

Mass Shootings in the 21st Century: An Examination through the Lens of the Interpersonal Psychological Theory of Suicide

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ABSTRACT

Suicide-related thoughts and behaviors (SRTBs) have become identified as common antecedent experiences of mass shooters prior to and during their shootings. To better support and inform efforts of such upstream prevention and intervention efforts of mass violence, this study aimed to provide an exploratory descriptive perspective of the interpersonal experiences of mass shooters who survived and those who died on the scene (i.e., died by self-inflicted suicide, or died by police intervention) using the interpersonal psychological theory of suicide (IPTS) as a theoretical framework. Through an open-source data collection method, researchers gathered data related to the interpersonal constructs of thwarted belongingness, perceived burdensomeness, and a capability for suicide, for $N = 112$ mass shooters that perpetrated their crime in the 21st century. Interpersonal constructs were observed as similar across both on-scene outcomes. The interpersonal constructs of thwarted belongingness and a capability for suicide were evidenced in a majority shooters across outcomes. These results offer initial exploratory evidence that most mass shootings may, at their core, be influenced to some extent by SRTBs as described by the IPTS. By addressing mass shootings through such a point-of-view, prevention and intervention efforts may benefit from alignment with those proven efficacious for SRTBs.

KEYWORDS

mass shootings, suicide, interpersonal risk, thwarted belongingness, perceived burdensomeness

Acts of firearm violence pose serious threats to public safety in the United States (US). The Centers for Disease Control and Prevention (CDC) reported over 220,000 firearm-related deaths on American soil from 2018 to 2022 (CDC, 2023). Of these deaths, 61% have been linked to deaths by suicide and 36% were the result of homicide (CDC, 2023). Amongst deaths that were a result of homicide in the US, less than 1% were a consequence of a mass shooting (Peterson & Densley, 2023). While statistically rare, the effects of firearm violence on victims, families, communities, and society should not be understated (Lowe & Galea, 2017).

According to the Congressional Research Service, and, as followed by this study, mass shootings result in four or more deaths by firearm (not including the shooter), a death in a public location or locations in close geographical proximity (e.g., a school, workplace, restaurant, shopping center), and must not be related to other criminal activity or commonplace circumstance (e.g. gang activity, armed robbery, family violence; Krouse & Richardson, 2015; see also Peterson & Densley, 2019; 2023). It should be noted that, although this study followed the Congressional Research Service's (Krouse & Richardson, 2015) definition of mass shootings, there is no universally agreed upon definition for this phenomenon, which can result in discrepancies of qualifications and frequency measurements for such shootings (Booty et al., 2019).

These types of shootings have plagued the US for decades and are becoming both more frequent and deadlier (Peterson & Densley, 2023). According to The Violence Project Database of Mass Shootings (Violence Project; Peterson & Densley, 2023), more than half of the deadliest 35 shootings over the past 100 years have occurred since 2010, with the single-most deadly taking place in 2017 at the Route 91 Harvest Music Festival in Las Vegas, Nevada.¹ As seen in many mass shootings, the Las Vegas shooting resulted in the death of the perpetrator at the scene of the shooting (Shultz et al., 2017). Since 1966, 57% of mass shooters have died on the scene of their killing (Peterson & Densley, 2023). Additionally, 72% of mass shooters had expressed some degree of suicidal ideation prior to or during the shooting, and 38% died by suicide during the shooting (Peterson & Densley, 2023; Shahid & Duzor, 2021). Shooters who died on the scene of the crime, but not by suicide, perished at the hands of intervention by an external force (e.g., law enforcement). Within this category of shooter mortality, the phenomenon known as suicide-by-police may act as a driving factor (Lankford, 2015), with up to 10% of mass shooters creating a suicide-by-police situation (Lankford, 2015).

Suicide, in a general sense, is a highly complex, multi-faceted human phenomenon (de Beurs et al., 2021; Orsolini et al., 2020) that has yet to be fully understood. Many current theorists believe that the phenomenon is a result of an interplay of psychological, biological, and social risk/protective factors (de Beurs et al., 2021; Orsolini et al., 2020). Among these theories is Thomas Joiner's (2005) interpersonal psychological theory of suicide (IPTS). According to Joiner's (2005) IPTS, the desire to die by suicide (i.e., suicidal ideation) is a result of the simultaneous interpersonal experience of thwarted belongingness (TB) and perceived burdensomeness (PB). This theory further posits that, to transition from suicidal ideation to suicidal behavior, the individual must possess a capability to enact lethal self-injury (Joiner, 2005). This transition of ideation to behavior has led to the IPTS being considered "the first in line of 'next generation' theories of suicide" due to its consideration of suicidal ideation and suicidal behavior as two distinct processes (Klonsky et al., 2018, p. 38). The IPTS differs from other theories of suicide who treat ideation and behavior as two distinct processes (e.g., integrated motivational-volitional theory, three-step theory; Klonsky & May, 2015; O'connor, 2011) however, as it proposes that one must overcome the innate fear of death to transition from ideation to behavior (Klonsky et al., 2018).

It should be noted that, at the time of this study, modifications to the IPTS have been proposed. Most notably, Van Orden and colleagues (2010) theorize that suicidal ideation is the result of an intractable sense of hopelessness about one's interpersonal states of TB and PB (see also Joiner et al., 2021). Research has shown both hopelessness and suicidal ideation to be higher among individuals labeled with a mental illness (e.g., major depressive disorder, psychosis, anxiety disorders; Oexle et al., 2017). Such individuals subsequently have shown to be at higher risk for suicide-related behaviors (Brådvik, 2018). Since the present study is one of the first to examine suicidality among mass shooters, the researchers decided to focus on the original core components of the IPTS (i.e., hopelessness was not included in the current study; Joiner, 2005). However, in light of research since the inception of the theory, the researchers also recognize both the interpersonal and intrapersonal factors that contribute to suicidal ideation and suicide attempts. Specifically, thwarted belonging is more interpersonal in nature compared to perceived burdensomeness which reflects intrapersonal perceptions and concerns. Additionally, compared to its original formulation as a purely acquired state, the capability for suicide may also stem from dispositional variables (Bayliss et al., 2022).

As described by Baumeister and Leary (1995), the need to belong is a fundamental human motivation that drives individuals to maintain relationships with peers. If this need to belong is threatened, and one does not feel they belong to a community, even if they try to connect, there may be an increased risk of psychological and physical consequences, including suicidal ideation (Joiner, 2005). Additionally, research indicates that feelings of TB can be exacerbated by interpersonal risk factors such as bullying victimization (Gunn & Goldstein, 2017), long-term rejection (e.g., Hill et al., 2017), short-term rejection (e.g., romantic dissolution; Love et al., 2018), and other negative life events (see Glenn et al., 2022). Similarly, if an individual feels they

are a burden to others, it may lead to thoughts that peers, family, or society would be better off without them (Joiner, 2005; see also Van Orden et al., 2006).

The capability for suicide is due, in part, to the habituation or desensitization to the fear of death which can occur through both physical and psychological means (Joiner, 2005). Additionally, an individual must have access to means (e.g. firearm, knife, excessive amounts of medication) for a lethal or near-lethal suicide attempt to occur (Joiner, 2005).² Physical desensitization is mostly due to an increase in physical pain tolerance, whereas psychological desensitization is said to be a result of one's lowered fear of death and pain (Joiner, 2005). The capability to enact lethal self-injury through physical means can be heightened through various ways such as nonsuicidal self-injury (Joiner, 2005; Whitlock et al., 2013), prior injury (e.g. broken bone, concussion; Fralick et al., 2019), being a victim of assault (Sutherland et al., 2002; Tomasula et al., 2012), and even donning tattoos and piercings (Blay et al., 2023; Solís-Bravo et al., 2019). Additionally, individuals may psychologically increase the capability for suicide through means such as mentally rehearsing or preparing for their suicide attempt (George et al., 2016), viewing social media content/videos of suicide or lethal injury (Kocakaya & Arslan, 2023), or working in professions that involve violence and/or mortality (e.g. military, emergency medicine doctors; Bartram & Baldwin, 2010; Joiner, 2005).

The elements of TB, PB, and the capability for suicide map onto variables found in previous research examining the behaviors and experiences of individuals criminally involved in school and mass shootings. Leary et al. (2003) found five antecedent conditions common to many K-12 school shootings: a long-term history of rejection, an acute rejection experience, a fascination (i.e., a preoccupation of out proportion compared to the general population) with firearms, a fascination with death/violence, and a history of psychological problems. More recently, Kowalski et al. (2021) examined the degree to which these same variables were related to K-12 as well as mass shootings that had occurred since the Leary et al. (2003) study. Among K-12 shooters included in their study, 63% had experienced acute and/or long-term rejection. Among mass shooters, 20% had experienced a long-term history of rejection, with 53% reporting an acute rejection experience (see Kowalski et al., 2021). According to Chinazzo et al. (2023), such experiences of rejection can lead to negative outcomes such as suicidal ideation or suicide attempts. In addition, 35% of K-12 shooters and 61% of mass shooters demonstrated a fascination with violence, often prior mass shootings (e.g., researching and idealizing the Columbine High School shooting). Almost a fifth (17.5%) displayed a fascination with firearms, often acquiring them from family members (see Kowalski et al., 2021). Immersing themselves in prior shootings or other forms of violence and frequently having ready access to firearms feeds into a capability for suicide.

Purpose of the Research

Results, such as these from Kowalski and colleagues (2021), indicate that the interpersonal risk factors that drive suicidal ideation and suicide attempts, may also play a role in driving acts of mass murder. As SRTBs have become identified as common antecedent experiences of mass shooters prior to and during their shootings (see Joiner, 2024), researchers have called for further research into the relationship of the two distinct yet possibly related phenomena (Hagan et al., 2015; Lankford, 2015). With those perpetrating a mass shooting and simultaneously experiencing SRTBs only composing a statistically rare proportion of all individuals who experience SRTBs, it's important to attempt to understand what may lead one to act on lethal urges toward others, and possibly themselves, rather than only themselves. This said, straying away from reactive measures (e.g., metal detectors in schools, excessive law enforcement presence), researchers believe that interventions directed towards upstream targets (i.e., SRTBs) may be beneficial in the prevention of mass violence (Hagan et al., 2015; Langman, 2017).

To better support and inform efforts of such upstream prevention and intervention efforts of mass violence, this study presents an exploratory descriptive perspective of the interpersonal experiences of mass shooters

who survived and those who died on the scene (i.e., died by self-inflicted suicide, or died by police intervention) using Joiner's (2005) IPTS as a theoretical framework. The IPTS was chosen as the framework for this study for several reasons. First, and most importantly, the IPTS is a leading theory for why individuals die by suicide, and due to the large percentage of mass shooters experiencing suicidal thought and behaviors, prior to or during the shooting (Lankford et al., 2021), the researchers felt it was important to utilize a well-studied and supported theory of suicide for this study's framework. Secondly, it considers both interpersonal and intrapersonal factors as risk factors for suicidal ideation and behavior, a common finding of antecedent thoughts and behavior also seen in mass shooters (Lankford et al., 2021). Finally, a major component of the IPTS is the capability for suicide, which the authors believed may also be a factor in mass shooters' ability to overcome the innate fear of ending one's life (i.e., mass shooters may also experience aversive, traumatic, or painful events that lead to the capability of not only suicide, but lethal behaviors directed at others). Toward this end, the researchers used an open-source data collection method with hopes of better understanding antecedent behaviors and interpersonal experiences of mass shooters.

To paint a clearer picture of the interpersonal risk factors that may have impacted SRTBs, as well as the decision of the individuals to perpetrate the mass shooting, two research questions are proposed:

RQ₁: Are there similarities in antecedent IPTS components (i.e., TB, PB, capability for suicide) experienced by mass shooters who live versus die at the scene of their crime?

RQ₂: Do mass shooters have experiences of perceived burdensomeness, thwarted belongingness, and a capability to enact lethal self-injury prior to their shooting?

Method

Study Population

Focusing on the 21st century, a total of 112 individuals who perpetrated a mass shooting between January 9, 2001, and May 6, 2023, were included in the study.³ Mass shooters were identified by referencing The Violence Project Database of Mass Shootings, Version 7.0 (Peterson & Densley, 2023), which stores data of mass shooters (in accordance with the Congressional Research Service's (Krouse & Richardson, 2015) definition of a mass shooter) from 1966 to present. Of the examined mass shooters, 95% ($n = 106$) were assigned male at birth. Racial and ethnic makeups of the shooters included 49% ($n = 55$) White, 20% ($n = 22$) Black, 9% ($n = 10$) Latinx, 8% ($n = 9$) Asian, 8% ($n = 9$) Middle Eastern, and 6% ($n = 7$) other. The average age of mass shooters was 34 years old with 47% ($n = 53$) of shooters falling between the ages of 15- and 30-years-olds, 38% ($n = 43$) between 31- and 50-years-old, and 14% ($n = 16$) 51-years-old or older. It should be noted that following in line with recommendations from organizations such as No Notoriety (n.d.) and ALERRT (n.d.), no shooters will be named in this manuscript or its data. A full list of shootings included in this study can be found in the appendix.

Measures

Demographics

Demographic information for mass shooters was informed via The Violence Project Database of Mass Shootings, Version 7.0 (Peterson & Densley, 2023). Demographic variables included location and date of the shooting, race/ethnicity, age, and sex.

Thwarted Belongingness (TB)

Experiences of TB were measured through evidence of the presence of three interpersonal risk factors which may have affected one's sense of belonging: a history of bullying victimization (i.e., bullied), an acute short-term rejection experience, and/or a history of long-term rejection. Risk factors were coded as present if

evidence for their presence were found within the sources. Risk factors were not coded for their absence, as it is not possible to truly confirm the total absence of such experiences. Individuals experiencing at least one TB risk factor were coded as showing evidence for some degree of TB prior to their shooting. Bullying victimization data was gathered from The Violence Project Database of Mass Shootings, Version 7.0 (Peterson & Densley, 2023) and included evidence of the shooter being a victim of bullying to at least some extent in any setting (e.g., school, workplace). Detailed descriptions of all other risk factors for this construct can be found in Table 1.

Perceived Burdensomeness (PB)

Experiences of PB were measured through evidence of the presence of the shooter reporting feelings of being a burden to society and/or friends/family. Risk factors were coded as present if evidence for their presence were found within the sources. Risk factors were not coded for their absence, as it is not possible to truly confirm the total absence of such experiences. Individuals experiencing at least one PB risk factor were coded as showing evidence for some degree of PB prior to their shooting. Detailed descriptions of both risk factors for this construct can be found in Table 1.

Capability for Suicide

Experiences potentially increasing one's capability for suicide were measured through evidence of the presence of two physical and six psychological risk factors that may have desensitized one to the act of lethal self-injury. Psychological risk factors included: passive (i.e., witnessing death as a bystander) and/or active (i.e., witnessing death as a perpetrator of homicide) exposure to death, fascination with death and/or violence, fascination with guns and weapons, and traumatic events that did not result in physical pain (e.g., witnessing abuse). Physical risk factors included: exposure to physical pain (chronic or acute), traumatic event(s) that resulted in physical pain, and body enhancements (e.g., piercings or tattoos; may also be referred to as "body modifications"). It should be noted that these are solely risk factors for SRTBs and do not necessarily indicate that an individual will perpetrate a mass shooting if they, for example, don tattoos. However, the exposure to pain, such as tattoos and piercings, may act as a form of non-suicidal self-injury and have been positively linked with SRTBs (Blay et al., 2023). Risk factors were coded as present if evidence for their presence were found within the sources. Risk factors were not coded for their absence, as it is not possible to truly confirm the total absence of such experiences. Individuals experiencing at least one capability for suicide risk factor were coded as showing evidence for some degree of capability for suicide prior to their shooting. Detailed descriptions of each risk factor for this construct can be found in Table 1.

Procedures

Theoretical Framework

To examine antecedent risk factors of mass shooters, Joiner's IPTS (2005) was selected as a theoretical framework utilizing TB, PB, and capability as constructs to guide the coding process. Due to the complex nature of such thoughts and behaviors (see de Beurs et al., 2021), and past research of mass violence and suicide (see Kowalski et al., 2021; Peterson & Densley, 2023), it was decided that these risk factors and constructs may give the greatest insight into precedent influences of the two phenomena.

Sources

Sources for coding the shootings consisted of primary sources (e.g., manifestos, journals, personal blogs), secondary sources (e.g., local news articles, police reports, court rulings), and community sources (e.g., Federal Bureau of Investigation (FBI) reports). To reduce chances of source selection bias, each of four raters were randomly assigned 28 shootings in which the rater selected five sources for each shooting. This procedure also falls in line with Booty et al.'s (2019) recommendation of corroborating evidence of each mass shooting with multiple sources to help mitigate concerns with the use of multiple definitions of the

Table 1
Descriptions of the Interpersonal Constructs and Risk Factors Identified In the Study

Construct	Risk Factor	Requirements
Perceived Burdensomeness (PB)	PB towards society	Belief that: (a) society would be better off without the individual; (b) society wished to get rid of the individual; (c) their death would be a relief to society; and/or (d) their presence in society makes “things worse” for others.
	PB towards friends and/or family	Belief that: (a) family/friends would be better off without the individual; (b) family/friends wished to get rid of the individual; (c) their death would be a relief to family/friends; (d) family/friends would be happier without the individual; and/or (e) their presence in society makes “things worse” for others.
Thwarted Belongingness (TB)	Long-term rejection	Identified as having an interpersonal experience of repeated rejection from an individual or group. Examples may include: (a) isolation/ostracism from family and/or peers; (b) parental abandonment or long-term mistreatment by parent/guardian; (c) involuntary isolation from family, peers, and/or greater community; and/or (d) repeated rejection from (i) a singular desired romantic partner, (ii) all or most desired romantic partners, and/or (iii) a group or organization.
	Short-term rejection	Identified as having an interpersonal experience of rejection at a single timepoint. Examples may include: (a) a romantic breakup/divorce; (b) termination or suspension of employment; (c) discharge from military service; (d) expulsion or suspension from place of education; (e) eviction from place of living; (f) romantically rejected following advances towards an individual; (g) friendship ending; (h) feelings of rejection following a legal proceeding; (i) betrayal by family, friends, or romantic partner (e.g., cheating); (j) feelings of rejection towards professor/teacher following poor academic performance (e.g., receiving a failing grade); rejection of a license or permit (e.g., firearms permit); and/or (k) failing to be accepted by organization, academic institution, employer, etc. (e.g., an admissions rejection, failure to receive a job offer)
	Bullied*	See Peterson and Densely (2023)
Capability for Suicide	Passive exposure to death	Identified as having witnessed or experienced the death of an individual with no involvement of the death. Examples may include the shooter being exposed to: (a) the death of a family member or friend due to natural causes, accident (e.g., motor vehicle accident), suicide, homicide, etc.; (b) witnessing death, such as, murder, suicide, accidental death, terrorist attack, deaths because of war, etc.; (c) death of a beloved pet.

Table 1 (continued)

	Active exposure to death	Identified as being excessively or abnormally interested in the concept of death (towards oneself or others). Examples may include having a history of fantasizing and/or idolizing: (a) infamous figures related to death, such as: (i) previous mass/school shootings/shooters, (ii) genocide and/or perpetrators of genocide (e.g., Nazi Germany), (iii) terrorist organizations (e.g., ISIS), and/or (iv) serial killers; and/or (b) suicide (e.g., watching videos of suicide).
	Fascination with firearms/weapons*	See Peterson and Densely (2023)
	Traumas (childhood and/or adult)*	See Peterson and Densely (2023)
	Exposure to physically painful event	Identified as having a painful experience beyond that of everyday experiences. Examples may include: (a) non-suicidal self-injury; (b) physical injury (e.g., broken bone, concussion); (c) chronic pain, disability, or illness; (d) starvation; (e) victim of abuse and/or molestation; (f) victim of assault; and/or (g) a painful medical procedure (e.g., surgery). This pain may be chronic or isolated, as well as self-inflicted, accidental, or caused by external persons.
	Body enhancements	Identified as having painful experiences that include enhancements to one's body such as tattoos, piercings, and/or cosmetic procedures.
	Played violent video games*	See Peterson and Densely (2023)

Note. Risk factors denoted with an asterisk (*) indicates that the data for the variable was identified by referencing Peterson and Densley (2023) and therefore coded according to their requirements.

phenomenon. Additionally, the use of multiple sources, and a variety of types of sources, assisted in corroborating evidence found for individual variables. A total of 559 sources were used in the coding process.⁴ The sources, when possible, for each shooting were bipartisan to reduce news source bias. To increase reliability across raters, only the five selected sources were utilized during the rating process for any given shooting.

Risk Factors

To quantify the evidence found in support of the presence TB, PB, and/or a capability for suicide for shooters, a set of risk factors were developed for each interpersonal construct that represented the IPTS (Joiner, 2005; see Table 1). For example, if a mass shooter had experienced bullying victimization, this would constitute evidence of the presence of some degree of TB for that shooter. As there is no known empirical evidence supporting the use of IPTS risk factors for the quantification of individual risk level (e.g., experiencing three TB risk factors constituting a different level of suicide risk compared to experiencing two TB risk factors), this study considered an individual experiencing any number of IPTS risk factors as experiencing that specific overarching construct to some degree. This scheme was followed for PB and capability for suicide risk factors as well. All risk factors considered for each construct, along with coding definitions, can be found in Table 1. Additionally, all risk factors have shown empirical support as being related to the construct of interest.

Coding

Preceding the coding process, shooters were randomly divided and assigned to four raters. Using an open-source data collection method, mass shootings were coded by four raters for evidence suggesting the presence of PB, TB, and capability for suicide for $n = 112$ mass shooters. All shooters were coded by two raters such that each unique pair of raters shared an equal number of shooters ($n = 18$ or $n = 19$ each among 6 pairs). To assist with uniformity and accuracy during the coding process, a codebook was developed and adhered to by each rater. Utilizing previous literature (e.g., Hill et al., 2017; Joiner, 2005; Solis-Bravo et al., 2019; Tomasula et al., 2012), the codebook consisted of risk factors developed for each of the IPTS' three constructs (i.e., TB, PB, and capability for suicide). Risk factors were coded present if evidence of its presence was determined within the sources by raters. If the risk factor of interest was not identified within the sources, that variable was considered lacking evidence for by the raters. When a risk factor was lacking evidence for its presence, this was only indicative of it not being cited within the sources and did not deem it confirmatory of its absence.

Outcome

Throughout analyses, whether a shooter dies at the scene of the shooting is considered as the outcome or response variable. These codes are drawn from the "On Scene Outcome" variable from The Violence Project Database of Mass Shootings, Version 7.0 (Peterson & Densley, 2023), considering both "Killed Self" and "Killed on Scene" collectively as "Died on Scene" values.

Interrater Agreeability and Discrepancy Resolution

Using Cohen's Kappa (Cohen, 1960), interrater agreeability across all variables among the four raters was calculated to assess overall variability across the raters' interpretation of (1) the codebook criteria and (2) the selected open sources. Most variables fell at, or above, $\kappa = .75$, indicating relatively strong agreement across raters. One variable, fascination with death, had a weaker level of agreement ($\kappa = .54$) due to raters' individual perceptions of unique characteristics associated with some shooters (e.g., shooters who had become radicalized by terrorist organizations were coded by some raters as having a fascination with death, while other raters did not code this as a fascination). Any variable with a disagreement between raters was critically examined by all four raters. Following examination, a discussion was held for each discrepancy and, with reference to the codebook, a decision was made by the majority to mark the variable as either possessing

evidence indicating its presence within the source or not possessing sufficient evidence to support its presence in the sources.

Analytical Strategy

Risk Factors and Shooting Outcomes

Research Question 1 asks whether there are similarities in antecedent IPTS components experienced by mass shooters who survive and die at the scene of their crime. Toward investigating this question, the proportions of shooters evidenced by indicating experiencing the IPTS components to some degree were assessed among shooters that died at the scene and survived the shooting. Additionally, similar analytic strategies were utilized to investigate similarities between the two groups for each individual IPTS risk factor. Plots developed in analysis separate Self-Perpetrated Suicide and Died by Police in the Died on Scene group, but proportions are reported for the Survived group as a whole.

Finally, the overlap between the presence of IPTS components, interpersonal risk factors, and outcome variables, are assessed. Correlations were measured using the Jaccard similarity coefficient as all variables are dichotomous (e.g., there was evidence that indicated the presence of a variable or there was no evidence that indicated the presence of a variable).

Risk Factors in Shootings

Following these analyses, Research Question 2 asks whether mass shooters have experiences of PB, TB, and a capability to enact lethal self-injury prior to their shooting. The proportions of each IPTS component and individual risk factors evidenced as present within the open sources for mass shooters were calculated among the full set of shootings in the database.

Results

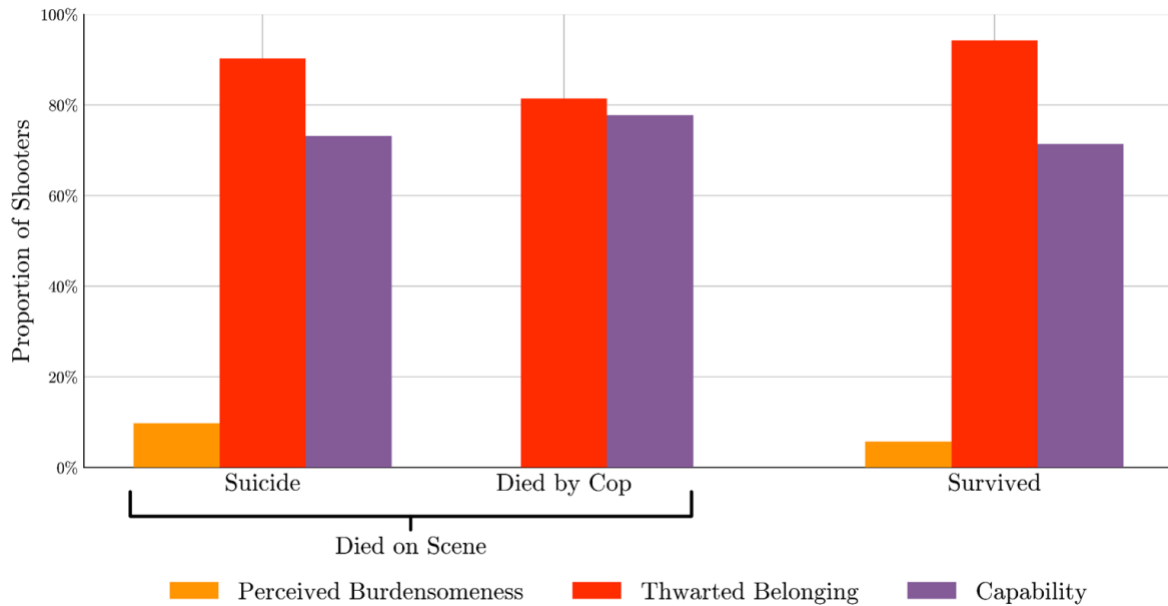
Risk Factors Differences in Shooting Outcomes

To investigate Research Question 1, whether there are similarities in the prevalence of IPTS components between shooters that died on the scene and those that survived, Figure 1 shows the proportion of shooters for which evidence of each component was identified. Evidence of TB was indicated as the most commonly mentioned antecedent experience of mass shooters within the IPTS constructs for both outcomes, died on the scene (85.5%) and survived the shooting (94.3%). Evidence for a capability for suicide was indicated as the second most common IPTS antecedent experience of mass shooters for both those that died on scene (75.4%) and survived (71.4%). Finally, PB was the IPTS construct in which the least amount of evidence was found across both outcomes, died on the scene (5.8%) and survived (5.7%).

Similar to Figure 1, Figure 2 shows the proportion of shooters for which evidence of each interpersonal risk factor was identified between those that died on the scene and those that did not. As in Figure 1, proportions of the PB risk factors between the two groups were similar: 1.5% and 5.8% among those that died on the scene and 2.9% and 5.7% among those that did not for PB (Society) and PB (Family/Friends) respectively. Regarding TB, evidence of Short-Term Rejection and Long-Term rejection were the most commonly found antecedent experiences for both shooting outcomes, died on scene (78.3% and 44.9%, respectively) and survived (74.3% and 62.9%, respectively). Finally, for the capability for suicide risk factors, the group that died on the scene presented a higher proportion of evidence of Active Exposure to Death (5.8% vs. 2.9%), Passive Exposure to Death (20.3% vs. 14.3%), Body Enhancements (10.1% vs. 0%), Fascination with Death (30.4% vs. 22.9%), and Adult Trauma (5.8% vs. 2.9%) than among those that did not. Childhood Trauma is the sole capability for suicide factor that was evidenced as more prevalent among those that survived the shooting (37.1% vs. 31.9%).

Figure 1

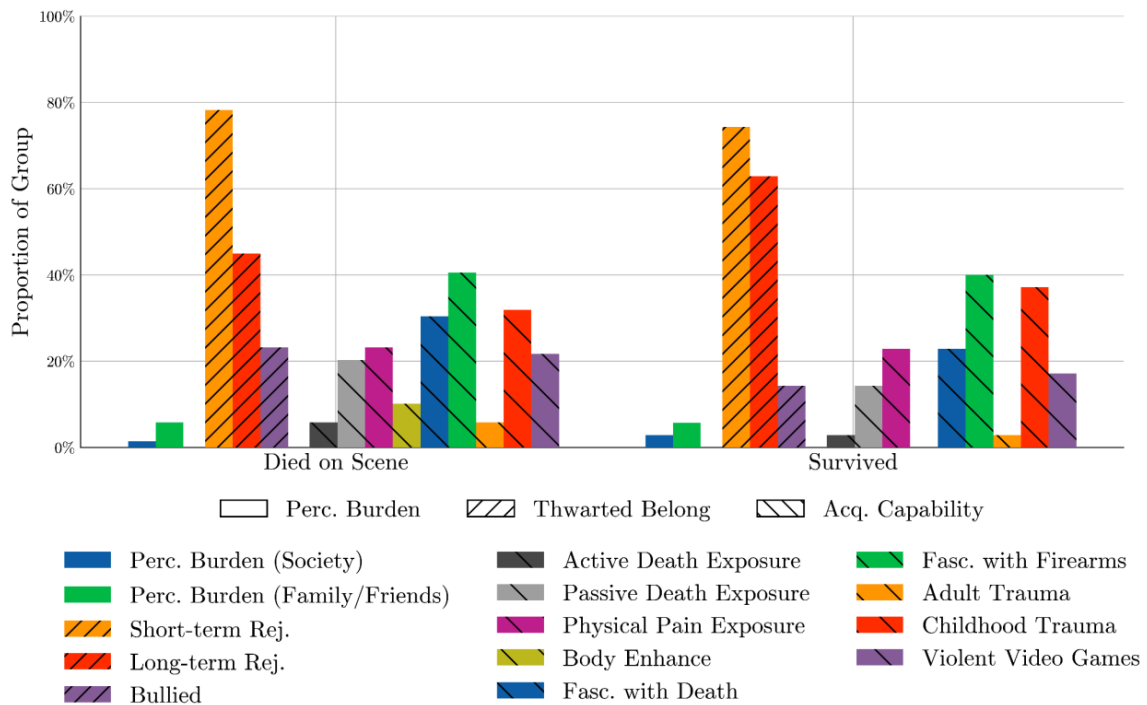
Proportion of Shooters Experiencing IPTS Constructs by Shooting Outcome



Note. Proportion of shooters for which evidence of the IPTS components are identified between shooters that died on the scene (Self-Perpetrated Suicide and Died by Police) and those that survived. IPTS = interpersonal psychological theory of suicide; Capability = Capability for Suicide.

Figure 2

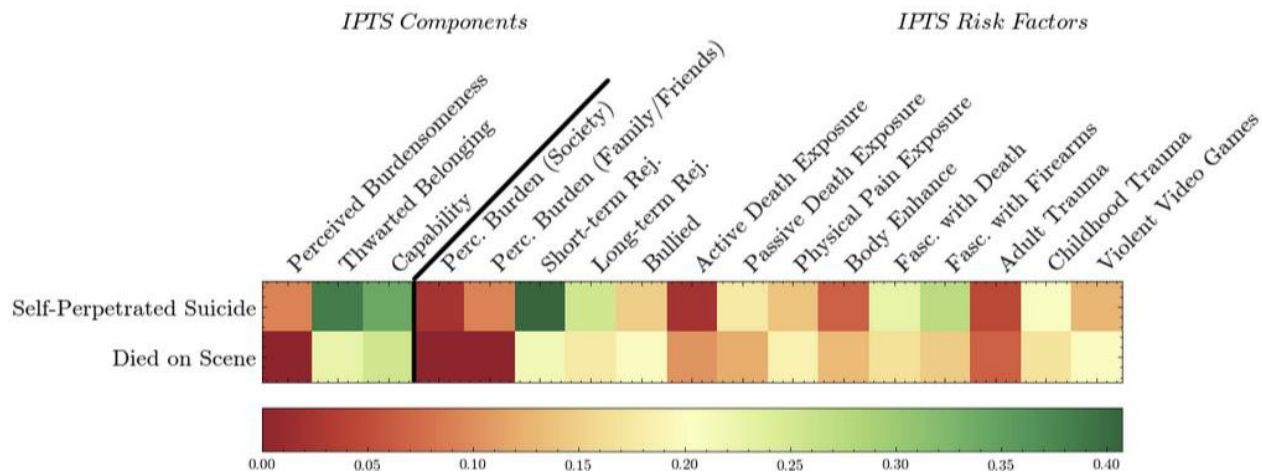
Proportion of Shooters Experiencing IPTS Risk Factors by Shooting Outcome



Note. Proportion for which evidence of the risk factors are identified among shooters that died by self-perpetrated suicide, those that died by police, and those that survived. IPTS = interpersonal psychological theory of suicide; Perc. = perceived; Rej. = rejection; Fasc. = fascination; Acq. Capability = Acquired capability for suicide.

Finally, Figure 3 shows the Jaccard Similarity Indices between the outcome variables and both the IPTS components and risk factors. Considering whether the shooter died by self-perpetrated suicide or died on the scene, while evidence of TB ($J = 0.38$ and $J = 0.22$, respectively) and a capability for suicide ($J = 0.34$ and $J = 0.25$) sufficiently overlapped, PB was greatly different ($J = 0.09$ and $J = 0.00$). Among TB factors, Short-Term Rejection was most similar ($J = 0.40$ and $J = 0.21$) followed by Long-Term Rejection ($J = 0.25$ and $J = 0.17$). Finally, each capability for suicide factor alone was dissimilar with whether the shooter died at the scene or not, with Fascination with Firearms ($J = 0.27$ and $J = 0.14$) and Fascination with Death ($J = 0.22$ and $J = 0.16$) being the least dissimilar.

Figure 3
Heatmap of Jaccard Similarity Indices by Shooting Outcome



Note. Heatmap of Jaccard Similarity Indices between shooting outcomes (Self-Perpetrated Suicide, Died on Scene) and both the IPTS components and risk factors. IPTS = interpersonal psychological theory of suicide; Perc. = perceived; Rej. = rejection; Fasc. = fascination; Enhance = enhancement. Darker green squares indicate greater similarity; darker red squares indicate minimal similarity.

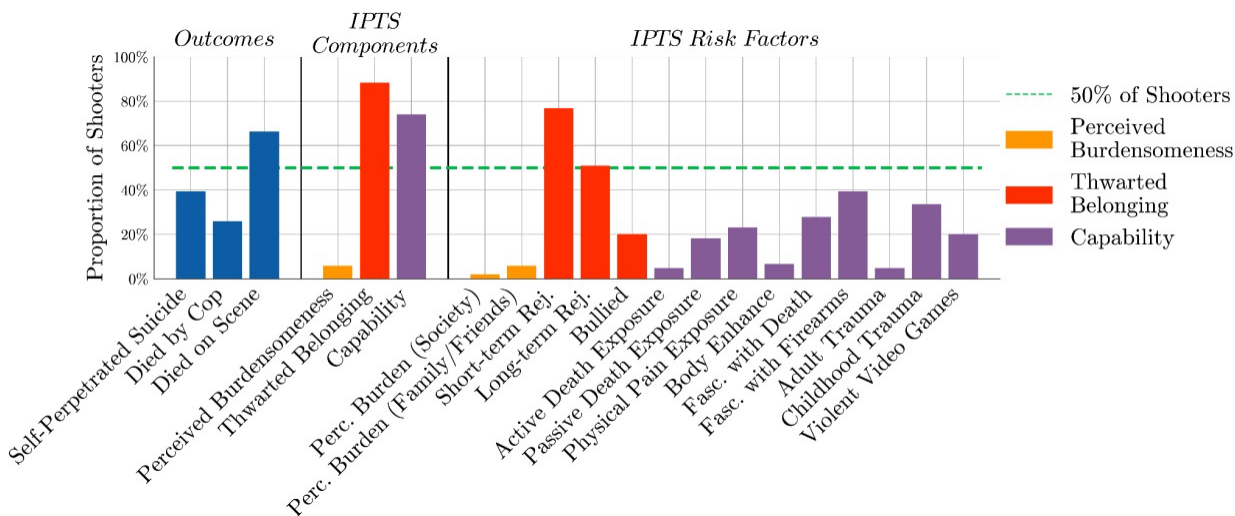
IPTS Risk Factors in Shooters

Toward answering Research Question 2, whether mass shooters have experiences of PB, TB, and a capability for suicide prior to their shooting, Figure 4 shows the overall prevalence of shooter outcomes, the IPTS components, and risk factors among all shooters. First, while a minority of shooters died by taking their own lives (39.4%), a majority died on the scene (66.4%). This discrepancy is accounted for by those who died by police intervention (25.0%). Among the IPTS components, PB (5.8%) was rarely evident among shooters, while evidence of TB (88.5%) and a capability for suicide (74.0%) was found in a majority of shooters. Additionally, most single risk factors were present in less than 50% of shooters, with the exception of the proportion of Long-Term Rejection (51.0%) and Short-Term Rejection (76.9%).

Discussion

The current study intended to provide an exploratory descriptive analysis of antecedent interpersonal experiences and risk factors among mass shooters who died on the scene, and those who survived their shooting. Results aimed to provide possible insight into potential upstream targets (i.e., interpersonal processes and behaviors that occur before the act of violence) for the prevention of mass shootings. While

Figure 4
Proportion of All Shooters Experiencing IPTS Risk Factors



Note. Heatmap of Jaccard Similarity Indices between shooting outcomes (Self-Perpetrated Suicide, Died on Scene) and both the IPTS components and risk factors. IPTS = interpersonal psychological theory of suicide; Perc. = perceived; Rej. = rejection; Fasc. = fascination; Enhance = enhancement. Darker green squares indicate greater similarity; darker red squares indicate minimal similarity.

the current study only focuses on a subset of mass shootings (i.e., only shootings in the 21st century), the researchers hope that this work will assist in developing the groundwork for future studies assessing the potential impact of SRTBs on the perpetration of mass shootings.

Addressing Research Question 1, across both groups of shooters, those who died on the scene and those who survived, TB was present in at least 80% of each group. PB, on the other hand, was present in just over 5% of shooters. The failure to find much evidence of PB should not be taken as an indication that mass shooters do not feel that they are a burden to society or to family and friends. It may simply be an artifact of the modality by which information for the current study was collected. Specifically, unless there was a direct quote in a manifesto left by a shooter, no evidence of PB was observed. Because it is the shooters’ self-perception that they are a burden (and not necessarily others’), it may be more likely to not see this variable as much as TB which can be observed by outsiders (e.g. if someone’s a loner, this will be obvious to peers/family). This is consistent with prior research examining the presence of PB and TB in suicide notes. Gunn et al. (2012) found that only 10.3% of suicide notes showed indications of PB, with 30.7% indicating TB. Lester and Gunn (2012) later examined a larger sample and found an even larger difference in the proportions, 15.5% and 42.5% respectively.

The prevalence of TB among both shooters who died at the scene and those who did not highlights the importance of people’s need to belong (Baumeister & Leary, 1995). People who feel rejected have low relational value (Kowalski & Leary, 2024; Leary, 2001). As noted by Kowalski and Leary (2024, p. 241), “a good deal of aggression and violence is perpetrated by people who feel that other people inadequately value having relationships with them. In such cases, the perpetrator feels rejected, is invariably hurt and angry, and behaves aggressively.”

The higher proportion of TB evidence among shooters who survived compared to those who died on the scene was surprising. This may reflect the shooter’s motivation. Those who survived and felt that others had rejected

them may have been motivated to hurt and kill as many others as they could, excluding the self. Their resentment may be other- rather than self-directed. Shooters who died on the scene, alternatively, may have had more self-hatred that better allowed them to overcome the motive for self-preservation (Lankford, 2015).

An examination of IPTS risk factors demonstrated a higher proportion of short-term rejection in shooters who died on the scene compared to those who didn't. However, a higher proportion of long-term rejection was observed in shooters who survived than shooters who died on the scene. People who have a history of rejection may desire to enact violence to cause pain to those who have hurt them out of spite, as opposed to self-inflicted harm (Leary, 2015). It is also possible that people who have a long-term history with rejection may have developed a sense of resilience that helps maintain the desire for self-preservation in the face of adversity. Additionally, Joiner (2014) highlights the premeditation that accompanies murder-suicides. Thus, what may seem like the proverbial straw that broke the camel's back may instead create a situation where the perversion of an interpersonal virtue can occur (Joiner, 2014).

The proportion of shooters for which evidence for a capability for suicide was present was similar across both groups, those who died at the scene and those who did not. However, individual risk factors for a capability for suicide did show some differences. Specifically, shooters who died at the scene had higher proportions of active and passive exposure to death, adult trauma, and body enhancements. This falls in line with previous research, such as Pirelli and Jeglic's (2009), which found those who had been exposed to a death by suicide or acute disease were more likely to have reported a suicide attempt compared to those who had not experienced a similar death exposure. In particular, the active and passive exposure to death may have made death seem less foreboding and, perhaps, a welcome respite from the pain and trauma of life.

The Jaccard Similarity Indices allowed a direct comparison between shooters who died by suicide versus those who died on the scene either through self-inflicted suicide, suicide by police, or by being shot by another individual other than a police. Similarity indices for TB and a capability for suicide were high for the two variables. They were much lower, however, for PB. IPTS risk factors for TB showed strong similarity for short-term rejection followed by long-term rejection.

Regarding Research Question 2, the presence of TB and a capability for suicide in a majority of the shooters indicate that interpersonal constructs evidenced in mass shooters overlap with those of suicidal individuals in accordance with the IPTS. Regardless of the outcome of the shooting, TB was the most represented of the IPTS components, present to some degree in almost 90% of the shooters. While not as prominent, some degree of a capability for suicide was evident in over 75% of shooters, indicating that almost three-fourths of all shooters had experienced physical or psychological events that may have lowered their fear of death, and therefore, enhanced their ability to overcome the instinctual human behavior for self-preservation.

Within the TB construct, short- and long-term rejection constituted the most prominent IPTS risk factors, with some form of short-term rejection present in almost 80% of all mass shooters. This presence of short-term rejection as an antecedent experience in a majority of shooters may indicate a lack of proficiency in individual coping and crisis response skills (i.e., managing emotions and behaviors in events that may evoke heightened arousal). While many individuals are fired from their profession or broken up with by a romantic partner, only a statistically rare few go on to perpetrate a mass shooting. Additionally, with at least 40% of all shooters expressing a fascination with firearms, and all having access to firearms, this may indicate a missed opportunity for intervention, such as means safety. As a crucial piece of suicide safety planning interventions (see Stanley & Brown, 2012), means safety seeks to remove or limit one's access to lethal means (e.g., firearms) before and/or during times of crises. Restricting (e.g., safe storage, universal background checks) and/or removing one's access to lethal means has proven effective for suicide intervention (Jin et al., 2016),

which yields promise for translating such an intervention to individuals deemed at risk of perpetrating a mass shooting.

Limitations and Future Research

As an exploratory descriptive analysis, the results of the current study should be interpreted with caution. First, the sample size is limited due to the rarity of occurrence of mass shootings. Second, as noted, PB was not often evidenced if the shooter did not express it prior to their shooting. It may be important to gain insight into the absence of PB in online sources that detail shooters' antecedent thoughts and behaviors. Additionally, if a shooting was perpetrated as a result of radicalization, it may be difficult to find evidence of TB as these individuals may have swung the pendulum of belonging to an excessive amount rather than thwarted (see Joiner, 2024). Third, beyond manifestos that only a few shooters left behind, it is impossible to discern the true motives and feelings of shooters who died on the scene as truly suicidal. Thus, understanding the true impact of individual risk factors on particular shooters is difficult. Fourth, the study gathered information from open sources such as media reports and the Violence Project Database (Peterson & Densley, 2019). Media report snapshots of information that may be true in the moment until disconfirming information is later revealed in which case a story may or may not be updated. In addition, public records for juveniles are limited, which affects the nature of data accessibility. Other databases for mass shootings exist that differ slightly in the shootings reported along with other characteristics. Depending on the database used, slightly different results may emerge. Finally, this study did not code for the absence of variables, only for the evidenced presence of an interpersonal variable. This method does not allow for definite absences of variables, which may result in missing data not found within the included sources. Future research should continue to allocate efforts to better understanding the impact of suicidal ideation on perpetrating mass shootings. Additionally, future research should consider utilizing a case study research method to counter the small sample size of perpetrators and to possibly allow for a better understanding of varying risk factor experiences that may occur between persons.

Conclusion

Results support previous theory (Joiner, 2024) that components of the IPTS would likely be evidenced in antecedent behaviors and experiences (i.e., before the shooting) of most mass shooters. Though PB was not observed to the extent of TB and capability for suicide throughout the coding process, it is most likely the case that this construct would present greater through self-reports. These results offer initial exploratory evidence that most mass shootings may, at their core, be influenced to some extent by SRTBs as described by the IPTS. By addressing mass shootings through such a point-of-view, prevention and intervention efforts may benefit from alignment with those proven efficacious for SRTBs. Such efforts may include restricting and/or removing access to means (Sarchiapone et al., 2011; Wintemute et al., 2019), safety planning (see Stanley & Brown, 2012), and psychoeducation regarding crisis response skills (e.g., distress tolerance skills; see Linehan, 2014). By confronting perceived threats with upstream preventative measures, rather than reactive, the researchers believe that the frequency of mass shootings could be reduced.

NOTES

1. These statistics should be interpreted through the lens of firearm technology and social context. Firearm technology has advanced markedly in recent years. Additionally, prior to the digital age, records were insufficient regarding incidents of mass violence and often did not include shooting massacres of people groups with limited rights, such as Native Americans.
2. It is assumed in this study that all mass shooters had access to lethal means due to the use of a firearm in their shooting.

3. While there may have been more recent mass shootings that fell between May 6, 2023, and the submission of this paper, a cutoff date had to be established for coding and data analysis purposes.
4. It should be noted that the shooting which took place in Rifle, CO, only had four sources listed due its lack of news sources accessible to the raters.

DISCLOSURE STATEMENT

No potential conflicts of interest were reported by the author.

DATA AVAILABILITY

The data that support the findings of this study are available from the corresponding author, Tyler Hendley, upon reasonable request.

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Appendix (continued)

Location	Year	Outcome on Scene	PB Risk Factors		TB Risk Factors			Capability for Suicide Risk Factors									
			Burden: Society	Burden: Fam/Friends	ST Rejection	LT Rejection	Bullied	Active Exposure	Passive Exposure	Physical Pain	Body Mod.	Fasc. w/ Death	Trauma: Child	Trauma: Adult	Fasc. w/ Weapons		
Paradise, PA	2006	Suicide	X	X	X	--	--	--	--	X	--	--	--	--	X	--	
Salt Lake City, UT	2007	Died by police	--	--	X	X	X	X	X	X	X	X	X	--	--	--	
Blacksburg, VA	2007	Suicide	--	--	--	X	X	X	--	--	--	X	X	--	--	--	
Omaha, NE	2007	Suicide	--	X	X	X	--	--	--	--	X	X	--	--	--	--	
Arvada, CO	2007	Suicide	--	--	X	--	--	--	X	X	X	X	X	--	--	X	
Kirkwood, MO	2008	Died by police	--	--	X	X	--	--	--	--	--	--	--	--	--	--	
Dekalb, IL	2008	Suicide	X	X	X	X	X	X	X	X	X	--	--	--	--	--	
Santa Maria, CA	2008	Survived	--	--	--	--	--	--	--	--	--	--	--	--	X	--	
Henderson, KY	2008	Suicide	--	--	X	--	--	--	--	--	--	--	--	--	--	--	
Alger, WA	2008	Survived	--	--	X	X	--	--	X	X	--	--	X	--	--	--	
Carthage, NC	2009	Survived	--	--	X	X	--	--	X	X	--	--	--	--	--	X	
Binghamton, NY	2009	Suicide	--	X	X	X	--	--	--	--	--	--	--	X	--	X	
Mt. Airy, NC	2009	Survived	--	--	X	--	--	--	--	--	--	--	--	--	--	--	
Killeen, TX	2009	Survived	--	--	--	X	X	X	--	--	--	--	X	--	X	--	
Parkland, WA	2009	Died by police	--	--	--	X	--	--	--	--	--	--	--	X	--	--	
Los Angeles, CA	2010	Survived	--	--	X	X	X	X	--	--	--	--	--	--	--	--	X
Hialeah, FL	2010	Suicide	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Manchester, CT	2010	Suicide	--	--	X	X	X	X	--	--	--	--	--	--	--	--	--
Jackson, KY	2010	Suicide	--	--	X	--	--	--	--	--	--	--	--	--	--	--	--
Tucson, AZ	2011	Survived	--	--	X	X	X	--	X	--	--	X	X	--	--	X	X

Appendix (continued)

Location	Year	Outcome on Scene	PB Risk Factors		TB Risk Factors			Capability for Suicide Risk Factors								
			Burden: Society	Burden: Fam/Friends	ST Rejection	LT Rejection	Bullied	Active Exposure	Passive Exposure	Physical Pain	Body Mod.	Fasc. w/ Death	Trauma: Child	Trauma: Adult	Fasc. w/ Weapons	
Akron, OH	2011	Died by police	--	--	X	--	--	--	--	X	--	--	--	--	--	--
Carson City, NV	2011	Suicide	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Seal Beach, CA	2011	Survived	--	--	X	--	--	--	--	X	--	--	--	X	--	--
Oakland, CA	2012	Survived	--	--	X	X	--	--	--	X	--	--	X	--	--	--
Seattle, WA	2012	Suicide	--	--	X	--	--	--	--	--	--	--	--	--	--	X
Aurora, CO	2012	Survived	--	--	X	X	--	--	--	X	--	--	X	--	--	--
Oak Creek, WI	2012	Suicide	--	--	X	--	--	--	--	X	X	X	X	--	--	--
Minneapolis, MN	2012	Suicide	--	--	X	X	--	--	--	--	--	--	--	--	--	X
Sandy Hook, CT	2012	Suicide	--	--	--	X	X	X	--	--	X	X	X	--	--	X
Herkimer, NY	2013	Died by police	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Federal Way, WA	2013	Died by police	--	--	X	--	--	--	--	--	--	--	--	--	--	--
Santa Monica, CA	2013	Died by police	--	--	X	--	--	--	--	--	--	--	--	X	--	X
Hialeah, FL	2013	Died by police	--	--	X	X	--	--	--	--	--	--	X	--	--	--
Washington, DC	2013	Suicide	--	--	X	--	--	--	--	X	--	--	--	--	X	X
Alturas, CA	2014	Survived	--	--	X	X	--	--	--	--	X	--	--	--	--	--
Isla Vista, CA	2014	Died by police	--	--	X	X	X	X	--	X	--	--	--	--	--	--
Marysville, WA	2014	Suicide	--	--	X	X	--	--	--	--	--	--	--	X	--	X

Appendix (continued)

Location	Year	Outcome on Scene	PB Risk Factors		TB Risk Factors			Capability for Suicide Risk Factors								
			Burden: Society	Burden: Fam/Friends	ST Rejection	LT Rejection	Bullied	Active Exposure	Passive Exposure	Physical Pain	Body Mod.	Fasc. w/ Death	Trauma: Child	Trauma: Adult	Fasc. w/ Weapons	
Milwaukee, WI	2020	Suicide	--	--	X	X	X	--	X	--	--	--	--	--	X	X
Springfield, MO	2020	Suicide	--	--	--	X	--	--	--	--	--	--	--	--	--	X
Chicago, IL	2021	Died by police	--	--	X	X	--	--	--	--	X	--	--	--	--	X
Atlanta, GA	2021	Survived	--	--	X	--	--	--	--	--	--	--	--	--	X	X
Boulder, CO	2021	Survived	--	--	--	X	X	X	--	X	--	--	--	--	--	--
Orange, CA	2021	Survived	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Indianapolis, IN	2021	Suicide	--	X	X	--	--	--	--	--	--	X	X	--	--	--
San Jose, CA	2021	Suicide	--	--	X	X	--	--	--	--	--	X	--	--	--	X
Oxford, MI	2021	Survived	--	--	--	X	--	--	--	--	--	--	X	--	--	X
Denver, CO	2021	Died by police	--	--	X	--	--	--	--	--	X	--	--	--	--	X
Buffalo, NY	2022	Survived	--	--	--	--	--	--	--	--	--	X	X	--	--	X
Uvalde, TX	2022	Died by police	--	--	X	X	X	X	--	X	--	--	X	X	--	X
Tulsa, OK	2022	Suicide	--	--	--	--	--	--	--	X	--	--	--	--	--	--
Highland Park, IL	2022	Survived	--	--	--	--	--	--	--	--	X	--	--	X	--	X
Raleigh, NC	2022	Survived	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Colorado Springs, CO	2022	Survived	--	--	--	--	--	X	--	--	X	--	X	--	--	X
Chesapeake, VA	2023	Suicide	--	--	X	X	--	--	--	--	--	--	--	--	--	--
Monterey Park, CA	2023	Suicide	--	--	X	X	--	--	--	X	--	--	--	--	--	X

Appendix (continued)

Location	Year	Outcome on Scene	PB Risk Factors		TB Risk Factors			Capability for Suicide Risk Factors								
			Burden: Society	Burden: Fam/Friends	ST Rejection	LT Rejection	Bullied	Active Exposure	Passive Exposure	Physical Pain	Body Mod.	Fasc. w/ Death	Trauma: Child	Trauma: Adult	Fasc. w/ Weapons	
Half Moon Bay, CA	2023	Survived	--	--	X	--	X	--	--	--	--	--	--	--	--	--
Nashville, TN	2023	Died by police	--	--	--	--	--	--	X	--	--	X	--	--	--	X
Louisville, KY	2023	Died by police	--	--	X	X	--	--	X	--	--	--	--	--	--	--
Allen, TX	2023	Died by police	--	--	X	X	--	--	--	--	--	X	--	--	--	X

Note. PB = perceived burdensomeness; TB = thwarted belongingness; Location = location mass shooting was perpetrated; Year = year mass shooting was perpetrated; Outcome on Scene = outcome of perpetrator on the scene of the shooting; Burden: Society = perceived burden to society; Burden: Fam/Friends = perceived burden to family and/or friends; ST Rejection = short-term rejection; LT Rejection = long-term rejection; Active Exposure = active exposure to death; Passive Exposure = passive exposure to death; Body Mod. = Body Modifications; Fasc. w/Death = fascination with death; Fasc. w/Weapons = fascination with weapons; Tenn. = Tennessee; X = evidence was found for the respective interpersonal variable; -- = no evidence was found for the respective interpersonal variable (this does not indicate absence). Names of mass shooters were purposely excluded from this list.

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