independent samples *t*-test can illuminate the problem. Learning more about the relationship between the reaction of victims, deaths, and injuries might help offer an explanation for the multiple casualties in mass shootings. This study may benefit policy makers who can create or revise policies and procedures regarding armed threats based upon the results.

Research Questions and Hypotheses

To shed light on the problem of multiple casualties in mass shootings, the following research questions and hypotheses are addressed in this study:

1. Is there a relationship between the number of deaths and the number of injuries in mass shootings? The author of this study hypothesizes that there is a correlation between the number of deaths and injuries.

2. Is there a relationship between the number of deaths, victims fighting, and victims fleeing in mass shootings? The author of this study hypothesizes that there is a correlation between the number of deaths and victim response.

3. Is there a relationship between the number of injuries, victims fighting, and victims fleeing in mass shootings? The author of this study hypothesizes that there is a correlation between the number of injuries and victim response.

4. Is there a difference in the number of deaths between victims fighting and victims fleeing in mass shootings? The author of this study hypothesizes that there is a difference in the number of deaths between victim responses.

5. Is there a difference in the number of injuries between victims fighting and victims fleeing in mass shootings? The author of this study hypothesizes that there is a difference in the number of injuries between victim responses.

Summary

Mass shootings have dominated recent discussions since the Aurora Theater and Sandy Hook Elementary School shootings. At first glance, mass shootings appear to be increasing, though scholars expressed otherwise that mass shootings are decreasing. People have failed to notice, however, the troubling multiple causalities in mass shootings. For instance, over 900 victims in 146 mass shootings in the U.S.A. from 2006 to 2013, and more than 350 victims overseas from 1982 to 2011. By rethinking our approach to mass shootings by examining the reactions of victims, society may thwart multiple causalities in mass shootings. The following chapter will present a review of literature and research associated with the problem addressed in this study, the theoretical framework, and review cases of mass shooting events.

LITERATURE REVIEW

This chapter begins with definitions of mass murder, spree murder, serial murder, and recent terminology. Any student of logic understands that definition is a matter of importance to avoid vagueness or ambiguity in logical discourse (McInerny, 2005). It appears that there is no harmony among researchers regarding said vocabulary, though some researchers have recommended a criterion to develop precise language. Also included in this chapter is discussion around the theoretical foundation of this study, namely, the fight-or-flight response. The definition, description of what occurs during fight-or-flight, and scholars contributing to that body of knowledge will be reviewed. Furthermore, a survey of scholarly articles, books, and other sources relevant to this study's subject matter provides a description, summary, and critical evaluation of each work. The chapter concludes with examples of victims reacting in mass shooting events.

What is a Mass Shooting?

There are three types of multiple murder and they are the following: mass murder, spree murder (or murder spree), and serial murder. Definitions vary among researchers and thus there are no agreed upon definition among them. (See Tables 1, 2, and 3 for similarities and differences among definitions.) Holmes and Holmes (1992) suggested that researchers ". . . should take into consideration the number of victims, the location of the murders, the time of the killings, and the possibility of distance between murder sites. These components become vitally important when differentiating between mass murder, serial murder, and spree murder" (p. 53). Lester (2004) pled to researchers that there is a need for comprehensible and consistent definitions and to adhere to them. According to

the following definitions, a mass shooting event may overlap or satisfy two or more descriptions.

Mass Murder

Dietz (1986) defined mass murder as three or more deaths, five or more injuries, involving a single offender, a single event, and occurring within 24 hours. Holmes and DeBurger (1988) defined mass murder as several victims, a single area, a single occurrence, and involving a single offender. Ressler, Burgess, and Douglas (1988) defined mass murder as four or more deaths, a single incident, and taking place at a single site. Petee, Padgett, and York (1997) defined mass murder as three or more deaths, a single place, and a single incident. Holmes and Holmes (1998) defined mass murder as three or more deaths, a single episode, in one location, and no cooling off period among murders. Meloy, Hempel, Gray, Mohandie, Shiva, and Richards (2004) defined mass murder as three or more deaths, a single incident, and a continuous event.

Fox and Levin (1998, 2003, 2005) defined mass murder as four or more murders, one or more offenders, a single event, and occurring within a few minutes or several hours. Douglas, Burgess, Burgess, and Ressler (2006) defined mass murder as four or more deaths, a single incident, no cooling off period between murders, involving one or more offenders, and a single location. The Federal Bureau of Investigation (FBI) (2008) defined mass murder as four or more deaths, a single incident, no distinctive time period among the murders, and a single setting. One example of mass murder involved George Hennard who opened fire in a Texas restaurant, murdering 22 people and injuring 20 others on October 16, 1991 (Chin, 1991).

Spree Murder

Holmes and DeBurger (1988) defined spree murder as several victims and within a period of hours or weeks. Ressler et al. (1988) defined spree murder as two or more deaths, a single episode, occurring for a short or long period of time, two or more locations, and no cooling off period between murders. Holmes and Holmes (1998) defined spree murder as three or more deaths, within a thirty-day period, and accompanied by the charge of another felony. Douglas et al. (2006) defined spree murder as two or more murders, a single event, a short or long time interval, two or more locations, and no cooling off period. MacKenzie, O'Neill, Povitsky, and Acevedo (2006) defined spree murder as three or more deaths, within a thirty-day time interval, and enjoined by another felony.

The FBI (2008) defined spree murder as two or more murders, involving one or more offenders, and no cooling off period between the murders. Ioannou (2010) defined spree murder as multiple victims, a single event, two or more locations, no cooling off period, and other criminal acts committed. Palmiotto (2013) defined spree murder as three or more deaths, different locations, and occurring within hours, days, or months. An example of spree murder included Derrick Bird who opened fire in six locations throughout Cumbria County in England, murdering twelve people and injuring eleven others during three hours on June 2, 2010 (Williams, 2010).

Serial Murder

Holmes and DeBurger (1988) defined serial murder as a recurring homicide, a time length of months or years, usually one-on-one, no relationship between offender and victim, and offender is motivated to murder. Ressler et al. (1988) defined serial murder as

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three or more deaths, three or more episodes, three or more places, and the offender having a cooling off period between murders. Holmes and Holmes (1998) defined serial murder as three or more deaths, spanning thirty days or more, and a significant cooling off period. MacKenzie et al. (2006) defined serial murder as three or more deaths, a time span of thirty days or more, and cooling off period between murders. Douglas et al. (2006) defined three or more events, three or more locations, and an emotional cooling-off period between murders. The FBI (2008) defined serial murder as two or more deaths, same offender or offenders, and split episodes. An example of serial murder involved John Muhammad and Lee Malvo who randomly opened fire on people from October 2–22, 2002, along Interstate 95 around the Virginia and Washington, D.C. metropolitan area. They murdered ten people and injured three others (Lalor, 2002).

Recent Terminology

Neologisms are emerging by researchers, think tanks, and institutions. Certainly, the term "mass shooting" is not new, but there has not been a universally accepted definition in research circles. Stein (2007) proposed a definition of mass shooting and described it as "an event with greater than five causalities, one or more shooters acting together, and a time frame of 24 hours or less. This eliminates serial murders from the discussion" (p. 444). The United States Department of Homeland Security (2008) generated the term "active shooter," which is defined as "an individual actively engaged in killing or attempting to kill people in a confined and populated area; in most cases, active shooters use firearms(s) and there is no pattern or method to their selection of victims" (p. 2). The expression "public mass shooting" is fairly new. Bjelopera, Bagalman, Caldwell, Finklea, and McCallion (2013) defined public mass shooting as

"incidents occurring in relatively public places, involving four or more deaths — not including the shooter(s) — and gunmen who select victims somewhat indiscriminately. The violence in these cases is not a means to an end such as robbery or terrorism" (p. 4). In spite of the definition, these seemingly random acts of violence elicit the fight-or-flight response in their victims.

Fight-or-Flight Response

Definition and Description

The theoretical framework underlying this study is the fight-or-flight response. The fight-or-flight response is "a physiological reaction to threat in which the autonomic nervous system mobilizes the organism for attacking (fight) or fleeing (flight) an enemy" (Weiten, 2010, p. 542). The autonomic nervous system is one part of the peripheral nervous system. The peripheral nervous system "comprises the nerves (cranial and spinal nerves) that connect the central nervous system to other body parts" (Shier, Butler & Lewis, 2010, p. 354). The peripheral nervous system comprises of the sensory division and motor division, which contains two parts (i.e., somatic nervous system and autonomic nervous system). The autonomic nervous system controls the ". . . viscera, such as the heart and various glands, and thus controls subconscious (involuntary) actions" (Shier et al., 2010, p. 356). Heart rate, blood pressure, breathing rate, body temperature, and other visceral actions that support in preserving equilibrium are managed by the autonomic nervous system (Shier et al., 2010).

The autonomic nervous system contains two parts, namely, the sympathetic nervous system and the parasympathetic nervous system. Shier, Butler, and Lewis (2010) illustrated the interaction between these two systems as follows:

The sympathetic division primarily prepares the body for energy-expending, stressful, or emergency situations. Conversely, the parasympathetic division is most active under ordinary, restful conditions. It also counterbalances the effects of the sympathetic division and restores the body to a resting state following a stressful experience. (p. 424).

For example, during a mass shooting incident, would-be victims may experience an increase of heart and breathing rates owing to the sympathetic nervous system. Following the mass shooting, surviving victims may come to rest because of the parasympathetic nervous system.

Shier et al. (2010) insisted that survival depends upon preserving homeostasis. They claimed, "Sensing such dangers directs nerve impulses to the hypothalamus, triggering physiological responses that resist a loss of homeostasis" (Shier et al., 2010, p. 513). Increased activity in the sympathetic nervous system and amplified production of adrenal hormones are some physiological reactions. A stressor is a factor that can motivate a stress response, which arouses physiological responses (Shier et al., 2010). The condition stressors create is called stress, which is a response to factors perceived as life-threatening (Shier et al., 2010). They explained the following with reference to stress:

During stress, the hypothalamus helps prepare the body for "fight or flight" by triggering sympathetic impulses to various organs. It also stimulates epinephrine release, intensifying the sympathetic responses. The hypothalamus also stimulates the adrenal cortex to release cortisol, which promotes longer-term responses that resist the effects of stress. (p. 514).

According to Shier et al. (2010), stressors may be physical, psychological, or a combination thereof. Something that is injurious or likely injurious to bodily tissues is physical stress, and thoughts about real or imagined threats are psychological stress (Shier et al., 2010). Stressors that generate psychological stress may differ among individuals and situations.

For the duration of fight-or-flight or "alarm stage," which is short-term, an individual may undergo the following: increased blood glucose, increased blood glycerol and fatty acids, increased heart rate, increased blood pressure, increased breathing rate, dilated air passages, dilated pupils, and redistributed blood flow (Shier et al., 2010). For long-term resistance, an individual may endure the following: increased concentration of amino acids in the blood, increased fatty acids, and increased glucose from non-carbohydrates (Shier et al., 2010). The above knowledge would not have been possible without the subsequent influential researchers.

Contributing Scholars

Spencer (1855), an early writer on the subject, stated, "Fear, when strong, expresses itself in cries, in efforts to hide or escape, in palpitations and tremblings; and these are just the manifestations that would accompany an actual experience of the evil feared" (p. 596). He mentioned an animal would experience a ". . . tension of the muscular system, gnashing of teeth, protrusion of claws, dilated eyes and nostrils, and growls" (Spencer, 1855, p. 596). James (1891) noted, "Fear is a reaction aroused by the same objects that arouse ferocity" (p. 415). He contended that whatever wishes to take an animal's life, it both fears and longs to kill that thing. For instance, in desperation a

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cornered animal's emotions will change from fright to rage and from escape to resist so to survive (James, 1891).

McDougall (1908) emphasized, "The instinct to flee from danger is necessary for the survival of almost all species of animals and in most of the higher animals the instinct is one of the most powerful" (pp. 49-50). He mentioned that things (e.g., a menacing animal) or senses (e.g., loud noises) may enable this instinct before experiencing harm or danger. When all instinctive impulses meet with opposition, they give place to, or they are complicated by, the aggressive impulse directed against the source of the obstruction (McDougall, 1908). For example, attempting to take away or approach the food of a dog may cause it to show teeth and stare, or a man may fight another in defense of his pride and honor if offended.

Crile and Lower (1915) said, "As self-preservation is the most deeply rooted instinct in all living beings — so fear is the most widely distributed of the emotions, and the most powerful in its effect upon the organism" (p. 93). As the injured body endeavors to escape from painful, hazardous encounters, so the perception of threatened peril causes the body to trigger itself for fleeing. It should be noted that some animals will fake death or injury, or "play possum," as opposed to fighting or fleeing in presence of a predator. For instance, the Virginia Opossum will neither fight nor flee from a predator; rather, it will play dead to deceive the predator (Yahner, 2011). Another example is the Ruffed Grouse, which will play injured (i.e., broken wing and flap away) to draw the attention of the predator away from the nest (Yahner, 2011). Once the threat is removed, the Virginia Opossum or Ruffed Grouse will return to its normal state. Although faking death or

injury is characteristic of some animals, and may be rare for other animals, fleeing is the common response during a threatening situation.

So great is the impulse to run away from anything which imperils the safety of the person become that distant perils even, or the sheer recollection of them, may cause all the occurrences associated with the incident once experienced by the person when dodging from a present hazard (Crile & Lower, 1915). Crile and Lower (1915) demonstrated this as follows:

> In rabbits frightened by dogs, but not injured and not chased, the principal clinical phenomena are rapid heart, accelerated respiration, prostration, tremors, and a rise in temperature. The dogs show similar phenomena, excepting that instead of muscular relaxation, as in the rabbits, the dogs and the rabbits are exhausted, but the exhaustion of the rabbits is greater even though the dogs may exert themselves actively and the rabbits remain physically passive. (p. 94).

Second to fear, the most detrimental emotion upon the body is anger. Crile and Lower (1915) explained, "Man partakes of the nature of both the fighting and the fleeing animals, and consequently fear alone may possess him, or anger alone, or his body may be shaken by the combined force of both emotions" (p. 95). In moments of immense excitement, principally during anger, humans still set their jaw and show teeth.

Worry, according to Crile and Lower (1915), has grievous results, since anxiety joins in the nature of both fear and anger. They understood, "It is a chronic state of attempt to escape from some threatening evil or of futile efforts to combat the cause of some anticipated disaster" (Crile & Lower, 1915, p. 95). Taking the above in account, they provided an example of one hospital patient. The patient was transferred from the

accident ward to an operating room. The patient's pulse and temperature were normal in the accident ward. Inside the operating room, the patient became alarmed upon his discovery. The patient believed that he was going to have his leg amputated, but doctors vigorously informed him that he was going to have a plaster cast applied. The effort to convince the patient was unsuccessful. Under such physical stress, the patient's pulse rose to 150 and he quickly developed a temperature of 101.2°F (Crile & Lower, 1915).

Cannon (1922) stated that there is an increase of adrenaline and sugar in the blood behind painful or strong emotional incidents. He observed that there is significant increase of sugar in the blood between the "flight instinct" and "fear emotion," and between the "pugnacity instinct" and "anger emotion" (Cannon, 1922). The fear and anger emotions are more likely to be followed by actions (e.g., fleeing or fighting) that ". . . require contraction of great muscular masses in supreme and prolonged struggle, a mobilization of sugar in the blood might be of signal service to the laboring muscles" (Cannon, 1922, p. 189). Fighting will most likely involve pain and pain will call for greater muscular energy to run away from the cause of affliction.

Cannon (1922) mentioned the importance of the respiratory system and oxygen during an event of fleeing or fighting. He observed the following:

> The urgent need in struggle or flight is a generous supply of oxygen to oxidize the metabolites of muscular contraction, and a quick riddance of the resultant carbon-dioxide from the body. . . . And one of the most characteristic reactions of animals in pain and emotional excitement is deep and rapid respiration. Again the reflex response is precisely what would be most serviceable to the organism in the strenuous efforts of fighting or escape that might accompany or follow distress or

fear or rage. It is known that by such forced respirations the carbon-dioxide

content of the blood can be so much reduced that the need for any breathing

whatever may be deferred for as much as a minute or even longer. (p. 202).

Rapid heart rate will return to normal after an event. The forced respirations during

intensely emotional episodes may be a preparation for expanded release of carbon

dioxide into the blood once immense muscular action commences (Cannon, 1922).

Cannon (1922) asserted that the supplies to fight-or-flight are a rise of blood

sugar, release of adrenaline, changed circulation, and quick blood clotting during pain

and emotional stimulation as biological adaptations to surroundings, which may have

involved fighting or fleeing, are favorable to self-preservation. He noted that the cranial

autonomic system of the autonomic nervous system is responsible for assembling

reserves; hence, preparing the body against stress. Whenever pain, fear, rage, or other

passionate emotions are present in an individual, secretion of saliva, gastric juice,

pancreatic juice and bile, functions of the stomach and intestines are ceased (Cannon,

1922). The body directs focus and energies from digestion to other members of the body

for survival and endurance.

Cannon (1922) affirmed that all bodily alterations that take place during a severe

emotional state (e.g., fear or anger) arise in the sympathetic nervous system.

Additionally, these bodily changes are ". . . in the highest degree serviceable in the

struggle for existence likely to be precipitated when these emotions are aroused"

(Cannon, 1922, p. 268). He stressed that these disturbances are physical responses that

may be of the highest significance to survival in times of severe crisis. The body's

reserves are just as important. Cannon (1922) explained the following:

Thus are the body's reserves — the stored adrenin [sic] and the accumulated

sugar — called forth for instant service; thus is the blood shifted to nerves and

muscles that may have to bear the brunt struggle; thus is the heart set rapidly

beating to speed the circulation; and thus, also, are the activities of the digestive

organs for the time abolished. . . . The functions which in quiet times establish

and support the bodily reserves are, in times of stress, instantly checked or

completely stopped, and these reserves lavishly drawn upon to increase power in

the attack and in the defense or flight. (p. 269).

Consequently, there is an interaction between the sympathetic nervous system and the

cranial autonomic system of the autonomic nervous system. The body correctly balances

between saving and spending, between preparing and employing, and between anabolism

and catabolism (Cannon, 1922).

Cannon (1932) maintained that fear and rage have served as groundwork for

action. He observed the following:

These are fundamental emotions and instincts which have resulted from the

experience of multitudes of generations in the fierce struggle for existence and

which have their values in that struggle. . . . In considering the homeostasis of

blood sugar, oxygen supply, acid base reactions, temperature, certain adaptive

reactions were described which kept the body on an even course in spite of

conditions which might have been deeply disturbing. It is remarkable that most of

these reactions occur as the accompaniment of the powerful emotions of rage and

fear. Respiration deepens, the heart beats more rapidly, the arterial pressure rises,

the blood is shifted away from the stomach and intestines to the heart and central

nervous system and the muscles, the processes in the alimentary canal cease,

sugar is freed from the reserves in the liver, the spleen contracts and discharges its

content of concentrated corpuscles, and adrenin [sic] is secreted from the adrenal

medulla. The key to these marvelous transformations in the body is found in

relating them to the natural accompaniments of fear and rage — running away in

order to escape from danger, and attacking in order to be dominant. Whichever

the action a life-or-death struggle may ensue. (pp. 213-214).

These reactions are regarded as preliminary for fighting back or struggle. Additionally,

they provide organisms to be more efficient in demonstrating power that fear or rage

might entail. Cannon (1932) claimed that fear and pain are related and fear precedes pain,

both of which serving an end to life. He said, "By experience agents which injure and

destroy, and which produce pain, become associated, so that our relations to them are

conditional by their effects. Thus pain saves us from repeating acts which in the end

might make an end to life itself" (Cannon, 1932, p. 215).

Grossman (2009) scrutinized the fight-or-flight dichotomy with the stresses of

combat. He contended that the fight-or-flight response and stresses of combat are

misapplied when understanding the psychology of the front line. He mentioned the

following:

The fight-or-flight dichotomy is the appropriate set of choices for any creature

faced with danger other than that which comes from its own species. When we

examine the responses of creatures confronted with aggression from their own

species, the set of options expands to include posturing and submission. (p. 5).

He noted that there are four responses or options (i.e., fight, flight, posture, or submit) in life threating conditions.

When there is an intra-specie quarrel, the opposing parties first rationalize to flee or posture. Both parties mechanically perform daunting postures, which are harmless in nature and involve loud sounds and robust displays. Fight, flight, or submission follows if posture fails. When the parties begin to fight, generally speaking, it is non-lethal. During this non-fatal fight, one party will eventually yield owing to the strength and proficiency of the other party, thus its only option is either escape or surrender. Grossman (2009) explained the above as follows:

> Submission is a surprisingly common response, usually taking the form of fawning and exposing some vulnerable portion of the anatomy to the victor, in the instinctive knowledge that the opponent will not kill or further harm one of its own kind once it has surrendered. The posturing, mock battle, and submission process is vital to the survival of the species. It prevents needles deaths and ensures that a young male will live through early confrontations when his opponents are bigger and better prepared. Having been out postured by his opponent, he can then submit and live to mate, passing on his genes in later years. (p. 6).

Grossman (2009) noted that killing the foe is the least of intentions for those fighting in combat, since the preferred technique is posturing. During the American Civil War, soldiers on both sides yelled loud enough to terrify the opposition out of its position in some incidents. The ancient Greeks and Romans frightened their enemies emerging taller and menacing owing to their plumed helmets (Grossman, 2009).

Grossman (2009) considers that gunpowder is one of optimum means of posturing. He affirmed, "Firing a musket or rifle clearly fills the deep-seated need to posture, and it even meets the requirements of being relatively harmless when we consider the consistent historical occurrences of firing over the enemy's head" (Grossman, 2009, p. 9). Equally influential is a soldier selecting not to shoot. "In this respect their actions very much resemble the actions of those members of the animal kingdom who 'submit' passively to the aggression and determination of their opponent rather than fleeing, fighting, or posturing" (Grossman, 2009, pp. 15-16).

Though pertaining to studies of law enforcement officers in deadly force confrontations, Patrick and Hall (2010) provide information regarding "sensory alteration" or "sensory specialization" during the fight-or-flight response. There are seven sensory alterations: tunnel vision, increased visual acuity, altered hearing, time distortion, dissociation, temporary paralysis, and memory distortion. These sensory alterations will vary among individuals and situations. First, one's peripheral vision becomes diminished, namely, one's sight is focused or narrowed to the threat and depth perception is either lost or weak (Patrick & Hall, 2010). Second, within the tunnel vision, fine points are acknowledged and vividly kept. Patrick and Hall (2010) explained, ". . . as seeing the bullet in the air, a ring on the gun hand of the subject clearly recalled but not the face of the shooter, or the shape of the knife blade being thrust" (p. 145). Third, altered hearing, which is common in fight-or-flight, may range from complete loss of sound to soft or distant sounds (Patrick & Hall, 2010).

Fourth, time may either accelerate or decelerate in a fight-or-flight experience. "The time may seem to speed up so rapidly that events and actions can barely be

perceived. As with altered hearing, both phenomena can occur during the same event"
(Patrick & Hall, 2010, p. 146). Fifth, there is a sense of independence or disconnection,
which means survival or staying alive, is the chief focus; hence, one may become
emotionless (Patrick & Hall, 2010). Additionally, the event appears to be like a motion
picture. Sixth, as the autonomic nervous system realizes that immediate action is
required, there is a brief, but potentially deadly, state of being unable to function, act, or
move. Patrick and Hall (2010) noted, "This is a less likely effect than the other. . .
[sensory alterations] . . . especially among trained professionals. After all, preventing this
type of involuntary response is one cogent priority of training" (p. 146). Finally, when
one is under high stress in fight-or-flight, deliberate and rational judgment is replaced by
quicker and effortless judgment and memory recollection may not be entirely accurate or
may be fragmented owing to exigency to survive (Patrick & Hall, 2010).

Studies Concerning Victim Reaction

Borsch (2009), a 30-year veteran of law enforcement and at present of this study
the manager of South East Area Law Enforcement (S.E.A.L.E.) Regional Training
Academy in Bedford, Ohio, examined 100 "rapid mass murder" cases. He defined rapid
mass murder as "where 4 or more victims are intentionally killed in the same episode and
location in no more than 20 minutes" (Borsch, 2009, p. 4). He discovered that the most
effective intervention was single, unarmed victims, since ". . . most likely because they
were already on the scene when the attacks started and had the courage to take action"
(Borsch, 2009, p. 5). According to Borsch (2009), nearly half of all victorious rapid mass
murder aborts were by single, unarmed victims.

In a later study, Borsch (2010) evaluated 40 rapid mass murder cases in the U.S.A. and international. He redefined rapid mass murder to "episodes in which 4 or more slayings have occurred during the same event and in the same location (schools, work sites, churches, malls, and other public places) within the same time frame (20 minutes or less)" (Borsch, 2010, p. 5). Of the total rapid mass murder conclusions, armed or unarmed citizens on the scene accounted for two-thirds and the remaining one-third by law enforcement officers arriving to the scene (Borsch, 2010a, 2010b). Of the two-thirds involving victims, an overwhelming majority were initiated by a single victim (Borsch, 2010a, 2010b). Of the one-third concerning law enforcement, 67% were initiated by a single law enforcement officer (Borsch, 2010). "Clearly, rapid aggressive action by a single actor has been and is now the most effective countermeasure for the active killer," Borsch asserted (p. 6). Both studies are insightful but Borsch overlooked the actions of the victims bearing in mind the fight-or-flight response and if those actions were helpful or harmful in the resolution.

Blair, Nichols, Burns, and Curnutt (2013) examined 84 active shooter events between 2000 and 2010 in the U.S.A. The researchers defined active shooter event as "one or more persons engaged in killing or attempting to kill multiple people in an area (or areas) occupied by multiple unrelated individuals" (p. 50). The median number of injured victims was four, whereas the median number of deaths was two (Blair et al, 2013). The researchers considered an active shooter event resolved when the shooter stopped shooting. For that reason, the resolution was split into two frames, that is, the event was resolved before the police arrived on scene (i.e., pre-police) or after the police arrived (i.e., post-police; Blair et al., 2013).

Forty-nine percent of the cases were pre-police and 51% of the cases were post-police. Of the 49% involving pre-police, 39% of the victims stopped the shooter and 61% of the shooters stopped themselves (i.e., left the scene or committed suicide). Of the 39% concerning victims stopping the shooter, 19% of the victims shot the shooter and 81% of the victims suppressed the shooter (Blair et al., 2013). Though revealing, Blair et al. neglected to examine whether the reactions of victims increased or decreased deaths and injuries.

People Fleeing from Danger

The following mass shooting events demonstrate victims fleeing from the assailant. Victims were present in a variety of offices, commercial entities, schools, factories, and other locations, and already on the scene. Behaviors of running, hiding, covering, ducking, staying, and crawling were common among victims. Few victims "played possum" and others submitted or obeyed to the assailant. Some victims expressed sensory alterations during the mass shooting. Resolutions were suicide, attempted suicide, or intercession by law enforcement arriving on the scene.

ESL Incorporated Shooting

On February 16, 1988, it was a routine workday for employees of ESL Incorporated. Richard Farley, a former employee, drove his rented vehicle into the parking lot around 2:50 p.m. (Mathews, 1988). Before entering the facility, Farley sat in the vehicle and ". . . [contemplated] whether he should go ahead with his plans" (Lindsey, 1988, pg. A16). Farley decided to go ahead with his plan, exited the vehicle, and approached the building. Farley shot his first victim just outside the building, shot the door security system, and entered the facility. Once inside, Farley opened fire on

employees in the entrance hall and proceeded to shoot at employees throughout the complex.

Farley frequently reloaded and shot at employees. As shots echoed, employees ran for exits, jumped out windows, and barricaded themselves in offices (Lindsey, 1988). Additionally, employees ". . . ran for their lives and hid under desks and in cupboards as Farley, two bandoliers of ammunition strapped across his chest, fired at anyone and anything that moved inside the building" (Crimeen, 1988). One witness commented, "It's a miracle that any of us escaped with our lives. He was just totally maniacal out of control and right off his head. I can't believe that I'm still alive" (Crimeen, 1988). "Some guy walked in and started blowing people away. There was just no stopping him," stated another witness (Crimeen, 1988). Farley surrendered after a nearly five-hour siege and negotiation with law enforcement. Farley murdered seven and injured four others.

General Motors Acceptance Corporation Shooting

On June 18, 1990, customers and employees of General Motors Acceptance Corporation, an auto loan company, conducted business as customary. That ordinary schedule would soon change when a heavily armed James Pough, who had his vehicle repossessed, walked into the office and began shooting anyone within sight. Pough shot customers within the entrance and then walked through the office shooting employees at random. Employees "dived under desks when the first of about 50 shots rang" (Word, 1990a). Pough "methodically went from desk to desk firing his rifle . . ." and ". . . deliberately aimed at workers who had taken cover" (Smothers, 1990; Word, 1990a). One witness stated, "And then we realized the guy was pointing his gun underneath people's

desks and killing them one by one. I just saw the bottom of the carpet and just prayed"

(Smothers, 1990).

Another witnessed described, "It wasn't random, and it wasn't continuous. It

wasn't pandemonium, and at the end we didn't know it was over, because there were

silences all through the shooting" (Smothers, 1990). Pough shot at employees, briefly

paused, and continued to shoot at them. A number of employees fled through a rear exit

and ". . . ducked into neighboring buildings" (Word, 1990b). An employee of AT&T

observed, "We saw people running from the building. One had blood on his leg and

another had blood all over his back" (Word, 1990b). An employee of American

Transtech saw employees "running literally for their lives" (Word, 1990b). Toward the

end, Pough turned the firearm on himself and committed suicide. Pough murdered nine

and wounded four.

Lindhurst High School Shooting

On May 1, 1992, students, teachers, and administrators of Lindhurst High School

were delighted, since it was Friday and start of the weekend. The upbeat atmosphere

changed when former student, Eric Houston, walked into the high school with shotgun

blazing. "It sounded like firecrackers at first. Then he came into our history class and

started to shoot. When I ran out, there were people on the ground," recalled one student

(Paulson, 1992). Another student mentioned, "He walked through the door, and he shot

someone, and he smiled and then he walked away" (Paulson, 1992). Houston roamed the

high school randomly shooting into classrooms. "[Houston] just walked in, cocked it,

[and] then fired. That was it," remembered a student who escaped by hiding (Grubb,

1992). Many people succeeded to escape the building, while other individuals hid in

several rooms inside the high school (Willis, 1992). Houston wandered the halls gathering individuals from various classrooms.

One teacher, in a theater room, "tied the doors shut with wire, turned off the lights and ordered students under their desks, but [Houston] entered the theater through an upstairs door and threatened to open fire" (Paulson, 1992). A teacher's aide recollected, "He was banging (on the doors) and saying 'Get out!' I think he was rounding up everybody from downstairs to go up-stairs. He came from the upstairs and said 'Come on out or I'm going to shoot!' The minute we got into the hall, the teacher said 'Run!'" (Paulson, 1992). Everyone quickly ran before Houston could shoot them. Houston collected nearly 80 hostages from different classrooms (Grubb, 1992; Paulson, 1992; Willis, 1992). At least ". . . two dozen students fled the building four hours after the siege began" (Agence France-Presse, 1992). Law enforcement surrounded the high school. After nearly an eight-hour standstill and negotiation with law enforcement, Houston surrendered (Willis, 1992). Houston murdered four people and injured nine others.

101 California Street Shooting

On July 1, 1993, Gian Ferri rode the elevator to the 34th floor of a 48-story high-rise. Stocked with firearms and ammunition, Ferri entered the law offices of Pettit & Martin and peacefully walked through the reception area to a conference room, where four individuals were having a meeting. Ferri opened fire on the four individuals through the glass wall, sending them for cover. One employee "ducked under a table and pulled a chair over her as a bullet struck her in the right arm" (St. Petersburg Times, 1993, p. 1A). A secretary across the hall came out of her office to look, was nearly nose-to-nose with Ferri, and said, "He pointed his gun down and looked me right in the eye. He looked very

determined, set in his ways. His movements were purposeful. He was wearing a neat dark suit. He had no expression, just an expressionless face. He kept steadily walking" (St. Petersburg Times, 1993, p. 1A). Then the secretary's boss yelled at her to get down, but he was shot, and Ferri pressed on through the law firm.

Ferri wandered five floors, shooting anyone at random within his path. Lawyers, employees, and visitors ". . . dived under desks, locked themselves in offices or dashed for elevators . . ." as gunshots resonated throughout the 34th floor (St. Petersburg Times, 1993, p. 1A). Some people "used furniture to barricade themselves in their offices" (Burke, 1993). One lawyer was shot, ran into his office, and slammed the door shut. Ferri followed the lawyer to his office, opened it, and the lawyer asked, "Who the hell are you?" (The New York Times, 1993, p. A10). The lawyer rushed past, pushing Ferri aside, and quickly ran down the hallway to hide in a room. In the stairwell, Ferri was between the 29th and 30th floors when he saw the police closing in on him from above and below; as a result, he committed suicide (St. Petersburg Times, 1993). Ferri murdered eight people and wounded six.

Transportation Department Shooting

On December 18, 1997, Arturo Torres returned to his former workplace and opened fire on employees and supervisors. Screaming in horror, people hid behind desks, dispersed for safety, and hopped fences. One witness stated, "I'm in the stockroom, and I hear bang, bang, bang! We just ran" (The Associated Press, 1997). The Caltrans spokesman informed, "Employees heard a popping sound. People were panicking. Everyone was running for safety" (The New York Times, 1997, A8). Torres left the Caltrans complex in a car, but he was blocked in an intersection, and he was shot and

killed by the police in an intense shootout (The New York Times, 1997). Torres murdered four and injured two others.

Edgewater Technology Shooting

On December 26, 2000, employees discussed their Christmas celebrations around a coffee machine as Michael McDermott sat quietly. McDermott stood up, strode toward the main lobby, pulled out guns, and started shooting (Witheridge, 2000). Screaming employees ran for exits, hid under desks, crawled across the floor seeking the fire escape, and called the police via cell phones (Witheridge, 2000). One employee hid under her desk as soon as she heard the gunshots and remained quiet (Emery, 2000). McDermott shot employees in their heads and backs as they attempted to flee from him (Sukiennik, 2000). Law enforcement moved in and discovered McDermott patiently waiting in the reception room. McDermott murdered seven people and wounded no one.

Navistar International Shooting

On February 5, 2001, William Baker approached the gate of his former workplace. The security guard recognized him and walked with him to the engineering building. Upon arrival, Baker immediately tossed the security guard aside and started shooting arbitrarily at employees. Baker paced up and down aisles, shooting anyone in sight. Screaming and horrified employees ran from the building. Alarm bells and gunshots filled the factory. "At first there was disbelief and then we figured out that it wasn't a joke and we took off running. I grabbed my cell phone, grabbed my coat and got out as quickly as I could," said one employee (Claiborne, 2001, A03). Some employees scattered throughout the factory seeking cover. "Someone just came into my office, saying, 'There's a guy out in the hallway and he's shooting.' I thought she was kidding,

and then I saw the look on her face," commented another employee (Siemaszko, 2001, p. 21). One employee observed, "I was one aisle away, and I heard shots. It didn't sound like engine noise. I wanted to get out of the building as soon as possible" (Siemaszko, 2001, p. 21). At the end, Baker committed suicide; he murdered four people and injured four.

Lockheed Martin Shooting

On July 8, 2003, employees of Lockheed Martin in Meridian, Mississippi, were working as scheduled. Doug Williams suddenly left an ethics training session, walked to his truck to grab two firearms, stormed into the meeting, and began shooting (Volz, 2003). Williams left the meeting room and walked throughout the factory shooting at will. Employees recklessly ran from danger. "At first I thought it was something falling on the ground. Then I walked to the aisle and saw him aiming his gun. I took off. Everybody took off," observed one employee (Volz, 2003). Many employees yelled "Get out!" as gunshots echoed in the complex (Volz, 2003). Williams walked through the plant shooting some and letting others go. At the end, Williams' girlfriend begged him to stop and he then committed suicide. Williams murdered five and injured nine others.

Islas Malvinas School Shooting

On September 28, 2004, Rafael Solich, a high school student, opened fire on classmates at the Islas Malvinas Middle School No. 2 in Carmen de Patagones, Argentina. As students were talking and waiting for the teacher, Solich pulled out a firearm and started to shoot fellow classmates randomly (Salvi, 2004). Terrified students crawled under their desks, while others ran out of the classroom. Some students thought the gunshots were firecrackers and rushed out in the hallways only to see blood covered

students running (Salvi, 2004). "We heard gunfire and a lot of screaming and then everyone coming out into the hallway. We saw three bodies on the ground with bullet wounds," explained one student (The Associated Press, 2004, p. 20). Solich was out of ammunition, so he used a large knife to injure at least two students (Salvi, 2004). Solich attempted to escape but was apprehended by the police. Solich murdered four people and wounded five others.

Jokela High School Shooting

On November 7, 2007, shortly before lunch period, Pekka-Eric Auvinen started shooting individuals at Jokela High School in Tuusula, Finland. The principal warned teachers and students via intercom to stay in their rooms and to lock the doors; yet, Auvinen tracked her down and shot her. One student recalled, "We heard the shots and then we broke the windows and jumped out of the windows" (Sallinen, 2007). Another student stated, "We were in the classroom when it started. We closed the doors. We were inside for about 50 minutes or an hour before we were able to leave. Then we went to the church to wait for information about who died" (Sallinen, 2007). "Suddenly people began running and shots began raining down. I saw injured people lying in the corridor. We started to run . . . [and] . . . everyone was trying to squeeze through a narrow door," described another student (Quetteville & Oksanen, 2007, p. 18). Auvinen randomly shot his victims as they attempted to flee.

In addition, Auvinen methodically walked up and down hallways shooting into classrooms, as a teacher observed the following:

He was moving systematically through the school hallways, knocking on the doors and shooting through the doors. I saw the gunman running with what

appeared to be a small-calibre [sic] handgun in his hand through the doors

towards me after which I escaped to the corridor downstairs and ran in the

opposite direction. It felt unreal: a pupil I have taught was running towards me,

screaming, [and] a pistol in his hand. (Quetteville & Oksanen, 2007, p. 18).

The teacher told his students to jump through the classroom windows. The police rushed

to the school and surrounded Auvinen who then attempted suicide and survived, but died

later in the hospital. Auvinen murdered eight people and injured 12 in this incident.

Westroads Mall Shooting

On December 5, 2007, shoppers and store clerks were busy amid the hustle and

bustle of holiday shopping at Westroads Mall in Omaha, Nebraska. On the third floor,

Robert Hawkins started shooting people inside the department store Von Maur. As

shoppers in the mall inspected up and down the three floors, they could not pin point the

origin of the gunshots, whereas others dismissed the gunshots as popping balloons or

construction noise (Friedberg & Davey, 2007). "I've never even heard gunshots here

before. Honestly, I didn't know what they sounded like until today, and I thought I never

would," said one witness (Friedberg & Davey, 2007, p. 1). Another witness stated, "I

thought somebody was hammering. All of a sudden, there was [sic] more shots. It seemed

like there was just shots forever after that" (Abourezk, 2007, p. 2). People swiftly rushed

for cover, ran for exits, dropped to the floor, hunted for dressing rooms, and sprinted

down escalators as more gunshots teemed in the mall.

Some shoppers pushed ". . . every table, rack and garbage can they could find

against the door and huddled behind clothes, making hushed calls to 911, to their

husbands and to their parents . . ." in one store (Friedberg & Davey, 2007, p. 1). "People

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started screaming about gunshots. I grabbed my wife and kids we got out of there as fast as we could," said another witness (Bratton & Garcia, 2007). Law enforcement rapidly and efficiently moved department to department, floor-to-floor extracting people to safety. The police eventually found Hawkins' body with a self-inflicted gunshot wound. Hawkins murdered eight people and wounded five.

Atlantis Plastics Shooting

On June 25, 2008, after an argument over safety goggles and cell phone usage, Wesley Higdon was escorted out of the assembly plant with his supervisor. Higdon retrieved a firearm, shot his supervisor, and returned to the factory (Lenz, 2008). Higdon began his shooting on the factory floor. Panicked employees hid and sought cover. Employees described the event as quick and frenzied. Higdon moved to the lunchroom and began shooting employees individually. Higdon aimed and shot under tables as some employees ducked for cover. Higdon left and then committed suicide. One employee said, "When I heard the gunshots, I thought it was something electrical. When I peeked back out, I saw [Higdon] lying there dead" (Lenz, 2008). Higdon murdered five people and injured one.

Kauhajoki School Shooting

On September 23, 2008, students were attending the Kauhajoki School of Hospitality on a sunny and calm day in Kauhajoki, Finland. In the morning, Matti Saari pursued and shot at people in the hallways. Frightened people frenetically ran for cover or out of the building. The school janitor commented:

I heard the sound of shooting and hysterical girls' voices. Then two girls came towards my room and said a weird man was shooting. I looked through the

window and he immediately shot at me. Thank God I was not hit! He fired at me

but I was running zigzag. I ran for my life. I did not see any victims lying on the

floor, but I saw two female students that had been shot in the side. And later I saw

one student come out and collapse on the road. I heard constant shooting. He

changed another case in the gun. He was very well prepared. (Touitou, 2008).

Smoke began to fill the school, since Saari started fires in several places. "We started to

hear shooting and a kind of a rumble like tables falling down. We thought someone is

playing around, fooling with toy guns. A couple of us went to have a look in the other

room through the door. The guy was there with a gun, and tried to shoot them," observed

one student (Turula, 2008). After some time, Saari attempted suicide, survived, but died

later in the hospital. Saari murdered 10 and injured no one.

American Civic Association Shooting

On April 3, 2009, immigrants were taking citizenship classes at the American

Civic Association in Binghamton, New York. While immigrants were studying

citizenship courses, Jiverly Wong parked his car adjacent to the building's back door and

proceeded to the front door. Wong walked through the front door, immediately shooting

two receptionists. One receptionist was ". . . shot in the abdomen, pretended to be dead

and then crawled under a desk and called police" (Kates, 2009). In a room off the

reception area, Wong started shooting people indiscriminately. Panicked people ran for

cover in rooms, hid in closets, and ducked under desks. A neighboring classroom heard

gunshots and sought shelter in the basement. "I heard the shots, every shot. I heard no

screams, just silence, shooting. I heard shooting, very long time, and I was thinking,

when will this stop? I was thinking that my life was finished," stated one immigrant

(Kates, 2009). Between two to three hours, the police circumspectly searched the building. The police discovered Wong's body with a self-inflicted gunshot wound and evacuated people from the building (Kates, 2009). Wong murdered 13 people and wounded four others.

IHOP Shooting

On September 6, 2011, family and friends were enjoying each other's company with breakfast at IHOP in Carson City, Nevada. Eduardo Sencion parked his vehicle, got out, walked toward the restaurant, shot a woman in the parking lot, and entered the restaurant spraying bullets on unsuspecting customers. Three of five uniformed Nevada National Guardsmen were the first victims in Sencion's line of fire. Customers dived for cover under tables and crawled to safety. One customer ". . . put her hands to her ears and got under the table as [Sencion] rapidly fired dozens of shots" (Chereb, 2011). Another customer told a family to get down and crawl to protection. He said, "I didn't freak out. I'm shocked. I stopped and I said, 'Get out'" (Spillman et al., 2011, p. 1A). One customer managed to open the exit door, which led others to escape. Sencion left IHOP and began unloading magazines at neighboring businesses and people (Chereb, 2011). Sencion committed suicide in the parking lot before law enforcement arrived. Sencion murdered four people and injured seven others.

Oikos University Shooting

On April 2, 2012, students were attending Oikos University in a Korean-American community in Oakland, California. One L. Goh, a former student, entered an unlocked side door of the university. Goh snatched the secretary and walked with her to a classroom. Goh ordered everyone inside the classroom ". . . to line up in a row against a

chalkboard" (Kuruvila et al., 2012, p. 1). Some people obeyed whereas others did not. People were ". . . shot as they begged for their lives and before they could finish lining up" (Kuruvila et al., 2012, p. 1). As Goh started shooting, eight students hid a classroom and turned off the lights. Goh shortly stepped outside, returned to the university, and ". . . went through the entire building, systematically and randomly shooting the victims" (Kuruvila et al., 2012, p. 1). Panic and chaos followed. At the end, Goh walked outside, stole a student's vehicle, drove to Alameda Safeway, admitted his crime to the store clerk, and peacefully surrendered to the police (Gafni et al., 2012). Goh murdered seven people and wounded three.

People Taking a Stand

The subsequent mass shooting events reveal victims fighting the assailant. Similar to the cases above, victims were present in a variety of locations and already on the scene. Running, hiding, covering, ducking, staying, and crawling were shared actions between fleeing victims. On the other hand, tackling, subduing, overpowering, grabbing, pinning, confronting, and posturing were common behaviors among fighting victims. Fighting victims resorted to physical confrontation or throwing objects at the assailant. Resolutions were intervention by victims, suicide, or attempted suicide.

Queen Street Shooting

On December 8, 1987, Frank Vitkovic walked into an office building to meet with an old friend on the fifth floor. Vitkovic disclosed to the friend of his shooting objective and the friend attempted to talk to him out it. Vitkovic ignored the friend's plea, pulled out a firearm, and ". . . sprayed bullets indiscriminately at anything that moved" (Doudle, 1987). Vitkovic's friend was "horrified . . . [and] . . . ducked for cover and escaped"

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(Skeggs, 1987). The room erupted into chaos, hordes of screaming, and panicking people (Doudle, 1987). One individual managed to activate an alarm. Vitkovic moved to the 12th floor to shoot and murder more individuals. Vitkovic then moved to the 11th floor and opened fire at random. Nearly 20 people scattered across the room and had no place to go (Doudle, 1987).

Some workers implanted themselves in window frames, whereas others whistled through opened windows to gather attention from below. "Papers flew from desks, files toppled and bins were kicked over as office staff scurried for what little cover they had, under desks or behind computers" (Doudle, 1987). Screams of terror from the building echoed down the street. An Australia Post assistant manager ". . . leapt on Vitkovic from behind, wrestling madly with him for several seconds before pulling the gun from him, and handing it to a male companion who tossed it into a staff refrigerator while the mad brawl continued" (Doudle, 1987). Vitkovic — now disarmed — panicked and rushed toward a window. The assistant manager and another worker grabbed Vitkovic by his waist, belt, and legs; however, Vitkovic squirmed out their detention and plummeted to his death. Vitkovic murdered eight people and injured no one.

Concordia University Shooting

On August 24, 1992, Valery Fabrikant walked into Henry F. Hall with intent to murder certain colleagues at Concordia University in Quebec, Canada. Fabrikant walked through the ninth floor hallway methodically firing at fellow professors; yet, he managed to spare students. Cries reverberated throughout the hallway. "He pointed his gun right into the room. Then he turned and went next door. We heard the shots and the department secretary screamed at us to close the door. He was shooting all over the place," recalled

one witness (The Toronto Star, 1992, p. A1). Toward the end of his shooting, Fabrikant seized two students and held them hostage, but it would not work in his favor. A law enforcement official stated, "One of them overpowered him and grabbed the gun and police moved in" (Contenta & Zerbisias, 1992, p. A1). Fabrikant murdered four people and injured one.

Long Island Railroad Shooting

On December 7, 1993, motivated by racial disgust, Colin Ferguson targeted whites and Asians aboard a commuter train. Ferguson boarded in Queens and began his attack at the Merillon Avenue station in Garden City. An estimated 80 to 90 passengers were aboard the commuter train. One witnessed observed Ferguson calmly loading a handgun. Another witness said, "After the second look, I ducked down in my seat, for real, knowing this man was going to kill people indiscriminately" (Kramer, 1993). Ferguson opened fire and passengers ran screaming for the exits as Ferguson walked down the aisle of the packed commuter train (Kramer, 1993). Shot at random and paused only to reload. "He would turn one way and shoot, then turn the other and shoot, and I thought to myself, 'This can't be happening,'" remarked one witness (Hampson, 1993). One passenger yelled, "This is real life, everybody" (Hampson, 1993). Some passengers carefully worked their way to the vestibule (i.e., where passengers normally wait to get off). They hoped ". . . to escape when the doors opened, but the gunman fired several shots at the waiting passengers" (Kramer, 1993). Ferguson was out of ammunition and begun reloading. Three passengers took the opportunity to rush, tackle, wrestle, disarm, and pin him until law enforcement arrived. Ferguson murdered six people and wounded 19.

Nanterre Town Hall Shooting

On March 27, 2002, attendees and councilors of a town hall meeting in Nanterre, France expected normal business, but Richard Durn had different plans in mind. "We heard a sound like a firework, we didn't understood right away it was a shot from a real gun," one councilor said (Briand, 2002). Durn was calm and methodical while people around him were crumbling and scattering. People yelled, "Get down! Get out" (Briand, 2002). Some people scrambled across the room, hid, and dived under tables. Durn's shooting came to end when ". . . one of the councillors [sic] threw a chair at [Durn] as his colleagues rushed him and, although at least one of them was seriously wounded, managed to stop him shooting" (Clark, 2002). Durn murdered eight people and injured 19 others.

Alrosa Villa Shooting

On December 8, 2004, excited heavy metal fans packed into the Alrosa Villa club and patiently waited to see Damageplan who entered the stage and started to play fan favorites. Then unexpectedly, Nathan Gale charged the stage and shot Damageplan's guitarist. At first glance, fans thought it was a prank, an act, or a fan wanting to jump off stage. "I totally thought it was part of the act. It just sounded like a cap gun," stated one fan (Walters, 2004, p. 43). Another fan mentioned, "I figured it was another fan wanting to jump off the stage and crowd surf. I think he knew he wasn't going to get out and he was going to take down as many people as he could" (Spencer, 2004). Chaos erupted when fans realized the guitarist remained lifeless and Gale turned his gun on the crowd. A bouncer tackled Gale, but he managed to shoot the bouncer, and continued shooting aimlessly at people (Walters, 2004). Fans rushed toward exits. A police officer, patrolling

within distance of the club, responded to the alert and entered the club through a rear door, shot, and killed Gale. Gale murdered four people and wounded two others.

Red Lake High School Shooting

On March 21, 2005, Jeff Weise walked into his Indian reservation high school. Weise encountered two unarmed security guards, who sat on either side of a metal detector. Without hesitation, one security guard confronted Weise, whereas the other ran to alert the rest of the school (Hanners, 2005). Weise shot the security guard twice, murdering him. Alerted teachers locked their classrooms. Weise attempted to enter six locked classrooms; the effort was unsuccessful. Weise managed to break into a locked room and opened fire. One student was physically comparable to Weise. That student quickly rose, confronted Weise, tried to stab him with a pencil, and then tried to wrestle Weise to the floor (Lee & Herald, 2005). Weise overpowered him, shot him direct in the face, and left the classroom. Weise continued his shooting in the halls; he shot at anyone in his path (Hanners, 2005). Weise was confronted and wounded by tribal law enforcement. He walked into a nearby classroom and committed suicide. He murdered seven people and injured seven.

Trolley Square Mall Shooting

On February 12, 2007, shoppers at Trolley Square Mall were going about their ordinary day until Sulejam Talovic met them with bullets. "It didn't seem real to me," one witness stated (Reavy & Winslow, 2007). Another witness observed, "He had a pump shotgun. He was shooting, and he shot about four shots" (Reavy & Winslow, 2007). A woman was murdered outside Bath & Body Works as people inside helplessly watched it. Some people hid and locked themselves in bathrooms. Ken Hammond, an off-

duty police officer, heard shots and responded. Talovic shot at Hammond. "He took a shot at me. It was quite a distance. I was still up on the second tier and decided I needed to get to a safer place. I went around the west side and fired another round and that's when I just lay flat on the ground," explained Hammond (Winslow, 2007). Talovic was eventually cornered by Hammond. Salt Lake City Police arrived and assisted Hammond in a shootout with Talovic (Reavy & Winslow, 2007). Talovic murdered five people and injured four others.

Missionary and New Life Church Shootings

On December 9, 2007, Matthew Murray walked into the Youth With A Mission facility, talked with staff members, and ". . . after a 30-minute discussion grew heated, he was turned away. When a staff member asked for help from others to usher [Murray] out, he drew a handgun, shot a woman and a man to death and wounded two other staff members" (Newman & Holusha, 2007). Murray fled the scene. Nearly 12 hours later, Murray travelled to New Life Church and ". . . opened fire in a parking lot and shot four people, one of them fatally, as bystanders dashed for cover" (Newman & Holusha, 2007). Almost 7,000 members of New Life Church attended. One witness said the following:

> I believe I heard a pop. I looked over my shoulder and saw a guy in black with an assault rifle. He turned and pointed it at us. And I think there was another pop, and then I screamed at every-body to get down, that there's a shooter out there. [Rachel] fell back onto the pavement. I saw him again point the gun and felt my belly rip, and fell to the pavement, not having gotten to Rachel all the way. (Pankratz, 2007, pg. A-01).

One volunteer security guard was in the cafeteria when gunshots erupted. The security guard confronted Murray, but was injured in the process. The security guard recalled the event:

> [Murray] had shot a couple out in the parking lot and by the time I got there, he had entered the two doors on the northeast side. I kept saying to the security guard, 'Give me your handgun, I'm going to take him out.' I jumped out, got his attention and called him a name. And then he just looked at me and then he started to shoot me and so when I realized that, I jumped back and all I got were two pellets in my arm so I thought, 'Well, I'll jump out again,' and then I noticed the lady to my right. He shot a few times. She shot a few. (The Associated Press, 2007).

The female volunteer security guard exchanged fire with Murray, thereby wounding him. "I heard shots fired. There was chaos. People were running away. The shots were so loud that I thought he was inside the church. I saw him coming through the doors. I waited for him to get closer. I identified myself. I took him down," mentioned the female guard (Newman & Holusha, 2007). Murray committed suicide soon after the fighting. Murray murdered four people and wounded four others.

Kirkwood City Council Shooting

On February 7, 2008, a normal council meeting was peacefully taking place. That quickly changed with "Shoot the mayor!" by Charles Thornton. Thornton first shot a law enforcement officer and then methodically shot at members of city council at the meeting. Council members and attendees scrammed for and dived to safety. "We crawled

under the chairs and just laid there," one observer said (Leonard, 2008). City Attorney

John Hessel confronted Thornton. Hessel recalled the event:

> I thought, 'I'm not going to sit here and let you shoot me.' . . . He was four feet
>
> away with both guns pointed at me. I said, 'Cookie, don't do this, don't kill me.
>
> I'm not going to let you do this. I'm not going to let you kill me.' I picked up a
>
> chair and threw it at him. . . . It was traumatic beyond belief. (Giegerich, 2008, p.
>
> A12).

The chair threw Thornton off balance, so Hessel proceeded toward the front of the room

while throwing a few more chairs at him. Police officers rushed into the room and they

shot and killed Thornton. Thornton murdered five people and wounded two.

Mercaz HaRav Shooting

On March 6, 2008, Alaa Abu Dhein attacked students of the Merkaz HaRav

rabbinical seminary in Israel. Dhein began shooting students in the seminary's library.

Dhein sprayed bullets in every direction before anyone could act in response. Yitzchak

Dadon, a part-time student, heard the shots in the study hall. Dadon explained his

reaction in the incident:

> Everyone left through a side door and I left through a window, and lied down on a
>
> roof overlooking the library. When he came out, I shot him in the head twice. I
>
> saw him start to stagger, and then David Shapira [a yeshiva graduate and
>
> paratroopers officer] arrived on the scene, shot him with his M-16 rifle, and then
>
> we emptied our magazines into him. It was terribly frustrating feeling, knowing
>
> he was in there shooting, but I could do nothing but wait for him to come out so
>
> that I could shoot him. While waiting, I could see some boys in a side room in the

library turn off the lights and barricade their door and though he tried, he was unable to come into the room and gun them all down. (Ratzlav-Katz & Fendel, 2008).

Shapira was in close proximity to the seminary when he heard the shots. He responded quickly and aided Dadon. Dheim murdered eight people and wounded 11 others.

Forza Coffee Shop Shooting

On November 29, 2009, customers were enjoying their morning breakfast and coffee with company of family or friends at Forza Coffee Shop in Lakewood, Washington. Among those customers were four uniformed Lakewood Police Department officers. Maurice Clemmons entered the coffee shop and walked to the counter pretending to place an order. A patron fled out the back door as soon as he saw a firearm when Clemmons opened his jacket. Clemmons advanced toward the four police officers and shot them while they were working on their laptops (Johnson, 2009). Two officers were immediately shot dead, while the other was shot dead after standing up.

The remaining officer promptly confronted and resisted Clemmons. The two struggled all the way out the door. Pierce County Sheriff's spokesman Ed Troyer said, "One of the officers managed to fight his way with the suspect, wrestled him out the door when he was shot and killed" (Johnson, 2009). The officer managed to fire a round and possibly wound Clemmons. Clemmons fled the scene, but he was found two days later (The Seattle Times, 2009). Clemmons murdered four people and injured no one.

Hartford Distributors Shooting

On August 2, 2010, Omar Thornton opened fire on employees at a beer-distributing warehouse. Thornton was fired for stealing beer from the warehouse (Ford &

Kennedy, 2010). The chief operating officer, who fired Thornton, was the first to be shot. The chief operating officer said to the 911 operator:

> Get the cops here right away, please. I'm bleeding all over the place. I'm hiding in an office. People are running all over the place. I see him running away now. He's shooting at somebody else! He's still shooting! He's shooting at a girl! He's chasing people out in the parking lot with his gun, shooting at them! Erin — get in here! Close the door! (Ford & Kennedy, 2010, p. 5).

Thornton voyaged through the depot and parking lot shooting some and sparing others. Many employees hid in offices, closets, behind beer crates, or under desks. Other employees managed to escape. "One victim tried to flee on a forklift and drove into an electrical conduit, starting a fire" (Ford & Kennedy, 2010, p. 5).

An elderly employee tried to end Thornton's shooting by running him over with a golf cart. Samson (2010) described, "Jerome Rosenstein was blasted by the gunman. . . . It is believed he hopped on the buggy, used by workers to get around the grounds of a beer distribution firm, when he saw Thornton firing randomly" (p. 10). A special weapons and tactics unit moved in and at that time Thornton committed suicide. Thornton murdered eight people and injured two others.

Safeway Supermarket Shooting

On January 8, 2011, people gathered outside the Safeway supermarket waiting to see U.S. Representative Gabrielle Giffords for a constituent meeting. The weather was stunning and people conversed with one another as they patiently waited. The atmosphere soon changed when Jared Loughner opened fire on the crowd of people. A communications staffer for Representative Giffords portrayed the incident as ". . . just

complete chaos, people screaming, crying" (Myers & Espo, 2011). Loughner shot

Representative Giffords and her district director and then began shooting individuals one-

by-one. One witness ducked for cover and ". . . escaped by running to the parking lot in a

crouch, hiding behind cars and taking refuge in a Walgreen's" (Dolnick, 2011, p. 21).

Loughner was out of bullets and that is when two witnesses tackled him to the

ground. In the struggle, Loughner attempted to reload his firearm. "Two gentlemen

knocked him down right next to me and someone said, 'Get the gun!' I was not able to

reach the gun. I saw him pull the magazine out. He dropped it on the sidewalk and he

grabbed at it, but I was able to get it first," recalled a witness (Kennedy, 2011, p. 5).

Another witness rushed over to help subdue Loughner, prevented him from grabbing two

more magazines, and explained, "I laid on [Loughner] and held him down. His face was

expressionless, it was blank" (Kennedy, 2011, p. 5). Loughner murdered six people and

wounded 13 others.

Café Racer Shooting

On May 30, 2012, patrons in Café Racer were enjoying their meals and beverages

and watched life pass by. Ian Stawicki walked in but he was politely told that he was not

welcomed. The shooting commenced. Panic and screams exploded. On the phone with

911, a witness explained, "Somebody came in and shot a bunch of people. I'm hiding in

the bathroom. We need help right away. I can see people laying [sic] on the floor. People

are bleeding all over the place" (Dininny & Johnson, 2012). One patron grabbed a stool,

threw it, and hit Stawicki. Stawicki directed his attention toward that patron, aimed at

him, and began shooting. The patron grabbed two more stools, threw them, and hit

Stawicki. During that time, an estimated three people escaped the café. Stawicki fled the

scene, the police eventually caught up with him, and he committed suicide. Stawicki murdered five people and injured one individual.

Sikh Temple Shooting

On August 5, 2012, some members were preparing meals, children were attending school, and worship scheduled at 11:30 a.m. at the Sikh Temple of Wisconsin in Oak Creek. Everything appeared to be a standard day of gathering and worship at the Sikh temple. Wade Michael Page had something else in mind that day. Page entered the temple and started shooting at members of the temple. Screams echoed throughout the temple. Some people hid in bathrooms, closets, and a pantry, while a few managed to escape. Satwant Singh Kaleka, president of the temple, grabbed a knife, confronted Page, and ". . . fought back with all his strength and a simple butter knife, trying to stab [Page] before taking two fatal gunshots to the leg" (Bauer, 2012). Toward the end, the police encountered Page and ordered him to stop, drop his weapon, and put his hands up. Page rejected and shot at the police. The police returned fire at Page and so took him down. Page murdered six people and wounded four others.

Accent Signage Systems Shooting

On September 27, 2012, Andrew Engeldinger worked his normal shift as scheduled. He was called to meet with management. In the meeting with two top managers, Engeldinger was informed of his poor performance and tardiness. Management gave him his last paycheck. In response, Engeldinger pulled out a firearm. The two managers confronted Engeldinger, struggled with him over the gun, and were shot in the course of action (Karnowski, 2012). Engeldinger exited the office and began shooting other employees individually. He ended his shooting with suicide in the

basement, where police found his body (Karnowski, 2012). Engeldinger murdered five people and wounded three.

Summary

Mass murder was generally defined as four or more murders as a single event in a single location. Spree murder was generally defined as two or more locations, a single event, and no cooling-off period between murders. Serial murder was generally defined as three or more events, three or more locations, and cooling-off period between murders. New terminology has developed in recent years to depict the phenomena of mass shooting. Some researchers have proposed a measure to formulate clear-cut definitions and maintain them. The fight-or-flight response is a physiological reaction, which is rooted in the autonomic nervous system, to something that is either physically or mentally threatening. The autonomic nervous system prepares the body to either fight or flee the threatening object.

In a fight-or-flight event, an individual may experience one or a combination of sensory alterations. A single, unarmed victim on site stopped two-thirds of "rapid mass murder" events, which proved to be the most successful intervention. Of the 49% of pre-police cases, 39% involved victims stopping the assailant, and of that 39%, 19% of the victims shot the shooter and 81% subdued the shooter. Several mass shooting events illustrated the response of victims in consideration of the fight-or-flight response. The next chapter will review the systematic technique of inquiry employed by this study.

METHODS

The purpose of this study is to describe the degree of relationship in the number of deaths and injuries between victims fighting and fleeing in mass shootings. This chapter will discuss the methods and procedures conducted by this study. The chapter begins with a discussion of the types of research methods and the appropriate research method to the objectives of this study. Following this is the selected research design including data collection and procedure. Also included in this chapter are definitions and clarification of terminology used for the purposes of this study. Furthermore, key research variables and their definition and measurement are expressed. The chapter concludes with the statistical techniques for processing and analyzing the data to answer the above research questions.

Research Method

There are three types of research methods: quantitative, qualitative, and mixed. Firestone (1987) listed four basic underpinnings of quantitative and qualitative research methods. Quantitative research is based on the philosophy of positivism, which assumes that ". . . there are social facts with an objective reality apart from the beliefs of individual" (Firestone, 1987, p. 16). Second, the aim of quantitative research is to explicate changes through objective measurement and quantitative examination (Firestone, 1987). Third, quantitative research utilizes either experimental or correlational designs to prevent error, bias, and other irrelevant material (Firestone, 1987). Finally, the researcher's responsibility in quantitative research is separated or detached to evade

partiality (Firestone, 1987). Quantitative involves data that are recorded and measured in numerical form.

Qualitative research is based on the phenomenological model, which assumes that ". . . reality is socially constructed through individual or collective definitions of the situation" (Firestone, 1987, p. 16). Second, the intent of qualitative research is to understand the social phenomenon from one's viewpoint by participating in that individual's life (Firestone, 1987). Third, qualitative research is based on ethnography, which ". . . helps the reader understand the definitions of the situation of those studied" (Firestone, 1987, p. 17). Finally, the researcher's function in qualitative research is submerged in the phenomenon of interest (Firestone, 1987). Qualitative does not involve data in numerical form; instead, it may use texts, pictures, sounds, and the like. Mixed research is simply a synthesis of quantitative and qualitative research methods and model characteristics. The research method selected for this study was quantitative. The quantitative method was selected to identify relationships between the research variables of this study.

Research Design

There are three types of commonly used research designs: experimental, non-experimental, and quasi-experimental. An experimental design, also known as true experiment, involves random assignment of participants to control groups and manipulation of research variables (Punch, 2005; Gray, 2009). Unlike an experimental design, non-experimental and quasi-experimental designs do not involve randomization; yet, quasi-experimental design involves multiple measures or comparison groups and manipulation of research variables (Punch, 2005; Gray, 2009). An inherent difference

between experimental and quasi-experimental is that experimental uses randomization, but both designs are similar; hence, the word "quasi" as in apparently experimental but not technically experimental.

The researcher in an experimental design knows who, what, when, where, and how the study will be conducted (Gray, 2009). In other words, the researcher has complete control in an experimental design. Contrasting to experimental design, researchers in non-experimental and quasi-experimental designs do not have control in the experiment (Gray, 2009). Regarding internal validity or causal assessment, experimental design is deemed the "gold standard" of the three research designs, whereas non-experimental design is considered the weakest (Weisburd et al., 2001). The research design of this study was quasi-experimental, since (a) it is not possible to randomly assign people to fight or flee in a mass shooting event, (b) involvement of group comparisons, and (c) manipulation of the research variables.

Definitions

For the purpose of this study, the term "mass shooting" is defined as four or more deaths, one or more assailants utilizing firearms, which may be accompanied with other weapons (e.g., grenades, knives, explosives, etc.), a single event, one or more locations, no cooling-off period between murders, and a period of 24 hours or less. The number four was chosen because ". . . this minimum body count — as opposed to a two or three victim threshold suggested by others — helps to distinguish multiple killing from homicide generally" (Fox & Levin, 1998, p. 408). The definition incorporates incidents of mass and spree murders, but eliminating serial murders. Assailant is defined as "a person who attacks another" (American Heritage Dictionary, 2011, p. 107). Firearm is

defined as "an instrument used in the propulsion of shot, shell, or bullets by the action of gunpowder exploded within it" (Black, 1979, p. 570).

Weapon is defined as "an instrument of offensive or defensive combat, or anything used, or designed to be used, in destroying, defeating, or injuring a person" (Black, 1979, p. 1429). Event is defined as "the consequence of anything; the issue or outcome of an action, operation, or series of operations, terminates. Noteworthy happening or occurrence. Something that happens." (Black, 1979, p. 498). Location is defined as a "site or place where something is or may be located" (Black, 1979, p. 847). There is no cooling-off period between murders, which may be understood as a ". . . distinguishable time interval between each murder, which can be days, weeks, months, or even years and is the key feature that distinguishes the serial killer from other multiple killers" (Ioannou, 2010, p. 302). Victim is defined as not only "one who is harmed or killed by another," but also one having the potential to be harmed or killed by another (American Heritage Dictionary, 2011, pg. 1929).

Research Variables

Independent Variable

An independent variable is the presumed cause in other variables (i.e., dependent variables). The variable "Victim Response" is defined as "a reaction, as that of an organism or a mechanism, to a specific stimulus" (American Heritage Dictionary, 2011, pg. 1496). Victim Response is categorical (or nominal) and dichotomous (or binary). A categorical variable contains values indicating membership in one of several possible categories (Gerring, 2001). A dichotomous variable includes observations that occur in one of two likely conditions (i.e., zero and one; Gerring, 2001). Victim Response

pertained to the reaction of victims; accordingly, the value "0" equaled "Flight" and the value "1" equaled "Fight." The value "Fight" is defined as "a confrontation between opposing groups [or individuals] in which each attempts to harm or gain power over the other, as with bodily force or weapons" (American Heritage Dictionary, 2011, pg. 656). The value "Flight" is defined as "the act or an instance of running away; an escape" (American Heritage Dictionary, 2011, pg. 672).

Dependent Variable

A dependent variable is the presumed effect or outcome, which is affected by other variables (i.e., independent variables). The variable "Deaths" is defined as "the cessation of life; permanent cessation of all vital bodily functions" (Dorland's Illustrated Medical Dictionary, 2012, p. 473). The variable "Injuries" is defined as "harm or hurt; usually applied to damage inflicted on the body by an external force" (Dorland's Illustrated Medical Dictionary, 2012, p. 941). Both variables Deaths and Injuries were continuous (or interval or numerical) variables. A continuous variable has numeral values and is not limited to particular values (Gerring, 2001).

<div align="center">

Data Collection

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Acquisition

Data for this study were acquired from the New York City Police Department's (NYPD) 2012 edition of *Active Shooter: Recommendations and Analysis for Risk Mitigation*. The NYPD's report was selected for this study because the report is the most comprehensive list of shooting events to date (Blair et al., 2013). Moreover, other researchers have used the NYPD's report in data compilation for their studies (Huff-Corzine et al., 2013; Lankford, 2012, 2013). The NYPD (2012) collected 324 cases

between 1966 and 2012. Two hundred and eighty-one cases involved at least one casualty and three cases involved no causalities, which is a total of 284 active shooter cases, and 40 cases were foiled (NYPD, 2012). The NYPD (2012) relied on open source material, specifically, news media sources and publically available government documentation, to assemble their dataset; therefore, classified material was not used in the NYPD study. Lankford (2013) affirmed that researchers, similar to the NYPD, commonly rely on open source material when examining shooting events.

The NYPD (2012) incorporated cases that met the United States Department of Homeland Security's definition of active shooter, which was defined in Chapter II. The NYPD (2012) limited the definition to exclude ". . . gang-related shootings, shootings that solely occurred in domestic settings, robberies, drive-by shootings, attacks that did not involve a firearm, and attacks categorized primarily as hostage-taking incidents" (p. 10). The NYPD (2012) included information presented in sources that are more recent if discrepancies were found between sources. Additionally, the NYPD (2012) integrated information presented in government material if inconsistencies were identified between the media and government sources.

The NYPD (2012) noted a few limitations in their research methodology. First, there was a strong bias toward recent shooting cases owing to internet searches. Cases that occurred between 2000 and 2012 were ". . . a nearly comprehensive account of active shooter incidents that attracted news coverage" (NYPD, 2012, p. 10). Therefore, cases before 2000 may not be included, since extensive internet reporting was not readily available then. Second, since shooting events with high deaths and injuries attract heavy media concentration and relatively easy to find, there was a bias toward such cases in

internet searches. Finally, the NYPD (2012) restricted its exploration to English open

source material, thus ". . . creating a strong sampling bias against international incidents"

(p. 11). Of the 324 cases, 271 cases were in the U.S.A. and 53 cases in foreign nations

(NYPD, 2012).

Procedure and Classification

The NYPD (2012) data were examined according to this study's definition of

mass shooting. Ninety-two of 284 cases met this study's definition, whereas 192 cases

did not and consequently were excluded. To examine the response of victims, the 92

cases were researched and reviewed using books, academic journals, LexisNexis

Academic, Academic Search Complete, and Google Search. Few cases were found in

books and academic journals, but the assailant was the primary focal point (e.g., the

assailant's profile or psychology); therefore, books and journals were of little use to this

study. With LexisNexis, the News search function was selected and then Newspapers &

Wires. In the Search For section, the assailant's name in quotations was placed in the first

input box, the Boolean connector "and" was selected, and keywords mass shooting and

shooting in quotations were placed in the next two input boxes (e.g., "Adam Lanza" and

"mass shooting" and "shooting").

Next, the option "Date is Between" was selected in the Specify Date function and

a month designated to uncover enough news articles related to the case (e.g., 12/14/2012

to 1/14/2013). Details of an event may not be complete in the beginning; therefore, the

month timeframe provided news articles with details that emerged afterward. In the

Select Source(s) segment, all sources were selected, particularly, Newspapers,

Newswires, US Newspapers & Wires, Non-US Newspapers & Wires, Major Newspapers,

and Small Town Papers (US). Finally, in the Sort function, Oldest to Newest was chosen. To reduce duplicity of results, High Similarity was preferred. With Academic Search Complete, the Newspaper Source database and advanced search were selected. Next, the assailant's name and keywords in quotations were typed in the proper input boxes. Next, all publication types, specifically, Newspaper, News Wire, Transcript, and Magazine were chosen. Next, in the Document Type division, only Article, Editorial, and Interview were selected. Next, month and year of publication were specified (e.g., December 2012 and January 2013). Finally, results were sorted from oldest to newest publication.

With Google Search, the assailant's name and keywords in quotations were typed in the input box. Next, in Search Tools, a month was specified in Custom Range (e.g., 12/14/2012 to 1/14/2013) and results were sorted by relevance. Eight-two cases were found using LexisNexis Academic, one case was found with Academic Search Complete, and nine cases were found with Google Search. A total of 307 news and magazine articles were gathered and read to inspect the reaction of victims with keywords that indicated fighting (e.g., fought, confronted, tackled, subdued, disarmed, shot, etc.) and fleeing (e.g., fled, hid, dived, cowered, ran, etc.). If victims fled from the assailant, then the case was labeled Flight; otherwise, a case was labeled Fight if one or more victims fought the assailant.

Data Analysis

According to Hall (2008), the chief function of data analysis is to answer the researcher's questions, which may involve one or more of the following: describing the phenomena under examination, plus determining relationships between concepts; establishing causal relationships among variables or concepts involved in the study; or

testing theories or hypotheses about the nature of the relationships amid variables or concepts (p. 215). Levine and Roos (2002) explained, "Data analysis is a body of methods that help to describe facts, detect patterns, develop explanations, and test hypotheses. It is used in all of the sciences" (p. 1). The data of this study were processed using IBM's Statistical Package for Social Scientists (SPSS) Version 21, unless otherwise stated. This study's data were first examined for outliers.

Identifying Outliers

Although there is no specific statistical definition of an outlier, and the definition varies among statisticians, an outlier is generally considered an anomalous case in the dataset (Vaus, 2002, p. 92). Outliers can be problematic in univariate, bivariate, and multivariate analyses (e.g., mislead, bias, distort the mean and standard deviation, or pull results in one direction or the other; Vaus, 2002; Finch, 2012). Finch (2012) counseled the following:

> While outliers can be problematic from a statistical perspective, it is not always advisable to remove them from the data. When these observations are members of the target population, their presence in the dataset can be quite informative regarding the nature of the population. To remove outliers from the sample in this case would lead to loss of information about the population at large. In such situations, outlier detection would be helpful in terms of identifying members of the target population who are unusual when compared to the rest, but these individuals should not be removed from the sample. . . . The removal of outliers, when done, must be carried out thoughtfully and with purpose so that the resulting

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dataset is both representative of the population of interest and useful with the

appropriate statistical tools to address the research questions. (pp. 2, 11).

The data were examined using box plots to discover outliers for deaths and injuries. As

demonstrated in Figure 1, nine outliers were confirmed with deaths. As shown in Figure

2, six outliers were established with injuries. The outliers for each variable were

inspected to ensure recording was correct and thus no fix was warranted. Moreover, the

outliers did not represent unusual occurrences that diverge dramatically from this study's

intentions. For that reason, the author of this study did not ascertain a merited reason to

remove the outliers.

Testing for Normality

Normality was inspected before operating statistical tests. A precondition for

many statistical tests is the normality of data, especially with parametric testing, since

normal data is an underlying assumption (Park, 2008; Rovai, Baker & Ponton, 2013).

Normality denotes the shape of distribution. Yap and Sim (2011) expressed the

following:

The importance of normal distribution is undeniable since it is an underlying

assumption of many statistical procedures. It is also the most frequently used

distribution in statistical theory and applications. Therefore, when carrying out

statistical analysis using parametric methods, validating the assumption of

normality is of fundamental concern for the analyst. (p. 2141).

Parametric tests "evaluate interval data or ratio data . . .," whereas nonparametric tests ". .

. evaluate categorical/nominal data and ordinal/rank-order data" (Sheskin, 2004, p. 97).

According to Park (2008), the Kolmogorov-Smirnov and Shapiro-Wilk tests are the most common among researchers for testing normality.

The Shapiro-Wilk test was selected for this study because it is (a) more reliable, (b) less conservative, (c) less sensitive, (d) proper when total sample number is less than 5,000, and (e) has good power properties over a wide range of non-normal distributions (Park, 2008; Yap & Sim, 2011; Rovai et al., 2013). The Shapiro-Wilk test suggested that normality is not a reasonable assumption for deaths ($SW = .555$, $df = 92$, $p = .000$). The Shapiro-Wilk test also suggested that normality is not a reasonable assumption for injuries ($SW = .811$, $df = 66$, $p = .000$). Though the data were not normal, specifically, positively skewed (i.e., there were more responses at the low end of the range), the data were not transformed as the assumption of normality would still be violated. The violation of normality was not overly gross.

Univariate Analysis

Univariate statistics involves the analysis of one variable, where bivariate statistics involves the analysis of two variables (Bailey, 1994). Descriptive statistics, a type of univariate statistics, provide a description of the data in summarized, organized, and simplified forms (Bailey, 1994; Gravetter & Wallnau, 2009). Central tendency and dispersion were calculated for deaths and injuries. Histograms were generated for deaths and injuries to provide a graphical picture of the overall shape or distribution of these data. A pie chart was created to illustrate the relative proportions or frequency distribution of victim response. Next, bivariate statistical tests were used to test this study's research questions and hypotheses.

Bivariate Analysis

Question 1. Is there a relationship between the number of deaths and the number of injuries in mass shootings? The question is seeking an association between two variables; therefore, a correlation test was selected to determine how strongly and in what direction are deaths and injuries related. There are several correlation tests, but the four common correlation tests are the following: (a) Pearson's product-moment correlation (i.e., both variables are continuous or interval), (b) Spearman rank-order correlation (i.e., both variables are ordinal), (c) point-biserial correlation coefficient (i.e., one variable is continuous and the other variable is nominal and dichotomous), and (d) phi coefficient (i.e., both variables are nominal and dichotomous; Sheskin, 2004; Gravetter & Wallnau, 2009; Warner, 2013).

Since deaths and injuries are continuous variables, the Pearson product-moment correlation coefficient was selected. A one-tailed test predicts the expected direction of the correlation in advance, but a two-tailed test does not predict the direction of the correlation in advance (Sheskin, 2004; Gravetter & Wallnau, 2009; Warner, 2013). The two-tailed test was selected given that (a) the prediction of the direction (i.e., positive, negative, or no correlation) between the two variables was not made, and (b) tested for the possibility of the relationship in either direction. A scatter plot was created to graphically depict the strength and direction of relationship between the two variables.

Question 2. Is there a relationship between the number of deaths, victims fighting, and victims fleeing in mass shootings? Similar to question one, the question is seeking a relationship between the variables deaths and victim response. The two possible correlation coefficient tests are biserial correlation coefficient and point-biserial

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correlation coefficient. Both biserial and point-biserial tests analyze one variable that is continuous and the other variable is dichotomous and categorical; however, biserial involves an artificial dichotomy (e.g., correct or incorrect answer), whereas point-biserial involves a true (or natural) dichotomy (e.g., gender; Sheskin, 2004; Gravetter & Wallnau, 2009; Warner, 2013). Since the fight-or-flight response is instinctive (or natural), the point-biserial correlation coefficient was selected. The two-tailed test was selected. A scatter plot was created to illustrate the relationship between the two variables.

Question 3. Is there a relationship between the number of injuries, victims fighting, and victims fleeing in mass shootings? Questions two and three are comparable in nature; hence, the point-biserial correlation coefficient was performed. The two-tailed test was selected. A scatter plot was created to depict the relationship between the two variables.

Question 4. Is there a difference in the number of deaths between victims fighting and victims fleeing in mass shootings? The independent-samples t-test compares the means between two independent groups on the same continuous, dependent variable (Sheskin, 2004; Gravetter & Wallnau, 2009). Group 1 was defined as "0" and Group 2 was defined as "1." The "0" equals Flight and "1" equals Fight. Since there was no prediction made regarding the difference between the two variables, the two-tailed test was preferred.

Question 5. Is there a difference in the number of injuries between victims fighting and victims fleeing in mass shootings? Related to question four, the independent samples t-test was performed to compare the difference between the response of victims and injuries and the two-tailed test was selected. Group 1 was defined as "0" and Group 2

was defined as "1." The "0" equals Flight and "1" equals Fight. The two-tailed test was selected.

Summary

Since this study is identifying relationships between the research variables, the quantitative research method was selected. The author of this study cannot randomly assign people to fight or flee in a mass shooting; therefore, the quasi-experiment design was selected owing to multiple measures and manipulation of the research variables. The word mass shooting and research variables were defined and for this study. Data were retrieved from the NYPD's 2012 edition of *Active Shooter* report. The total sample was 92 cases. The reaction of victims was reviewed with newspapers and magazines using LexisNexis Academic, Academic Search Complete, and Google Search. Outliers were found using box plots and they were not removed as there was no necessary cause. Finally, the statistical and arithmetical techniques used to organize data for the purpose of answering questions of this study were explained. In the subsequent chapter, the results of the statistical analyses will be discussed.

CHAPTER IV

RESULTS

This chapter is an overview of the data analysis (i.e., the statistical test that was

applied to the data) and the outcome of the analysis will be presented The data were

collected and then processed in response to the research questions asked in Chapter I of

this study. This chapter begins with univariate statistics, or descriptive statistics, of the

research variables. Also included in this chapter are the outcomes of statistical tests

performed on the research variables. Furthermore, the key results will be presented in an

orderly and logical sequence, and the reader will be referred to the corresponding tables

and figures for more information. All results were rounded to the nearest hundredth after

all arithmetic and statistical operations, unless otherwise stated. The chapter concludes

with a synopsis of the results of this study.

Univariate Statistics

As shown in Table 4, deaths ranged from four to 69. The mean was 9.92, the

median was seven, and the mode was four. Therefore, deaths inclined to lump together at

the low end of the scale. As illustrated in Figure 3, a positively skewed distribution is

indicated given that the mean was greater than the median and mode. The range was 65,

the interquartile range was 6.5, variance was 109.43, and the standard deviation was

10.46. From this, deaths had a tendency to be variable. For instance, the middle 50% of

deaths had a range of 6.5 (i.e., interquartile range) demonstrating that there was a sensible

spread of scores around the median.

As shown in Table 4, injuries ranged from zero to 125. The mean was 11.25, the

median was four, and the mode was zero. Therefore, injuries tended to collect together at

the low end of the scale. As illustrated in Figure 4, a positively skewed distribution is indicated given that the mean was greater than the median and mode. The range was 19, the interquartile range was 12.75, variance was 372.06, and the standard deviation was 19.29. From this, injuries had a tendency to be variable. Such as the middle 50% of injuries had a range of 12.75 (i.e., interquartile range) demonstrating that there was a sensible spread of scores around the median. Deaths ($N = 92$, $M = 9.92$, $SD = 10.46$) were marginally lower than injuries ($N = 92$, $M = 11.25$, $SD = 19.29$). As illustrated in Figure 5, 22% of cases involved victims fighting the assailant and 78% of cases involved victims fleeing from the assailant.

Bivariate Statistics

Question 1

Is there a relationship between the number of deaths and the number of injuries in mass shootings? It was hypothesized that there is relationship between the number of deaths and the number of injuries. The Pearson product-moment correlation coefficient test was conducted to evaluate the null hypothesis. The null hypothesis was that there was no relationship between the number of deaths and the number of injuries in mass shootings ($N = 92$). The test was conducted using an alpha of .05. The assumption of normality of deaths was evaluated using the Shapiro-Wilk test ($SW = .669$, $df = 20$, $p = .000$) and was found to be departed from normality. Equally, the assumption of normality of injuries was evaluated using the Shapiro-Wilk test ($SW = .669$, $df = 20$, $p = .000$) and was found to be departed from normality.

As illustrated in Figures 1 and 2, the absence of outliers was not confirmed using box plots for each variable. As demonstrated in Figure 6, the assumption of linearity was

reasonable given review of a scatter plot of the two variables. As shown in Table 5, the test suggested that there was a moderate, positive relationship between the number of deaths ($M = 9.92$, $SD = 10.46$) and the number of injuries ($M = 11.25$, $SD = 19.29$) in mass shootings, but the relationship was statistically significant, $r(92) = .34$, $p = .001$. Therefore, the null hypothesis that there would be no relationship between the number of deaths and the number of injuries in mass shootings was rejected at the .05 level of significance. The coefficient of determination was $r^2 = .12$, indicating that 12% of the variance on the number of deaths is shared with the number of injuries, but 88% of variance remains unexplained.

Question 2

Is there a relationship between the number of deaths, victims fighting, and victims fleeing in mass shootings? It was hypothesized that there is relationship between the number of deaths and victim response. The point-biserial correlation coefficient was performed to evaluate the null hypothesis. The null hypothesis was that there was no relationship between the number of deaths and victim response (i.e., fight or flight) in mass shootings ($N = 92$). The test was conducted using an alpha of .05. Review of the Shapiro-Wilk test indicated that the number of deaths was not normally distributed for victims fighting ($SW = .669$, $df = 20$, $p = .000$) and victims fleeing ($SW = .538$, $df = 72$, $p = .000$). Skewness and kurtosis for victims fighting were 2.18 and 4.28 respectively, showed a positive skew. In addition, skewness and kurtosis for victims fleeing were 3.8 and 16.44 respectively, confirmed a positive skew.

As exhibited in Figure 7, box plots confirmed the presence of outliers in each group. As revealed in Figure 8, a scatter plot provided slight evidence of linearity. The

point-biserial correlation coefficient was conducted despite the departure from normality owing to the test's robustness with violations of normality (Kraemer, 2005). As shown in Table 5, the test suggested that there was a weak, negative correlation between the number of deaths and victim response, but the relationship was not statistically significant, $r_{pb}(90) = -.04$, $p = .69$, when victim response was coded as $0 = $ flight and $1 = $ fight. Therefore, the null hypothesis that there would be no relationship between the number of deaths and victim response in mass shootings was not rejected at the .05 level of significance, and any relationship was in the sample only.

Question 3

Is there a relationship between the number of injuries, victims fighting, and victims fleeing in mass shootings? It was hypothesized that there is relationship between the number of injuries and victim response. The point-biserial correlation coefficient was performed to evaluate the null hypothesis. The null hypothesis was that there was no relationship between the number of injuries and victim response (i.e., fight or flight) in mass shootings ($N = 92$). The test was conducted using an alpha of .05. Review of the Shapiro-Wilk test indicated that the number of injuries was not normally distributed for victims fighting ($SW = .804$, $df = 20$, $p = .001$) and victims fleeing ($SW = .604$, $df = 72$, $p = .000$). Skewness and kurtosis for victims fighting were 1.16 and .02 respectively, indicated a positive skew. Similarly, skewness and kurtosis for victims fleeing were 3.17 and 11.87 respectively, showed a positive skew.

As shown in Figure 9, a box plot confirmed no outliers in injuries for victims fighting, but a box plot revealed presence of outliers in injuries for victims fleeing. As illustrated in Figure 10, a scatter plot presented evidence of linearity. The point-biserial

correlation coefficient was conducted despite the departure from normality owing to the test's robustness with violations of normality (Kraemer, 2005). As shown in Table 5, the test suggested that there was a weak, negative correlation between the number of injuries and victim response, but the relationship was not statistically significant, $r_{pb}(90) = -.14$, p = .18, when victim response was coded as 0 = flight and 1 = fight. Therefore, the null hypothesis that there would be no relationship between the number of injuries and victim response in mass shootings was not rejected at the .05 level of significance.

Question 4

Is there a difference in the number of deaths between victims fighting and victims fleeing in mass shootings? It was hypothesized that there is a difference in the number of deaths between victim responses. The independent-samples t-test was performed to evaluate the null hypothesis. The null hypothesis was that there was no difference in the number of deaths between victim responses. The assumption of normality was tested and was not met for the distributional shape of deaths for victims fighting. Review of the Shapiro-Wilk test for normality ($SW = .669$, $df = 20$, $p = .000$) suggested that normality of deaths for victims fighting was a departure from what would be expected. Similar results were suggested with deaths for victims fleeing. Review of the Shapiro-Wilk test ($SW = .538$, $df = 72$, $p = .000$) suggested that normality of deaths for victims fleeing was a departure from what would be expected.

As illustrated in Figure 7, box plots suggested presence of outliers in the number of deaths for both victim responses respectively. The independent samples t-test was conducted despite the violation of normality, since a two-tailed test reduces Type I and Type II errors (Sawilowsky & Blair, 1992). According to Levene's test, equal variances

were assumed ($F = .28$, $p = .598$), as a result the degrees of freedom were not adjusted. As shown in Table 6, the test showed that there was no difference in the number of deaths between victims fighting ($M = 9.1$, $SD = 7.62$) and victims fleeing ($M = 10.15$, $SD = 11.16$) and the difference was not statistically significant, $t(90) = .40$, $p = .69$. Therefore, the null hypothesis that there was no difference in the number of deaths between victim responses was not rejected at the .05 level of confidence. The differences found in the sample could not be inferred to the population. The 95% confidence interval for the difference in means ranged from −6.33 to 4.23.

Question 5

Is there a difference in the number of injuries between victims fighting and victims fleeing? It was hypothesized that there is a difference in the number of injuries between victim responses. The independent-samples t-test was performed to evaluate the null hypothesis. The null hypothesis was that there was no difference in the number of injuries between victim responses. The assumption of normality was tested and was not met for the distributional shape of injuries for victims fighting. Review of the Shapiro-Wilk test for normality ($SW = .804$, $df = 20$, $p = .001$) suggested that normality of injuries for victims fighting was a departure from what would be expected. Similar results were found with injuries for victims fleeing. Review of the Shapiro-Wilk test ($SW = .604$, $df = 72$, $p = .000$) suggested that normality of injuries for victims fleeing was a departure from what would be expected.

As demonstrated in Figure 9, a box plot revealed outliers in injuries for victims fleeing, but no outliers were found in injuries for victims fighting. The independent samples t-test was used despite the violation of normality, since a two-tailed test reduces

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Type I and Type II errors (Sawilowsky & Blair, 1992). According to Levene's test, equal variances were not assumed ($F = 4.151$, $p = .045$), as a result the degrees of freedom were adjusted from 90 to 88. As shown in Table 6, the test indicated that there was a difference in the number of injuries between victims fighting ($M = 6.15$, $SD = 6.73$) and victims fleeing ($M = 12.67$, $SD = 21.34$) and the difference was statistically significant, $t(88) = 2.22.$, $p = .03$. Therefore, the null hypothesis that there was no difference in the number of injuries between victim responses was rejected at the .05 level of confidence. This indicates there was a statistically significant difference in the number of injuries between victims who fought and victims who fled. The 95% confidence interval for the difference in means ranged from -6.33 to 4.23.

Summary

The sample revealed that deaths were slightly lower than injuries. Deaths for victims fighting the assailant were scarcely lower than deaths for victims fleeing from the assailant. Injuries for victims fighting the assailant were significantly lower than injuries for victims fleeing from the assailant. Nearly one-fourth of victims fought the assailant and over three-fourths of victims fled from the assailant. There was a statistically significant correlation between the number of deaths and the number of injuries. There was a weak, negative, and non-significant correlation between the number of deaths and victim response. Equally, there was a weak, negative, and non-significant correlation between the number of injuries and victim response. There was no difference in the number of deaths between victim responses. Alternatively, there was a significant difference in the number of injuries between victim responses. The following chapter will

explore the underlying meaning of this study's outcomes and offer suggestions to extend the research of this study.

CHAPTER V

CONCLUSION

This study sought to investigate the problem of mass casualties in mass shootings. The purposes of this study were to test the fight-or-flight response by relating the number of deaths and injuries to fighting and fleeing for victims, and by comparing fighting and fleeing in terms of the number of deaths and injuries for victims in mass shootings. The author of this study anticipated that the knowledge generated from this inquiry might offer new insight and so enlighten policy makers and the people at large. This research employed a correlation analysis to illustrate the problem under examination. This chapter begins with an overview of major findings and their possible implications. Following this are potential contributions by this study. Also included in this chapter are limitations of the study. The chapter concludes with suggestions to extend this study to other queries that may add to the understanding of mass casualties.

Major Findings

Table 4 shows that the number of deaths is comparatively lower than the injuries in mass shootings. One possible explanation may be the assailant shooting at random. The assailant is shooting neither systematically nor precisely and directly aiming for center mass (i.e., upper torso), or other vital members of the body (e.g., head), to gain as many deaths as possible. Another possibility is the sporadic shooting wounds victims more often than fatally. Table 5 and Figure 6 explain that mass shootings high in deaths are likely also to be high in injuries. Put differently, as the number of deaths increase, the number of injuries increase. A likely reason is the focus of an assailant is to inflict as many casualties as possible. Another possible explanation is mass shooting events take

place in a moderate to high-populated location (e.g., school, workplace, or shopping center). An assailant using multiple firearms with a large amount of ammunition and other weapons may be another factor.

Table 6 demonstrates that victims fighting the assailant had narrowly lower deaths than did victims fleeing from the assailant. Additionally, Table 5 and Figure 8 show that, as deaths with victims fleeing increase, deaths with victims fighting decrease. In other words, there were fewer deaths as victims fought the assailant. A possible justification is the knowledge of self-defense or courage with victims who fought against the assailant. A probable explanation for increased deaths as victims flee is injured victims may die later from their injuries or an assailant exclusively targets shoots fleeing victims. Victims confronting an assailant thwart or frustrate the assailant's shooting, which may provide an opportunity for others to escape, may be a likely factor for reduced deaths.

Table 6 indicates that victims fighting had significantly lower injuries than did victims fleeing. Furthermore, Table 5 and Figure 10 reveal that, as injuries with victims fleeing increase, injuries with victims fighting decrease. There were significantly fewer injuries as victims fought the assailant. A victim fighting the assailant provides an opportunity for others to escape or diverts the assailant's attention away from others could be a factor. A victim fleeing from the assailant may become potentially injured.

Contributions

Generally speaking, the findings of this study suggest fighting or confronting the assailant is the better measure. Fighting the assailant proposes a number of benefits for the people. Victims who are aware of their surroundings and conscious of the fact that they do not feel vulnerable in the situation make the selfless sacrifice to save lives.

Subduing the assailant does not necessarily guarantee one's death or injury. The assailant may be a terrible shooter or may not be able to shoot every individual confronting him.

It is well recognized that knowing self-defense may help one feel less anxious and prepared in a variety of situations (Heyden, Jackson, Anger & Ellner, 1999; Wiseman, 2000; Patrick & Hall, 2010; Eimer, 2012). Likewise, self-defense may help people develop more assurance in themselves, in their abilities, and in their surroundings (Heyden, Jackson, Anger & Ellner, 1999; Wiseman, 2000; Patrick & Hall, 2010; Eimer, 2012). Knowledge of self-defense may enable one to be aware of his environment and to be prepared for the unexpected at any time. Perhaps this may be the remedy to multiple causalities in mass shootings.

<div align="center">**Limitations**</div>

This study had a number of limitations. First, the dataset of this study was compiled from the NYPD's active shooter report. The NYPD's report attempted to collect as many active shooter events as possible. While said report was useful to this study and the most comprehensive collection to date, the analysis presented therein was limited in few areas, which in turn limited this study. The report's drawbacks were the following: (a) biased toward recent cases in consequence of internet searches, (b) biased toward cases involving high deaths and injuries as a result of internet searches, (c) hinged on open source material in English, (d) biased toward cases in the U.S.A., and (e) exclusively relied on open source material, in particular, the media.

Second, of the 284 active shooter cases in the NYPD's report, 92 cases were included this study. This study's definition of mass shooting was definitive and could have played a role in the sample size. Two cases could have been included in the sample

if there was not an issue with conflicting number of deaths or injuries (see Appendix B). Though there were several international cases, the sample was biased toward cases that occurred in the U.S.A. The variables deaths and injuries were skewed, which may have influenced the results of this study. Finally, years of the sample were limited between 1966 and 2012, so mass shooting events before 1966 and after 2012 were not included.

Third, a variety of sources was used to examine the reaction of victims. First, books are an authoritative measure and they include comprehensive accounts of research, data, expert testimony, and so forth. Books have their limits since they may take years to write and publish; therefore, they may not always be the best up-to-date source. Some cases were found in books, but the primary focus was on the assailant, not the victims. Second, journal articles provide excellent and reliable information, since they are checked by academics and other experts (i.e., peer reviewed). Nonetheless, journals have their shortcomings as well. Journals may take months or years to write and publish owing to research, review, and publication. Some cases were found in journals, but, similar to books, the primary focus was on the assailant, not the victims. Finally, LexisNexis Academic, Academic Search Complete, and Google Search were used to find news and magazine articles.

Newspapers and magazines provide a good basis of information, eyewitness testimony, and raising awareness. There are, however, drawbacks to said media. First, newspapers and magazines may have an unchecked historical viewpoint. Second, they may be sensational, defective, inaccurate, incomplete, or biased. Third, they may neglect information that can be useful to researchers. For example, the response time when victims reached or stopped the assailant at the commencement of shooting. Fourth, ages

and gender of all victims were not provided. Finally, the news and magazine articles used in this study were in English. Similar to the NYPD's report, only a few international cases were translated in English. Although more exist, a language barrier prevented them from being included and may have affected the results.

Finally, this study did not attempt to establish causality. The research method and statistical analyses performed in this study examined relationships between the research variables between fighting and fleeing an armed assailant. First, correlation measures the relationship or association between variables. Second, correlations inform whether two variables are related or not, but nothing can be said about whether one variable caused the other. Therefore, the author of this study cannot arrive to any conclusions about cause and effect between the research variables. Lastly, there may be extraneous variables causing the relationship or link between the research variables not examined in this study.

Future Research

Further research needs to be conducted on the fight-or-flight response and victims in mass shootings. Researchers should explore the knowledge of self-defense with victims and if that knowledge influenced victims to fight or flee. Another variable to consider is policies and procedures concerning armed threats at the time of these mass shooting events. Researchers should investigate if those policies and procedures were helpful or hurtful to victims in the mass shootings. Kopel (2009) commented on the discouragement within some policies:

> Every major world religion lauds people who charitably accept grave risks to themselves in order to protect other innocent citizens. Yet some educational administrators actively attempt to discourage such actions. For example, the

University of Colorado tells students that, in case of an attack by a mass killer, "Do not be a hero. Be a good witness." Arguably, the university should not pressure people to act courageously. But why should the university discourage selfless courage? Several school shootings have been stopped by people who acted heroically against an armed killer. (p. 554).

Researchers should study if those protocols influenced the decision to fight or flee among the victims. Researchers should consider the response time by victims, that is, how long it took victims from commencement of the mass shooting to confront the assailant and end the shooting. Researchers should consider interviewing or surveying survivors of mass shootings to understand their thought process and decision making during the event. Finally, researchers should expand beyond the fight-or-flight dichotomy to include posturing and submission, and determine the likelihood of survival with each reaction.

Summary

This study addressed the problem of mass casualties in mass shootings. The purposes of this study were to test the fight-or-flight response by relating the number of deaths and injuries to fighting and fleeing for victims, and by comparing fighting and fleeing in terms of the number of deaths and injuries for victims in mass shootings. Approaches have been made to examine the outcomes of individuals responding to the assailant. The evidence was nearly equally reliable in suggesting that aggressive action by victims is an operative countermeasure for the assailant. Very few studies (Borsch, 2009, 2010a, 2010b; Blair et al., 2013) have examined the response of victims in shooting events. Whether the degree of fighting or fleeing by victims had a beneficial outcome or

direct consequence on the number of deaths and injuries in mass shootings, however, remained an open question in said studies.

The shortage of knowledge regarding victim response in mass shootings is unfortunate, since it is the kind of evidence policy makers may find useful in developing policies and procedures wherein benefit would-be victims in mass shootings. This study attempted to contribute to the body of knowledge by examining the relationship in the number of deaths and injuries between victim responses in mass shootings. The results of this study suggested that fighting or confronting the assailant in a mass shooting is the better measure to prevent mass casualties.

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Table 1

Definitions of Mass Murder

Scholar(s)	Offender(s)	Number of Fatalities	Number of Injuries	Number of Events	Number of Locations	Cool-off Period between Murders	Time Period
Dietz (1986)	1	3 +	5 +	1	n/a	n/a	n/a
Douglas et al. (2006)	n/a	4 +	n/a	1	1	n/a	No distinctive time
FBI (2008)	n/a	4 +	n/a	1	n/a	n/a	No distinctive time
Fox & Levin (1998, 2003, 2005)	1 +	4 +	n/a	1	n/a	n/a	Few minutes to several hours
Hempel et al. (1999)	1	3 +	n/a	1	n/a	n/a	n/a
Holmes & DeBurger (1988)	1	Several	n/a	1	1	n/a	n/a
Holmes & Holmes (1998)	n/a	3 +	n/a	1	1	No	n/a
MacKenzie (2006)	n/a	3 +	n/a	1	1	n/a	n/a
Meloy et al. (2004)	n/a	3 +	n/a	1	n/a	n/a	n/a
Petee et al. (1997)	n/a	3 +	n/a	1	n/a	n/a	Within 24 hours
Ressler et al. (1988)	n/a	4 +	n/a	1	1	n/a	n/a

Note. The scholars did not mention or define some criteria in their definitions; hence, the n/a means not applicable, not available, or no answer.

Table 2

Definitions of Spree Murder

Scholar(s)	Offender(s)	Number of Fatalities	Number of Events	Number of Locations	Cool-off Period between Murders	Time Period	Other
Douglas et al. (2006)	n/a	2 +	1	2 +	No	Short or long duration	n/a
FBI (2008)	1 +	2 +	n/a	n/a	No	n/a	n/a
Holmes & DeBurger (1988)	n/a	Several	n/a	n/a	n/a	Hours or weeks	n/a
Holmes & Holmes (1998)	n/a	3 +	3 +	3 +	No	n/a	Accompanied by the commission of another felony
Ioannou (2010)	n/a	Multiple	1	2 +	No	n/a	Other criminal acts committed
MacKenzie et al. (2006)	n/a	3 +	n/a		n/a	Within 30 days	Accompanied by the commission of another felony
Palmiotto (2013)	n/a	3 +	n/a	1 +	n/a	Within hours, days, or months	n/a
Ressler et al. (1988)	n/a	2 +	1	2 +	No	n/a	n/a

Note. The scholars did not mention or define some criteria in their definitions; hence, the n/a means not applicable, not available, or no answer.

Table 3

Definitions of Serial Murder

Scholar(s)	Offender(s)	Number of Fatalities	Number of Events	Number of Locations	Cool-off Period between Murders	Time Period	Other
Douglas et al. (2006)	n/a	n/a	3 +	3 +	Yes	n/a	n/a
FBI (2008)	1 +	2 +	1 +	n/a	n/a	n/a	n/a
Holmes & DeBurger (1988)	n/a	n/a	n/a	n/a	n/a	Months or years	One-on-one; no relationship between offender and victim
Holmes & Holmes (1998)	n/a	3 +	3 +	3 +	Yes	Over 30 days	n/a
MacKenzie et al. (2006)	n/a	3 +	n/a	n/a	Yes	Over 30 days	n/a
Ressler et al. (1988)	n/a	3 +	3 +	3 +	Yes	n/a	n/a

Note. The scholars did not mention or define some criteria in their definitions; hence, the n/a means not applicable, not available, or no answer.

Table 4

Descriptive Statistics of Deaths and Injuries (N = 92)

	Deaths	Injuries
Five Number Summary		
Minimum	4.00	0.00
First Quartile	5.00	1.00
Median	7.00	4.00
Third Quartile	11.50	13.75
Maximum	69.00	125.00
Central Tendency		
Mean	9.92	11.25
Median	7.00	4.00
Mode	4.00	0.00
Range	65.00	125.00
Standard Deviation	10.46	19.29
Interquartile Range	6.50	12.75
Variance	109.43	372.06
Skewness	3.77	3.52
Kurtosis	16.94	15.17

Table 5

Correlation Matrix of Deaths, Injuries, and Victim Response (N = 92)

	Deaths	Injuries	Victim Response
Deaths			
Pearson Correlation	1		
Significance (2-tailed)			
Injuries			
Pearson Correlation	.34***	1	
Significance (2-tailed)	.00		
Victim Response			
Pearson Correlation	−.04	−.14	1
Significance (2-tailed)	.69	.18	

*** *p* < .001

Table 6

Independent-Samples T-Test Comparing the Means of Deaths and Injuries by Victim Response

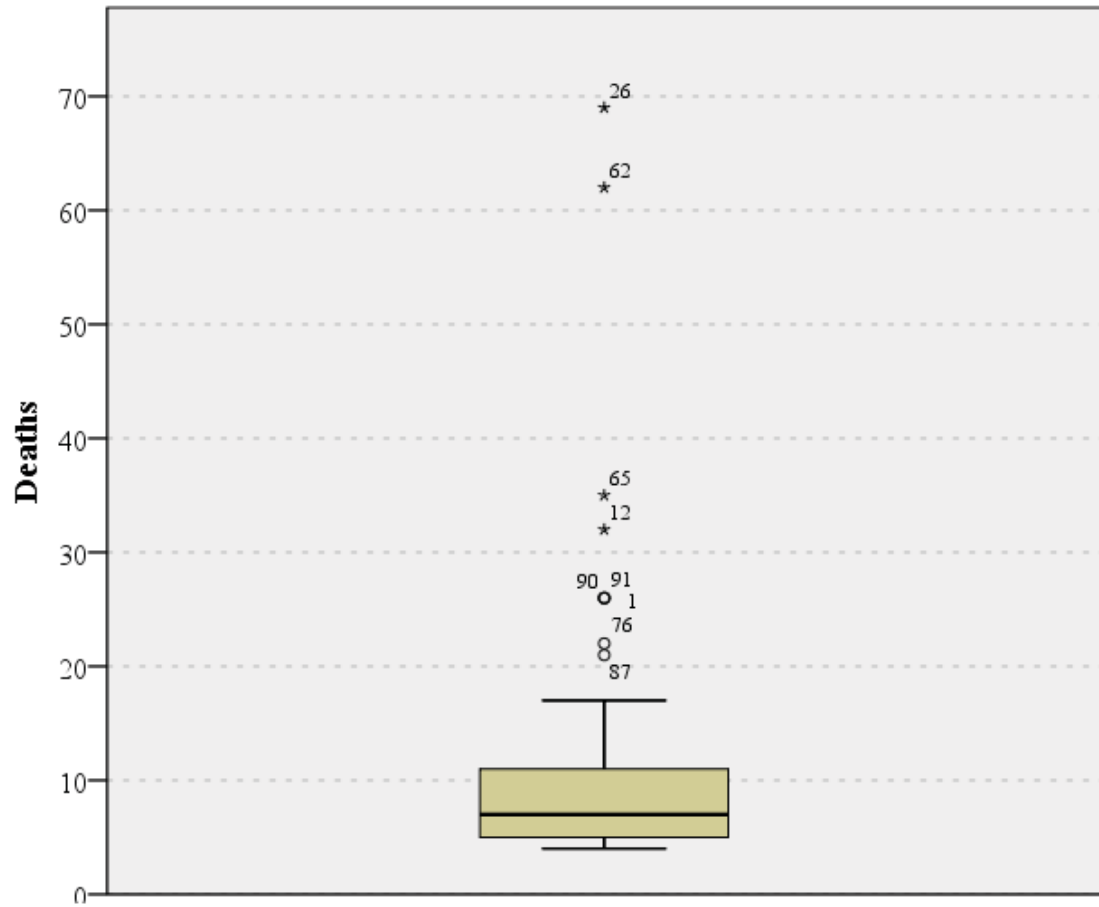|	Victim Response	n	M	SD	t	df	*p*-value
Deaths	Fight	20	9.10	7.62	.40	90	.69
	Flight	72	10.15	11.16			
Injuries	Fight	20	6.15	6.73	2.22	88	.03*
	Flight	72	12.67	21.34			

* *p* < .05

Figure 1. Box Plot of Deaths.
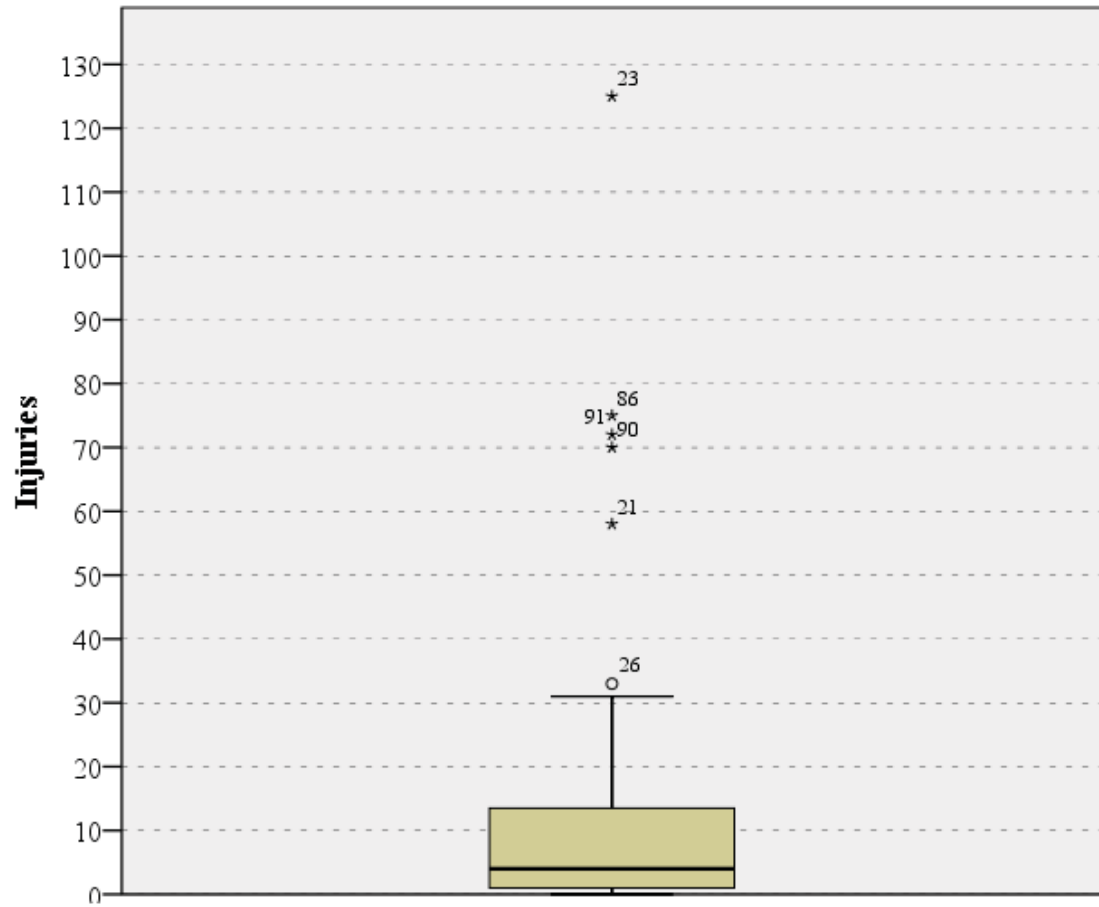
Figure 2. Box Plot of Injuries.
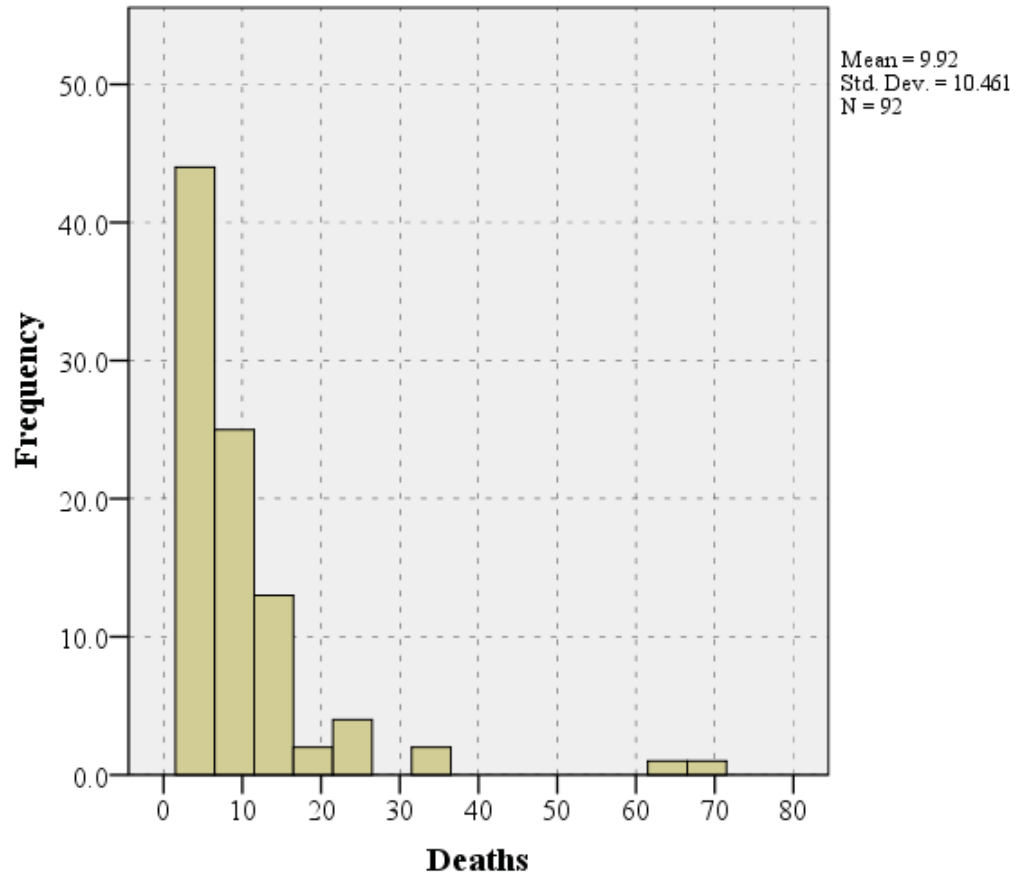
Figure 3. Histogram of Deaths.
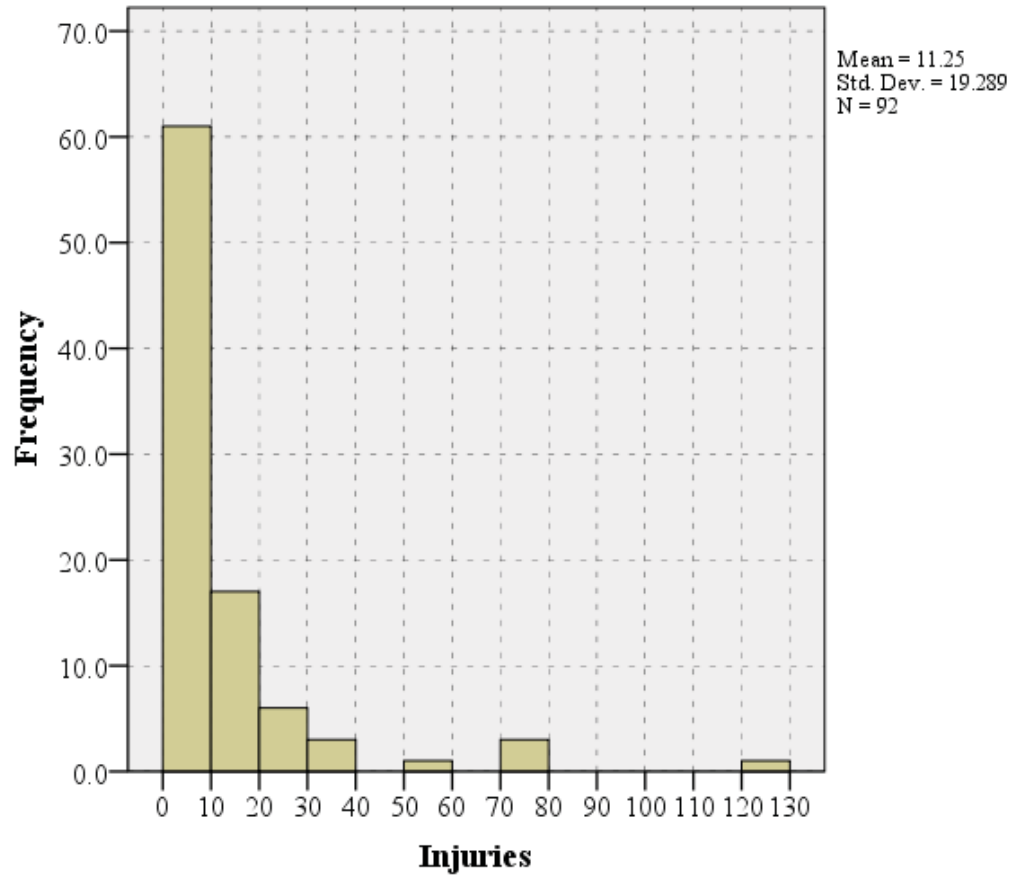
Mean = 11.25
Std. Dev. = 19.289
N = 92

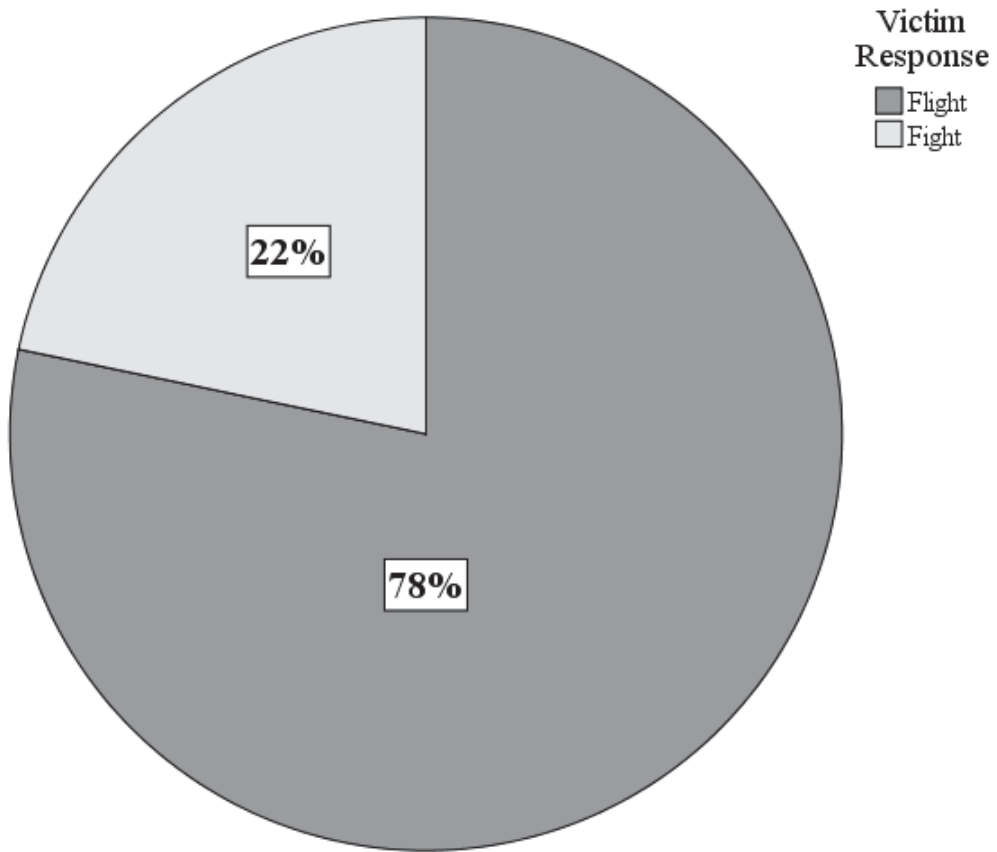*Figure 4*. Histogram of Injuries.

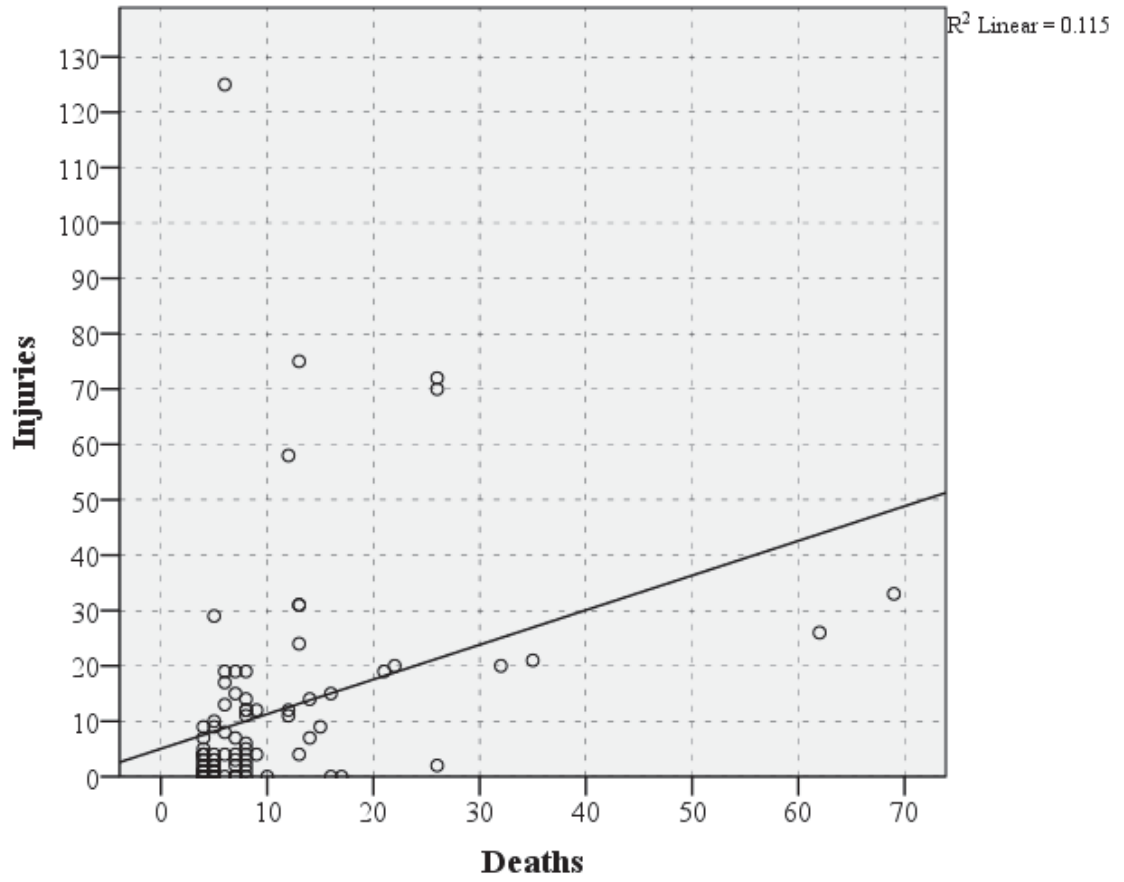*Figure 5*. Frequency Distribution (Percentages) of Victim Response.

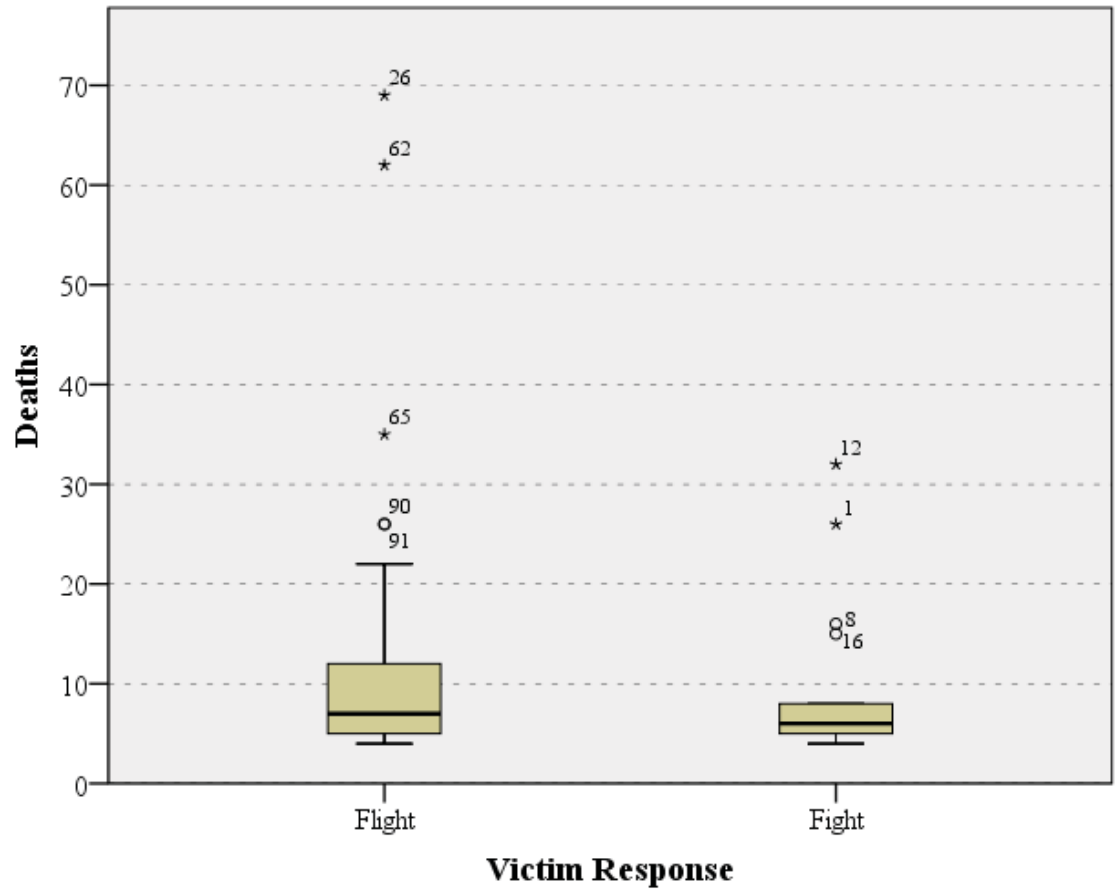*Figure 6*. Scatter Plot of Deaths and Injuries.

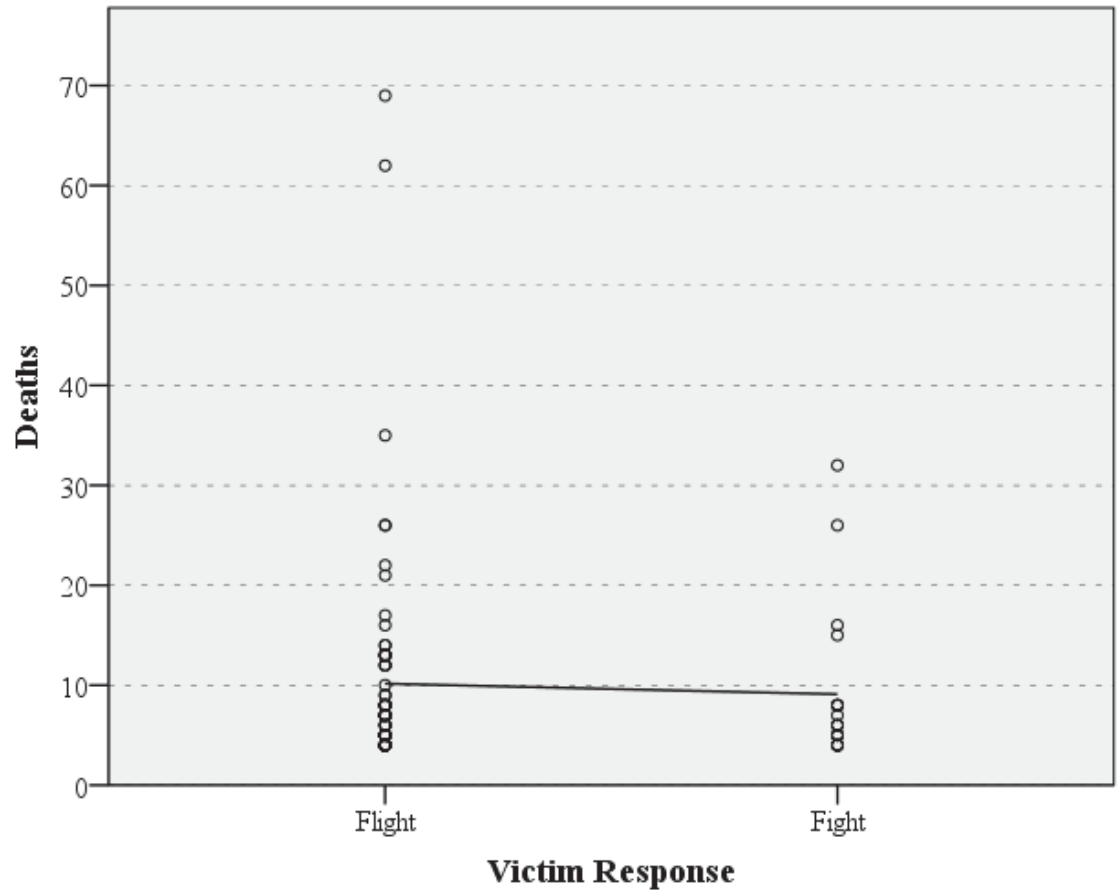*Figure 7*. Box Plot of Deaths by Victim Response.

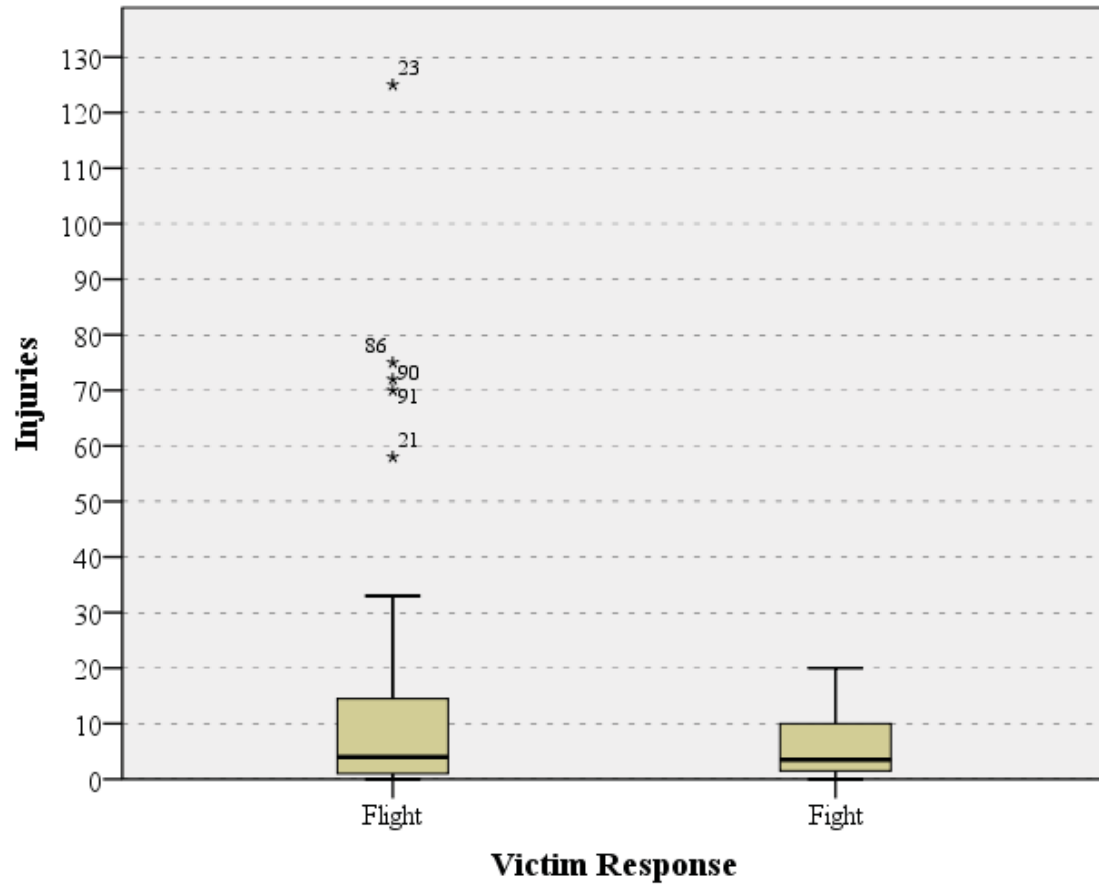*Figure 8*. Scatter Plot of Deaths by Victim Response.

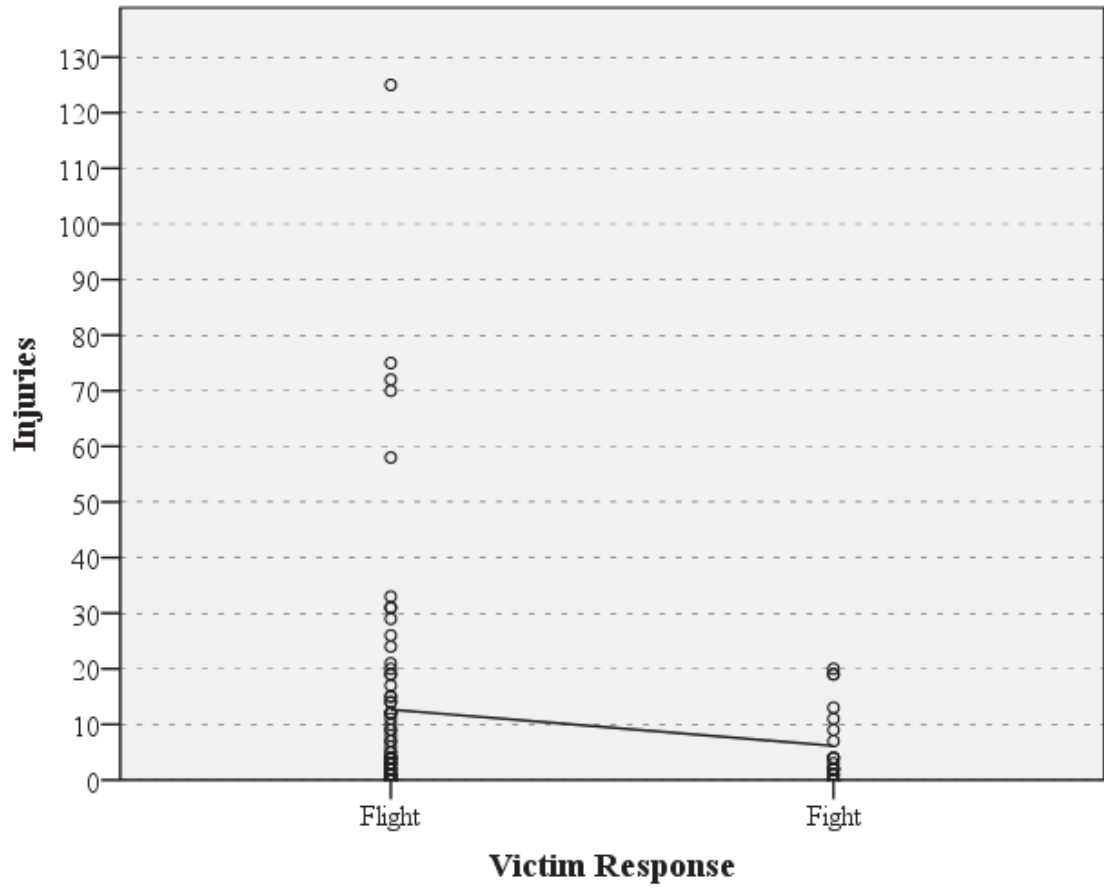*Figure 9*. Box Plot of Injuries by Victim Response.

Figure 10. Scatter Plot of Injuries by Victim Response.

APPENDIX A

Mass Shootings Included in Study

Location(s)	Date	Shooter(s)	Deaths	Injuries	Victim Response
Austin, Texas	8/1/1966	Charles Whitman	13	31	Flight
Airport City, Israel	5/29/1972	Kozo Okamoto, Takeshi Okudaira, Yasuyuki Yasuda	26	72	Flight
Ma'alot, Israel	5/15/1974	Terrorist Group	26	70	Flight
Fullerton, California	7/12/1976	Edward Allaway	7	2	Flight
Miami, Florida	8/20/1982	Carl Brown	8	3	Flight
San Ysidro, California	7/18/1984	James Huberty	21	19	Flight
Rome, Italy	12/27/1985	Terrorist Group	13	75	Flight
Edmond, Oklahoma	8/20/1986	Patrick Sherrill	14	7	Flight
Melbourne, Australia	8/9/1987	Julian Knight	7	19	Flight
Wiltshire and Hungerford, England	8/19/1987	Michael Ryan	16	15	Flight
Melbourne, Australia	12/8/1987	Frank Vitkovic	8	0	Fight
Sunnyvale, California	2/16/1988	Richard Farley	7	4	Flight
Stockade, California	1/17/1989	Patrick "Purdy" West	5	29	Flight
Louisville, Kentucky	9/14/1989	Joseph Wesbecker	8	12	Flight
Quebec, Canada	12/6/1989	Marc Lepine	14	14	Flight
Jacksonville, Florida	6/18/1990	James Pough	9	4	Flight
Strathfield, Australia	8/17/1991	Wade Frankum	6	8	Flight
Killeen, Texas	10/16/1991	George Hennard	22	20	Flight
Iowa City, Iowa	11/1/1991	Gang Lu	5	1	Flight
Hoyt, Kansas	5/1/1992	Eric Houston	4	9	Flight
Quebec, Canada	8/24/1992	Valery Fabrikant	4	1	Fight

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San Francisco, California	7/1/1993	Gian Ferri	8	6	Flight
Oxnard and Ventura, California	12/2/1993	Alan Winterbourne	4	4	Flight
Garden City, New York	12/7/1993	Colin Ferguson	6	19	Fight
Falun, Sweden	6/11/1994	Mattias Flink	7	0	Flight
Corpus Christi, Texas	4/3/1995	James Simpson	5	0	Flight
Los Angeles, California	7/19/1995	Willie Woods	4	0	Flight
Fort Lauderdale, Florida	2/9/1996	Clifton McCree	5	1	Flight
Dunblane, Scotland	3/13/1996	Thomas Hamilton	17	0	Flight
Jackson, Mississippi	4/24/1996	Kenneth Tornes	4	0	Flight
Tasmania, Australia	4/28/1996	Martin Bryant	35	21	Flight
Sana'a, Yemen	3/30/1997	Mohammad Ahman al-Naziri	8	14	Flight
Aikens County, South Carolina	9/15/1997	Arthur Wise	4	3	Flight
Deir el-Bahri, Egypt	11/17/1997	Terrorist Group	62	26	Flight
Orange County, California	12/18/1997	Arturo Torres	4	2	Flight
Newington, Connecticut	3/6/1998	Matthew Beck	4	0	Flight
Jonesboro, Arkansas	3/24/1998	Mitchell Johnson, Andrew Golden	5	10	Flight
Littleton, Colorado	4/20/1999	Eric Harris, Dylan Klebold	13	24	Flight
Atlanta, Georgia	7/29/1999	Mark Barton	9	12	Flight
Iwilei, Hawaii	11/2/1999	Bryan Uyesugi	7	0	Flight
Tampa, Florida	12/30/1999	Silvio Izquierdo-Leyva	5	3	Flight
Irving, Texas	3/20/2000	Robert Harris	5	1	Flight

Wakefield, Massachusetts	12/26/2000	Michael McDermott	7	0	Flight
Melrose Park, Illinois	2/5/2001	William Baker	4	4	Flight
Sacramento, California	9/9/2001	Joseph Ferguson	5	2	Flight
Nanterre, France	3/27/2002	Richard Durn	8	19	Fight
Erfurt, German	4/26/2002	Robert Steinhauser	16	0	Fight
Huntsville, Alabama	2/25/2003	Emanuel Patterson	4	1	Flight
Meridian, Mississippi	7/9/2003	Doug Williams	5	9	Flight
Chicago, Illinois	8/27/2003	Salvador Tapia	6	0	Flight
Kansas City, Kansas	7/2/2004	Elijah Brown	5	2	Flight
Carmen de Patagones, Argentina	9/28/2004	Rafael Solich	4	5	Flight
Columbus, Ohio	12/8/2004	Nathan Gale	4	2	Fight
Red Lake, Minnesota	3/21/2005	Jeff Weise	7	7	Fight
Santa Barara, California	1/29/2006	Jennifer San Marco	7	0	Flight
Lancaster County, Pennsylvania	10/2/2006	Charles Roberts, IV	5	0	Flight
Salt Lake City, Utah	2/12/2007	Sulejman Talovic	5	4	Fight
Blacksburg, Virginia	4/16/2007	Seung-Hui Cho	32	20	Fight
Tuusula, Finland	11/7/2007	Pekka-Eric Auvinen	8	12	Flight
Omaha, Nebraska	12/5/2007	Robert Hawkins	8	5	Flight
Arvada and Colorado Springs, Colorado	12/9/2007	Matthew Murray	4	4	Fight
Kirkwood, Missouri	2/7/2008	Charles Thornton	5	2	Fight
DeKalb, Illinois	2/14/2008	Steven Kazmierczak	5	0	Flight
Jerusalem, Israel	3/6/2008	Alaa Abu Dhein	8	11	Fight
Santa Maria, California	3/19/2008	Lee Leeds	4	0	Flight
Henderson, Kentucky	6/25/2008	Wesley Higdon	5	1	Flight

Kauhajoki, Finland	9/23/2008	Mattie Saari	10	0	Flight
Winnenden, Germany	3/11/2009	Tim Kretschmer	15	9	Fight
Oakland, California	3/21/2009	Lovelle Mixon	4	1	Flight
Carthage, North Carolina	3/29/2009	Robert Stewart	8	4	Flight
Binghamton, New York	4/3/2009	Jiverly Wong	13	4	Flight
Killeen, Texas	11/5/2009	Nidal Malik Hasan	13	31	Flight
Lakewood, Washington	11/29/2009	Maurice Clemmons	4	0	Fight
Cumbria, England	6/2/2010	Derrick Bird	12	11	Flight
Hialeah, Florida	6/6/2010	Gerardo Regalado	4	3	Flight
Manchester, Connecticut	8/3/2010	Omar Thornton	8	2	Fight
Buffalo, New York	8/14/2010	Riccardo McCray	4	4	Flight
Bratislava, Slovakia	8/30/2010	Lubomir Harman	7	15	Flight
Tucson, Arizona	1/8/2011	Jared Loughner	6	13	Fight
Rio de Janerio, Brazil	4/7/2011	Wellington Oliveria	12	12	Flight
Alphen aan den Rijn, Netherlands	4/9/2011	Tristan van der Vlis	6	17	Flight
Gwanghwa Island, South Korea	7/4/2011	Kim Min-chan	4	1	Flight
Utoya, Norway	7/22/2011	Anders Breivik	69	33	Flight
Carson City, Nevada	9/6/2011	Eduardo Sencion	4	7	Flight
Seal Beach, California	10/12/2011	Scott Dekraai	8	1	Flight
Liege, Belgium	12/13/2011	Nordine Amarni	6	125	Flight
Oakland, California	4/2/2012	One L Goh	7	3	Flight
Seattle, Washington	5/30/2012	Ian Stawicki	5	1	Fight
Aurora, Colorado	7/20/2012	James Holmes	12	58	Flight
Oak Creek, Wisconsin	8/5/2012	Wade Page	6	4	Fight
Minneapolis, Minnesota	9/27/2012	Andrew Engeldinger	5	3	Fight
Newtown, Connecticut	12/14/2012	Adam Lanza	26	2	Fight

APPENDIX B

Potential Mass Shootings but Excluded in Study

Location(s)	Date	Shooter(s)	Reason for Elimination
Saipan, Northern Mariana Islands	11/20/2009	Li Zhong Ren	Conflicting number of injured
Mogadishu, Somalia	8/24/2010	Terrorist Group	Conflicting number of fatalities