



A Comprehensive Assessment of Leakage, Threats, Public Reporting, and Responses to Reports among Public, Family, and Felony Mass Shootings

Jason R. Silva¹ · Adam Lankford²

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Abstract

This study provides a comprehensive assessment of leakage, threats, public reporting, and criminal justice responses to reports among all U.S. mass shootings in which four or more victims were killed from 2000 to 2023 ($N=483$). Based on available evidence, our findings indicate that leakage and threats both appear more common among public mass shooters than family or felony shooters. Criminal propensity, “cry for help,” and attention-seeking theories may explain why perpetrators often reveal their violent intent. The public appears to report leakage and threats less consistently than the criminal justice system responds to such reports; however, important opportunities for improvement exist in both areas. Multiple factors help explain variation in reporting rates, but public uncertainty about individuals’ dangerousness may be the greatest barrier, rather than fears of retribution. Based on these findings and others, we offer recommendations for improving mass shooting prevention.

Keywords Mass shootings · Leakage and threats · Violence prevention · Threat assessment

Introduction

Paradoxically, mass shooters often reveal their violent intent prior to their offenses, and then are able to act on it anyway. Some engage in what threat assessment experts refer to as “leakage”: they signal their specific interest in committing mass violence

✉ Jason R. Silva
silvaj18@wpunj.edu

Adam Lankford
adam.lankford@ua.edu

¹ Department of Sociology, Criminal Justice, and Social Work, William Paterson University, 300 Pompton Road Wayne, 07470 New Jersey, USA

² Department of Criminology & Criminal Justice, The University of Alabama, Tuscaloosa, AL, USA

or general interest in committing violent crimes by telling a “third party,” like an intimate partner, family member, friend, acquaintance, or online audience (Lankford et al. 2019; Meloy and O’Toole 2011; Silva and Greene-Colozzi 2024; Silver et al. 2018a; Vossekuil et al. 2002). Others make direct threats to targets or potential victims (Abel et al., 2022; Meloy & O’Toole, 2011).

Sometimes, it seems obvious that these perpetrators posed a deadly threat. For example, a family mass shooter was overheard telling his estranged wife, “You are bringing this all on yourself. If you don’t quit, I will kill you and the others,” three months before murdering her and five children (Turanovic & Neville, 2023, p. 56). A felony mass shooter “told friends he wanted to rob and possibly kill someone” days before he murdered four people at a residence (Prince, 2016). Similarly, a public mass shooter who killed 17 victims at a school posted on Instagram, “I wanna die Fighting killing shit ton of people” and “I wanna shoot people with my AR-15” (Public Safety Commission, 2019, p. 246). As a recent National Institute of Justice report concluded after reviewing prior research, “leaks of mass shooting plans create, perhaps, the best chance for intervention and prevention” (Kane et al., 2023, p. 8).

Despite valuable past research, however, much remains unknown about the nature and frequency of mass shooters’ leakage and threats, the public’s reporting of that information, and the criminal justice system’s responses to such reports. This study aims to fill key knowledge gaps by providing a comprehensive assessment of U.S. mass shootings involving four or more victims killed from 2000 to 2023 ($N=483$) that will (a) measure both leakage and threats, (b) account for all mass shooting types, including public, family, and felony incidents, (c) test for associations between leakage, threats, and important life factors that could help explain *why* mass shooters reveal this information, and (d) provide a scientific basis for understanding public reporting and criminal justice responses.

Mass Shooters’ Leakage and Threats

For more than two decades, researchers have recognized that mass shooters, active shooters, school shooters, and mass murderers often reveal their violent intent prior to their attacks, with most studies focused on documenting the frequency of this behavior (Hempel et al. 1999; Lankford et al. 2019; Madfis 2020; Silver et al. 2018b; Turanovic et al. 2022; Vossekuil et al. 2002). For example, Silver et al. (2018b) identified prior leakage in 56% of active shooter incidents, while Lankford et al. (2019) found a higher percentage among the deadliest public mass shooters and Turanovic et al. (2022) identified a lower percentage among all mass shooter types. Additional research has shown that leakage comes in many different modes, including verbal statements, written materials, online posts, and social media communications (Madfis 2020; Silver et al. 2018b), and that leakage and threats may reveal specific interest in mass killing or be more general in nature (Hempel et al., 1999; Lankford et al., 2019; Peterson et al., 2021). Overall, this work is extremely valuable and confirms the opportunity for improving violence prevention (Kane et al., 2023).

Despite the growing literature, important gaps remain. For instance, it is necessary to study both leakage (to third parties) and direct threats (to the targets themselves)

because both types of communication reveal shooters' violent intent. Most studies have focused solely on leakage and have not accounted for threats. Researchers also need a better understanding of leakage and threats across all types of mass shootings, not only public mass shootings (Kane et al., 2023). It appears only one study has included public, family, and felony mass shootings, and that merely documented whether perpetrators voiced "a motive or plan to kill" (Turanovic et al., 2022).

Given what we know about leakage among public mass shooters specifically (Lankford et al., 2019; Peterson et al., 2021; Silva & Greene-Colozzi, 2024), as well as more general research on threat-making among family killers of multiple victims (Liem et al., 2013) and offenders involved in gang violence and drug trafficking (Lessing, 2015; Patton et al., 2019), it may be that public mass shooters are more likely to leak to third parties, whereas family and felony mass shooters are more likely to directly threaten their eventual victims. Although these latter studies do not examine mass shooters specifically, they provide relevant insights. For instance, because public mass shooters often target strangers (Silva & Lankford, 2026), they may have fewer opportunities or reasons to directly threaten their eventual victims, with violent intentions instead being communicated through leakage to third parties. Family mass shooters are often in abusive or power-laden relationships with intimate partners or relatives, so threats may have an important coercive function in those contexts (Liem et al., 2013). Felony mass shooters may similarly make threats more often because of the benefits of projecting power, strength, and intimidation during criminal interactions (Lessing, 2015; Patton et al., 2019). These potential differences, however, have never been tested.

Similarly, the reason *why* some mass shooters reveal their intentions also requires further investigation. After all, mass shooters' leakage seems difficult to explain. These perpetrators are typically capable of rational calculations and strategic decision-making (Osborne & Capellan, 2017; Silver & Silva, 2022), which suggests they should recognize that the potential costs of these revelations far exceed the benefits. Most mass shooters act alone (Silva, 2022), giving them the chance to keep their violent thoughts and plans a secret. Yet many forfeit that advantage for no clear reason: their leakage is generally not an attempt to acquire advice, weapons, or assistance. Why, then, do they voluntarily reveal information that could be used to stop them?

Several theories may provide an answer. First, it is possible that some mass shooters with criminal propensities do not care about the risks. If they have prior arrests or violent histories, for instance, merely talking about harming others might seem minor by comparison. This would fit with Gottfredson and Hirschi's (1990) general theory of crime, which suggests individuals differ in how prone they are to risk-taking, regardless of the long-term consequences. In general, a similar propensity seems to explain public cursing (Reisig & Pratt, 2011), negative social media posting (Intravia, 2023), and more common forms of crime (Gottfredson & Hirschi, 1990). Accordingly, some mass shooters have prior arrest records or histories of violence that suggest they may have a criminal propensity as well (Silva, 2022; Silver & Silva, 2022).

A second possibility is that some mass shooters engage in leakage or threats as a "cry for help" (Lankford et al., 2019; Peterson et al., 2021). This would be an extension of the cry for help theory of suicidality, which posits that before people take their own lives, they often make suicidal threats or non-lethal suicide attempts to signal

that they are experiencing psychological pain and will do something drastic if nothing changes (Farberow & Shneidman, 1961). Some may do this because they wish to be stopped or rescued. This could apply to mass shooters because some are similarly suicidal or struggling with mental health problems, and they may have a conscious or unconscious desire to be stopped or saved before they commit crimes that will almost certainly end in their death or life imprisonment (Lankford et al., 2019; Peterson et al., 2021). In perhaps the first empirical confirmation of the relationship between suicidality and leakage, Peterson et al. (2021) found evidence of a statistically significant association among public mass shooters.

A third possibility is that some mass shooters' leakage is motivated by attention-seeking. This fits with Merton's (1938) anomie theory, which suggests that when individuals lack legitimate means to accomplish their goals, they may use deviant means instead. In modern societies, attention-seeking is widely considered a legitimate goal, but some people resort to making extreme, provocative, or aggressive statements for attention (Silva, 2023). Accordingly, it is well established that a subset of mass shooters seek fame for themselves or attention for their ideological cause (Lankford & Silva, 2025; Silva & Greene-Colozzi, 2019). Before they attack, some perpetrators may also try to attract attention by talking or posting about their violent intentions. To date, it appears only two studies have examined this relationship statistically, and both focused on public mass shooters. The first found fame-seeking was twice as common among shooters who leaked as those who did not, but it was not statistically significant using their method (Peterson et al., 2021). The second found shooters who had extreme ideological interests (and were often seeking attention for their cause) leaked significantly more than other shooters (Lankford & Silva, 2025). These associations would benefit from further exploration.

Public Reporting and the Criminal Justice System's Response

Given the frequency of leakage and threats, it is natural to wonder why these attacks are still happening. One problem is insufficient reporting by the public. Community members often witness leakage and threats, but if they do not report them, they do not have much preventive utility (Kane et al., 2023). Data on reporting rates are extremely limited, but an FBI study of 63 active shooters found that even when concerning behavior was observed, it was only reported to law enforcement 41% of the time (Silver et al. 2018b). In some cases, people seem to interpret perpetrators' leakage or threats as merely attention-seeking (e.g., provocative boasts or inappropriate jokes), instead of taking them seriously (Lankford et al., 2019; O'Toole, 2000). This could limit reporting of public mass shooters who seek fame for themselves or attention for their ideological cause. Other bystanders may feel like reporting would constitute a betrayal or be concerned that reporting will not lead to an effective response from the police or other authorities (Kane et al., 2023; Lankford et al., 2019; Madfis, 2014). This could make it frightening for people to report leakage or threats, especially if the potential perpetrator is considered dangerous and may become angry and vengeful because they spoke up. In particular, family mass shooters may not be

reported if the intimate partners they threaten have unsuccessfully sought protection from the system in the past, and felony mass shooters may not be reported in communities where public trust in the system is lacking.

Another problem may be suboptimal responses to mass shooters' leakage and threats from law enforcement or other authorities. Some of this is attributable to the incomplete information authorities sometimes receive from the public. However, research on the deadliest public mass shootings in the United States from 1998 to 2018 suggests that in approximately half of cases, perpetrators had been reported to law enforcement for their leakage or threats about killing (Lankford et al., 2019). In retrospect, not enough was done to respond and prevent their attacks. As a recent National Institute of Justice report states, "It's imperative that authorities act swiftly when they learn of leaked mass shooting plans" (Kane et al., 2023, p. 28).

From a theoretical perspective, public inaction may be best explained by the "bystander effect." This theory helps explain reactions from people who witness an emergency (Fischer et al., 2011; Latané & Darley, 1969). Overall, people seem less likely to respond when there is (a) diffusion of responsibility (they believe others will respond instead), (b) pluralistic ignorance (they do not see others treating the situation as an emergency), or (c) evaluation apprehension (they fear being judged for overreacting or making a mistake) (Latané & Darley, 1969; Mathes & Kahn, 1975). Subsequent research has shown that people seem to respond better to emergencies that are more clearly dangerous (Fischer et al., 2011).

When we apply bystander effect theory to mass shooters' leakage and threats, the "emergency" is the potential perpetrator's expression of violent intent, and the "bystanders" are everyone exposed to that information with a chance to act. Given the theory's tenets, we might expect the public will be more prone to inaction than criminal justice practitioners. Because it is their job, law enforcement officers, the courts, and other authorities may assume more individual responsibility for taking action, and they may be more confident about trusting their professional judgment about ambiguous cases.

Current Study

As noted earlier, this study was designed to provide a comprehensive assessment of U.S. mass shootings from 2000 to 2023, using more than 30 distinct variables on leakage, threats, public reporting, and the criminal justice system's responses to reports. Based on our review of past research, we developed the following hypotheses:

Frequency of Leakage and Threats

H1 Public mass shooters are more likely to leak than family and felony mass shooters.

H2 Family and felony mass shooters are more likely to make threats than public mass shooters.

Potential Explanations for Leakage and Threats

H3 Mass shooters' leakage and threats are associated with higher rates of (a) prior arrest and a history of domestic violence (criminal propensity), (b) mental health problems and suicidal ideation (cry for help), and (c) fame-seeking and ideological motives (attention-seeking).

Attrition from Leakage and Threats to Public Reporting and Criminal Justice Response

H4 The public reports leakage and threats less consistently than the criminal justice system responds to those reports.

Potential Explanations for Variation in Reporting Rates

H5 Reporting is more common when shooters make threats than when they leaked.

H6 Reporting is more common when shooters reveal a specific interest in committing mass violence than when they reveal an interest in other forms of violence.

H7 Reporting is more common when shooters reveal information through multiple modes or to multiple recipient types.

H8 Reporting is less common when shooters have a prior arrest and/or a history of committing domestic violence, which may increase fears of retribution.

H9 Reporting is less common when shooters are fame-seeking, which may increase perceptions that the leakage or threats were "just talk."

Methods

Data Sources and Data Collection

As a starting point, we attempted to identify all U.S. mass shootings from 2000 to 2023. Consistent with past approaches, we defined mass shootings as incidents in which four or more victims were killed with firearms in a 24-hour period (Cohen, 2024; Krouse & Richardson, 2015; Silva, 2022; Turanovic et al., 2022).¹ We employed an open-source data collection strategy but benefited greatly from past scholarship and existing databases that are openly accessible. Open-source data refers to all pub-

¹ The 4-fatality criterion is standard in most prior research, but there are benefits to using a broader criterion as well.

licly available information, and it is the primary data source for hard-to-study forms of rare/extreme homicide (Chermak et al., 2025).

Most data came from the National Institute of Justice-funded mass shooting database created by Turanovic et al. (2022) and subsequently updated by that research team.² The database includes 474 mass shooting incidents from 2000 to 2023 and nearly 100 variables on offender, incident, and victim characteristics. We began with the Turanovic et al. (2022) data because it provides the most comprehensive database of all mass shooting types over the longest period. However, to verify the accuracy of its data, we also reviewed the eight datasets included in Huff-Corzine and Corzine's (2020) summary of open-source mass shooting data, as well as The Violence Project's mass shooting database (Peterson & Densley, 2024).³ In total, we identified 483 mass shooting incidents from 2000 to 2023, 98% of which came from the Turanovic et al. (2022) database and its update.

Like prior research (Cohen, 2024; Fox, 2024; Krouse & Richardson, 2015; Silva, 2022; Silva & Lankford, 2026), we assigned each mass shooting to one of four mutually exclusive types: public, family, felony, or other. Public mass shootings refer to incidents occurring in public or populated locations, with many victims chosen at random and/or for their symbolic value. Family mass shootings refer to incidents where the majority of victims were the offender's immediate/extended family and/or a current or former intimate partner and their immediate/extended family, most of whom are killed in private residences or sparsely populated locations.⁴ Felony mass shootings refer to incidents involving underlying criminal activity (e.g., robbery/burglary, gang violence, drug deals). Any mass shootings that did not fit these categories were coded as "other" (see also Fox, 2024; Silva & Lankford, 2026).

As noted, Turanovic et al.'s (2022) database contains a great deal of incident and offender information. This includes each incident's date and location; the number of victims killed/injured and their relationship to the shooter; the number, age, sex, and pre-attack histories of shooter(s); the firearms they used and their post-attack resolution (suicide, killed, arrested); and the number of news reports and availability of official records on the incident. In cases with multiple shooters, the data were coded at the incident level (i.e., whether that mass shooting involved a male shooter, a female shooter, a shooter who died by suicide, etc.), with all relevant answers being coded (1 = yes, 0 = no). We used these data, added information for the handful of newly identified incidents, refined coding parameters for several variables, and supplemented

² The publicly available Turanovic et al. (2022) database includes all mass shootings between 2000 and 2018. Turanovic then created an updated version with additional cases between 2019 and 2023. In rare cases where offenders were unknown or the case was unsolved, they were not included in our analysis.

³ These eight datasets include: Everytown for Gun Safety, FBI Active Shooter Reports, Gun Violence Archive, Mass Shooting Tracker, Mother Jones, NYPD Active Shooter Reports, AP/USA Today, and Washington Post.

⁴ If there was a 50/50 split in victim fatalities, family mass shooting coding was determined based on the proportion of family injuries. If there was a 50/50 split in victim fatalities with no victim injuries, we coded as family if the incident occurred in a single residential location and other victims were largely known to the offender.

missing information.⁵ We also pulled from prior research, existing databases, and our own open-source data collection to add information on whether any offenders were insiders at a school or workplace location (i.e., current or former students/employees), fame-seeking, or ideologically motivated, and whether their history involved committing domestic violence, a past protective order, prior incarceration, mental health treatment, or suicidal ideation. Based on a similar approach from The Violence Project's database (Peterson & Densley, 2024), we coded history of suicidal ideation in two ways to distinguish pre-attack suicidal ideation (e.g., suicidal statements, prior suicide attempts) from cases where there was no prior evidence of suicidal ideation but it was clear the shooter expected to die as a result of the mass shooting.

For most variables that pertained to all mass shootings—such as victim counts, offender age and sex, the presence of multiple offenders (1=yes, 0=no), post-attack resolution (suicide, killed, arrested), location type, and incident date—there was no missing data. An exception was firearm type, for which data were complete for approximately 94% of incidents; our corresponding tests used the available data with no imputation for missing values. Consistent with prior open-source research (Parkin & Freilich, 2015; Silva, 2022; Turanovic et al., 2022), binary variables for factors that may not have been present in offenders' lives were coded as “no/no evidence” rather than “missing” when available open-source materials contained no evidence of the characteristic. Parkin and Freilich (2015) recommend this as the default coding approach in open-source research. By definition, it is impossible to know whether factors that cannot be documented actually existed or not, but the “no evidence” interpretation leaves open the possibility that future research can uncover something new.

Leakage and Threats

This study's primary focus was on mass shooters' pre-attack leakage and threats of violence. As noted, the distinction is that “leakage” refers to violent intent communicated to a third party (e.g., person A tells person B about their interest in harming person C or attacking target D), whereas a “threat” refers to violent intent communicated to the target or potential victim themselves (e.g., person A tells person B about their interest in harming person B).

We also identified whether these leaks or threats involved specific interest in committing a mass killing, or only other interest in committing violence (e.g., homicide), and whether incidents involved discussion of plans among co-shooters and/or with non-participating accomplices (e.g., individuals who may have helped organize the attack but did not engage in the shooting). Importantly, we coded

⁵ This study's mass shooting data was compared to two datasets: The Violence Project Database (Peterson & Densley, 2024) and the AP/USA Today Mass Killing Database (Fox, 2024). Of the 483 mass shootings in the current data, 405 (i.e., 84% of incidents) also appeared in at least one of these two sources. Any overlapping variables were compared, and a limited degree of conflicting information was identified, which shows the strength of the Turanovic et al. (2022) database's coding procedure and the newly coded data. The methodological consensus is that anything above 0.80 is an acceptable level of reliability, and all variables were well above this requirement. When information conflicted across sources, additional open-source data (largely news reports) were reviewed to verify final coding. Greater weight was given to more recent information (Chermak et al., 2025).

these discussions with co-shooters or non-participating accomplices separately from our leakage and threat variables, as these measures are informative yet conceptually distinct.

When leakage or threats occurred, we collected data on the mode, recipient, public reporting (if applicable), and criminal justice system's responses to reports (if applicable). Modes included in-person communication, written document (e.g., letter, journal, or drawing), direct message (e.g., phone call, text message, email, or direct/private message online), and public post online. Recipient types included family member (excluding intimate partners), intimate partner, coworker, fellow student, friend/acquaintance (excluding fellow students or coworkers), stranger, online audience, and "other." Public reporting included reports to the criminal justice system (e.g., local law enforcement, FBI, courts, etc.), school staff, supervisor, and "other." Criminal justice responses included law enforcement dispatched to the scene and offender interview, investigation, arrest, incarceration, protection order issued, mental health treatment, and "other."

Most leakage and threat variables were not mutually exclusive and were coded at the incident level. This means for each mass shooting, we coded whether there was evidence of leakage, threats, and/or both, and all associated modes, recipient types, public reporting, and criminal justice responses. If a mass shooting involved leakage or threats to multiple recipient types (e.g., family member, coworker, stranger) or multiple modes (in-person, direct message, online), we coded all that information.

The Turanovic et al. (2022) database provided a valuable starting point for identifying many mass shootings with perpetrators who "voiced motives" pre-attack. We also identified additional evidence of leakage and threats via two sources: Silva and Greene-Colozzi's (2024) dataset and The Violence Project database (Peterson & Densley, 2024). Across these three sources, 112 incidents were identified as involving leakage or threats.

Next, a team of three researchers used open-source data to search each of the 483 cases to identify additional evidence of leakage or threats. These searches drew on both official records (e.g., court documents, law enforcement records, government reports) and news media reporting. When possible, information was corroborated across multiple sources, with official records given precedence when accounts differed. Official records were located for 49% of the cases; however, consistent with prior open-source research (Chermak et al., 2025), news media reports were consulted when official documentation was unavailable or limited. Later news coverage was prioritized when it incorporated information from subsequent investigations, court proceedings, or other newly released information (Chermak et al., 2025). Overall, these supplementary investigations identified 85 additional cases involving leakage or threats and provided additional evidence for cases previously identified in the reviewed datasets. In total, 197 mass shootings were identified as involving leakage or threats.

As the final step, two members of our research team coded the mode, recipient, reporting, and response. They convened to discuss any disagreements, and then final coding was determined. If any cases raised questions after this process, a third member reviewed the case. After this review and discussion stage, there were no cases on which the researchers disagreed.

Data Analysis

Because so little is known about mass shooting leakage, threats, public reporting, and criminal justice responses, we first calculated frequencies and proportions. We tabulated this information (a) for the entire sample, (b) for those cases that involved leakage or threats, and (c) for each mass shooting type separately. We then used chi-square (χ^2) tests to identify statistically significant differences in leakage, threats, reporting, and responses across public, family, and felony mass shootings. This helped clarify which challenges vary across mass shooting types and which they have in common.

We also conducted statistical tests to examine relationships between leakage/threats and important life factors that could help explain *why* mass shooters signal their violent intent in advance. As the first step, this included bivariate analyses (i.e., chi-square tests, t-tests) to compare mass shootings that were preceded by leakage or threats with those that were not. We assessed differences across a wide range of offender variables, including their background, mental health, stressors, attack locations, firearms, victims, and attack resolution.

We then used logistic regression to test predictors of mass shooters' leakage (Model 1), threats (Model 2), and leakage or threats (as a composite measure) (Model 3). Variables were selected based on each theory, after making sure to avoid including factors that were too closely correlated.⁶ We tested prior arrest record and history of domestic violence to account for shooters' criminal propensity, used mental health problems and suicidal ideation to account for them "crying for help," and used fame-seeking and ideological motives to account for them seeking attention. We believe these variables are sufficiently distinct that they correspond to the aforementioned theoretical concepts without blurring or overlapping (e.g., prior arrest record would not measure "crying for help," and mental health problems would not measure criminal propensity). For all models, we also used three control variables: the incident's year, whether it was covered in 100 or more news articles, and whether it had a publicly available official record (e.g., court document, police report). This controlled for changing trends and variation in data availability.

For our final analyses, we closely examined public reporting rates and criminal justice response rates. First, we analyzed attrition to see where inaction appeared most common. Second, we analyzed reporting rates in a variety of conditions, including (a) when there was leakage, a threat, or both; (b) when the shooter revealed specific interest in committing a mass killing versus only other interest in committing violence; (c) when leaks or threats were made in multiple modes or to multiple recipient types; and (d) when the theory-based mass shooter variables were present: prior arrest record, history of domestic violence, mental health problem, pre-attack suicidal ideation, fame-seeking, or ideological motives. These analyses helped clarify whether the public was more apt to report certain types of shooters.⁷

⁶ For example, prior arrest was closely correlated with history of violence, but not history of domestic violence, so we used the latter; ideological motives and hate crimes were closely correlated, so we used the former.

⁷ For several reasons, we analyzed public reporting rates more closely than the criminal justice system's responses. For instance, we expected more inaction with public reporting, so focused more on understanding that part of the problem. In addition, criminal justice responses are usually reliant on public reporting, so it seems important to learn more about reporting before analyzing subsequent responses in more depth.

Results

As shown in Table 1, overall, we found that 41% of U.S. mass shootings from 2000 to 2023 were preceded by perpetrators revealing their violent intent. Public mass shootings were the subtype where this was most common: they showed the highest frequency of leakage *or* threats (71%), both leakage *and* threats (28%), leakage (56%) and threats (42%) when measured separately, specific interest in committing mass killing (35%), and other interest in committing violence (35%) ($p < .01$ or $p < .001$ for all these results). Leakage and threats were also more common among family mass shootings than felony mass shootings, across all these measures. However, many felony mass shooters discussed their plans with co-shooters or non-participating accomplices before they attacked, so it was actually family mass shooters who appeared most likely to have never leaked, threatened, or discussed their violent

Table 1 Frequency of leakage, threats, public reporting, and CJ responses to reports in mass shootings (N=483)

Variables	All Types (N=483) %	Public MS (n=116) %	Family MS (n=218) %	Felony MS (n=96) %	Other MS (n=53) %	X ²
<u>Occurrence</u>						
Leakage or Threat	41%	71%	37% ^a	16%	38% ^a	69.83 ***
Leakage	26%	56%	16% ^{a, b}	9% ^a	28% ^b	81.62 ***
Threat	27%	42%	28% ^a	7% ^b	23% ^{a, b}	33.46 ***
Both	11%	28% ^a	6% ^{b, c}	1% ^b	13% ^{a, c}	46.57 ***
<u>Type</u>						
Specific Interest in Committing Mass Killing	14%	35%	8% ^a	2% ^a	9% ^a	63.34 ***
Other Interest in Committing Violence (Only)	27%	35% ^a	28% ^a	14% ^b	28% ^{a, b}	13.15 **
<u>Reporting</u>						
Leakage or Threat Reported Pre-Attack	22%	43%	20% ^a	3%	21% ^a	50.48 ***
<u>Criminal Justice Response</u>						
Leakage or Threat Led to Pre-Attack Response	18%	30% ^a	19% ^a	3%	17% ^a	25.77 ***
<u>Criminal Conspiracy</u>						
Discussed Plans w/ Co-Shooter(s)	11%	3% ^{a, b}	2% ^b	41%	11% ^a	115.29 ***
Discussed Plans w/ Non-Participating Accomplice	10%	0% ^a	2% ^a	41%	6% ^a	131.54 ***
No Leakage, Threat, or Discussion w/ Others	46%	29% ^a	61% ^b	30% ^a	53% ^b	42.19 ***

* $p < .05$. ** $p < .01$. *** $p < .001$

Notes: Co-shooters and non-participating accomplices are not included in leakage or threat variables. The omnibus Pearson χ^2 is included in the final column. Post-hoc pairwise comparisons of column proportions were conducted using z tests with a Bonferroni adjustment for multiple comparisons. Within each row, percentages that share a superscript letter (a, b, c) do not differ significantly from one another at $p < .05$

intent with anyone, which we found in 61% of cases.⁸ Of all 483 mass shootings we studied, 22% were reported in advance by members of the public because of leakage or threats, and 18% resulted in a pre-attack criminal justice response.

Table 2 provides many additional details on cases where leakage or threats occurred ($n=197$). For instance, the most frequent communication mode was in person (82%), with no significant difference across mass shooting types. Second most common were direct messages (22%), followed by online posts (14%) and written documents (8%), with the latter two categories significantly more common in public mass shootings ($p < .001$). Intimate partners (44%), friends/acquaintances (29%), and family members (23%) were the most common recipients of leakage or threats, but there was substantial variation across mass shooting types. Overall, 54% of mass shootings with leakage or threats were reported by the public prior to the attack, and the public reported this information to the criminal justice system far more than they did to supervisors, school staff, or other authorities. In 45% of cases with leakage or threats, there was a formal response from criminal justice practitioners. That response usually involved law enforcement being dispatched to the scene and/or interviews or investigations of the eventual perpetrator. That information led to the perpetrator's arrest only 21% of the time, and to their incarceration only 6% of the time.

Our findings on bivariate relationships between leakage or threats and offender variables are presented in Table 3. Mass shooters appeared significantly more likely to leak or make threats when they had a prior arrest record, history of domestic violence, past protective order, or history of violence; when they had a history of being abused, mental health problems, pre-attack suicidal ideation, or mental health treatment; when they were fame-seeking, ideologically motivated, going to commit a hate crime, or an insider at their attack location; and when they had recently been separated or divorced; and less likely when they had a history of gang involvement ($p < .001$ or $p < .01$ for all these results). Additionally, as shown in Appendix 1, leakage or threats were significantly more common when the incident involved one shooter (instead of multiple shooters), occurred at a commerce or education location, was committed with a rifle or assault weapon, or resulted in more victims killed or injured or a higher percentage of victims who were strangers ($p < .001$ or $p < .01$ for all these results). We provide these results separately in an appendix because this study's primary focus is on pre-attack behaviors.

In Table 4, we present our regression results. In Model 1, leakage was predicted by mental health problems, fame-seeking, and ideological motives, with suicidal ideation marginally significant at $p = .054$ (Cox & Snell=0.23, Nagelkerke=0.33). In Model 2, threats were predicted by prior arrest record, history of domestic violence, mental health problems, and suicidal ideation (Cox & Snell=0.28, Nagelkerke=0.41). In our composite Model 3, leakage or threats were significantly associated with all the theory-based variables: prior arrest and history of domestic violence (criminal propensity); mental health problems and suicidal ideation (cry for help); and fame-seeking and ideological motive (attention-seeking) (Cox & Snell=0.31, Nagelkerke=0.42).

Our close examination of attrition in reporting and responses is depicted in Fig. 1. As noted earlier, 54% of all mass shootings with leakage or threats were reported by

⁸ Even in cases where family mass shooters had not leaked or threatened violence, some had clear histories of violence or had revealed their suicidal ideation, which was not included in this result.

Table 2 Mode, recipient, public reporting, and CJ responses to reports when leakage or threats occurred ($N=197$)

Variables	All Types ($n=197$)	Public MS ($n=82$)	Family MS ($n=80$)	Felony MS ($n=15$)	Other MS ($n=20$)	X^2	
	%	%	%	%	%		
<u>Leakage/Threat Mode</u>							
In-Person	82%	77%	85%	93%	80%	3.08	
Written Document	8%	17%	3%	0%	0%	15.13	***
Direct Message	22%	27%	20%	7%	20%	3.15	
Online	14%	29%	3%	0%	10%	27.02	***
<u>Recipient</u>							
Family Member	23%	23%	29%	13%	10%	4.14	
Intimate Partner	44%	37%	55%	20%	50%	9.55	*
Coworker	10%	21%	1%	0%	10%	18.71	***
Fellow Student	5%	10%	1%	0%	0%	8.76	*
Friend/Acquaintance	29%	34%	19%	47%	40%	8.49	*
Stranger	8%	10%	4%	27%	5%	9.52	*
Online Audience	14%	29%	3%	0%	10%	27.02	***
Other	21%	29%	15%	13%	20%	5.58	
<u>Reporting</u>							
Reported Pre-Attack	54%	61%	54%	20%	55%	8.59	*
CJ System	49%	49%	54%	20%	55%	6.05	
School Staff	5%	12%	0%	0%	0%	14.77	**
Supervisor	6%	13%	0%	0%	5%	13.89	**
Other	4%	9%	1%	0%	0%	7.32	
<u>CJ Response</u>							
Response to Reports	45%	43%	53%	20%	45%	5.77	
Law Enforcement Dispatched	33%	35%	33%	20%	35%	1.39	
Interview	27%	30%	26%	20%	25%	0.91	
Investigation	21%	24%	18%	20%	25%	1.33	
Arrest	19%	17%	20%	20%	25%	0.71	
Incarceration	6%	4%	6%	7%	15%	3.64	
Protection Order	16%	9%	26%	0%	15%	12.68	**
Mental Health	7%	12%	5%	0%	0%	6.43	
Other CJ Response	8%	9%	8%	7%	5%	0.31	

* $p < .05$. ** $p < .01$. *** $p < .001$

the public prior to the attack. Of these, 83% resulted in a criminal justice response. However, attrition varied by mass shooting type. Public mass shootings were reported most often (61%), but those reports were least likely to result in a criminal justice response (70%). By comparison, reporting was the lowest for felony mass shootings: when leakage and threats occurred, the public reported them only 20% of the time. Fortunately, when felony or family mass shootings were reported to the criminal justice system, they almost always resulted in a formal response (felony mass shootings=100%; family mass shootings=98%).

Finally, our analysis of reporting rates is shown in Fig. 2. Because 54% of all mass shootings with either leakage or threats were reported by the public, it can be helpful to think of that as the baseline or average. Mass shootings with leakage were

Table 3 Comparing mass shootings with and without leakage and threats

Variables	Leakage/Threat (<i>n</i> = 197)		No Leakage/Threat (<i>n</i> = 286)		χ^2 /T-test	
	<i>n</i>	%/Mean	<i>n</i>	%/Mean		
<u>Shooter(s) Background</u>						
More Than 1 Shooter	12	6%	40	14%	7.57	***
Sex						
Male	192	98%	275	96%	1.26	
Female	8	4%	14	5%	0.18	
Age	-	34	-	34	0.39	
<u>Shooter(s) Behavior</u>						
Prior Arrest	129	66%	152	53%	7.29	**
Prior Incarceration	45	23%	69	24%	0.11	
History of Domestic Violence	109	55%	50	18%	75.67	***
Past Protective Order	48	24%	18	6%	32.29	***
History of Violence	136	69%	127	44%	28.53	***
Gang Involved	6	3%	27	9%	7.49	**
Fame-seeking	27	14%	2	1%	34.97	***
Ideological Motive	22	11%	1	0%	30.10	***
Hate Crime	15	8%	1	0%	19.22	***
Insider	33	17%	16	6%	15.93	***
<u>Shooter(s) Mental Health</u>						
History of Being Abused	39	20%	15	5%	24.88	***
Documented Mental Health Problem	90	46%	64	22%	29.18	***
History of Suicidal Ideation	124	63%	123	43%	18.56	***
Pre-attack Suicidal Ideation	75	38%	34	12%	45.76	***
Intended to Die (Only)	49	25%	89	31%	2.23	
Mental Health Treatment	64	33%	36	13%	28.14	***
<u>Shooter(s) Stressor</u>						
Recently Lost Job	18	9%	17	6%	1.77	
Recent Financial Strain	9	5%	22	8%	1.89	
Recent Separation/Divorce	55	28%	49	17%	8.03	**
Recent Interpersonal Conflict	138	70%	179	63%	2.88	
Recent Other Stress	44	22%	61	21%	0.07	

p* < .05. *p* < .01. ****p* < .001

Note: For incidents with multiple offenders, age measures the average age of shooters

reported less often (48%) than cases with threats (71%), and reporting was highest (80%) when both leakage and threats were made. In turn, mass shooters were more often reported when they revealed specific interest in committing mass violence than when they only revealed interest in committing other violence (specific = 64%; other = 50%). Reporting was also higher when leakage and threats involved multiple modes (78%) or multiple recipient types (73%). Regarding shooter profiles, the public reported perpetrators more often when they were fame-seekers (74%) or had a history of pre-attack suicidal ideation (71%), domestic violence (67%), mental health problems (62%), or prior arrest (57%), and reported shooters less often when they were ideologically motivated (46%).

Table 4 Predictors of leakage and threats

Variables	Model 1 (Leakage)			Model 2 (Threat)			Model 3 (Leakage or Threat)		
	B	SE	OR	B	SE	OR	B	SE	OR
Prior Arrest	0.31	0.28	1.36	0.63	0.29	1.88	0.50	0.25	1.64
History of Domestic Violence	0.48	0.27	1.62	2.34	0.27	10.34	1.88	0.25	6.53
Mental Health Problem	0.56	*	1.75	0.60	*	1.82	0.67	0.26	1.95
Pre-attack Suicidal Ideation	0.58		1.79	1.04	***	2.84	0.87	0.31	2.39
Fame-seeking	2.11	**	8.27	0.08	0.56	1.08	1.82	*	6.19
Ideological Motive	2.85	***	17.23	0.23	0.59	1.26	3.35	**	28.45
Control									
Year	0.03	0.02	1.03	0.05	0.02	1.05	0.06	0.02	1.06
≥100 News Articles	0.72	**	2.05	0.12	0.28	1.12	0.30	0.24	1.35
Official Record	0.38		1.47	0.36	0.27	1.44	0.41	0.24	1.51
Constant	-66.6		0.00	-107.3	**	0.00	-114.1	***	0.00
Chi-square	123.3	***		158.4	***		178.4	***	
C&S r^2	0.23			0.28			0.31		
Nagelkerke r^2	0.33			0.41			0.42		
N	483								

* $p < .05$. ** $p < .01$. *** $p < .001$

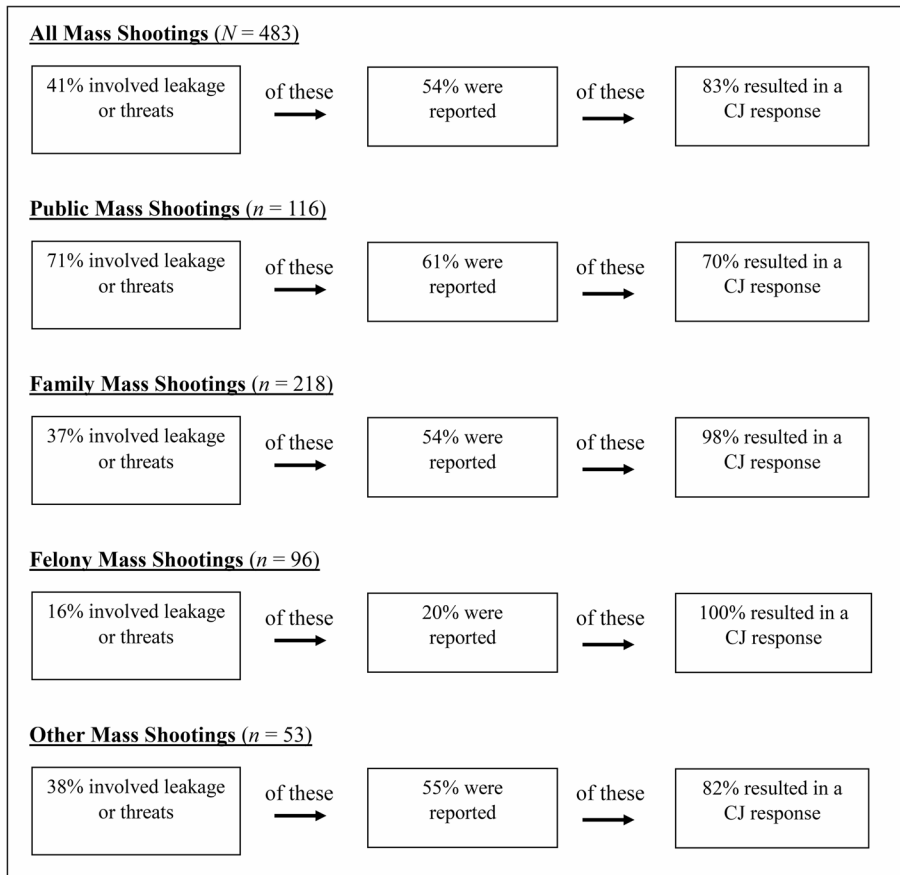


Fig. 1 Attrition from leakage and threats to public reporting and CJ response

Discussion

For this study, we examined all U.S. mass shootings in which four or more victims were killed from 2000 to 2023 and conducted a comprehensive assessment of leakage, threats, public reporting, and responses to reports. Below, we revisit our hypotheses and discuss major findings.

Leakage and Threats Are Most Common Among Public Mass Shooters

We hypothesized that leakage would be more common among public mass shooters (H1), while threats would be more common among family and felony mass shooters (H2). Our results support the first hypothesis but not the second. Every way we measured it, public mass shooters leaked and made threats more than other types of mass shooters. Upon closer inspection, this is largely attributable to differences in perpetrators revealing their specific interest in committing a mass killing. This occurred prior

<u>Signal Type</u>		
Leakage or Threat ($n = 197$)	→	54% were reported
Leakage ($n = 123$)	→	48% were reported
Threat ($n = 128$)	→	71% were reported
Both Leakage and Threat ($n = 54$)	→	80% were reported
Specific Interest in Committing Mass Violence ($n = 66$)	→	64% were reported
Other Interest in Committing Violence (Only) ($n = 131$)	→	50% were reported
Multiple Leakage/Threat Modes ($n = 41$)	→	78% were reported
Multiple Recipient Types ($n = 86$)	→	73% were reported
<u>Shooter Characteristics</u>		
Prior Arrest Record ($n = 129$)	→	57% were reported
History of Domestic Violence ($n = 109$)	→	67% were reported
Documented MH Problem ($n = 90$)	→	62% were reported
Pre-Attack Suicidal Ideation ($n = 75$)	→	71% were reported
Fame-Seeking ($n = 27$)	→	74% were reported
Ideological Motive ($n = 22$)	→	46% were reported

Fig. 2 Reporting rates when leakage or threats occurred

to 35% of public mass shootings, 8% of family mass shootings, and 2% of felony mass shootings. By contrast, the differences in mass shooters' signaling other interest in committing violence (e.g., homicide) were smaller: this occurred in 35% of public mass shootings, 28% of family mass shootings, and 14% of felony mass shootings.

The reasons for these differences are not entirely clear, but evidence-based interpretations can be made. One possibility is that while many mass shooters have violent thoughts pre-attack, public mass shooters are more likely to specifically fantasize about killing large numbers of victims, which then shapes the content of their leakage and threats. If they are more likely to fantasize about their attacks being dramatic, impactful, or likely to thrust them into the national spotlight, that fits with evidence

showing public mass shootings are the subtype that receives the most media coverage, incites the most fear, spawns the most copycats, and has the highest proportion of fame-seeking offenders (Lankford & Silva, 2024; Silva & Lankford, 2026).

A related possibility is that public mass shooters may engage in longer periods of premeditation and planning for mass killing specifically. As a result, there may be more opportunities over time for them to reveal this intent. By contrast, some family shooters had homicidal or suicidal thoughts for extended periods, but their mass shooting appeared hastily planned or even a crime of passion. Similarly, felony mass shooters may have spent considerable time thinking about drug trafficking, gang conflict, or robbery/burglary, but minimal time thinking about mass murder. This could explain their infrequent leakage and threats about specific interest in mass killing, and thus their lower overall counts.

Multiple Theories Help Explain Why Mass Shooters Reveal Violent Intentions

In accordance with theories of criminal propensity, cry for help, and attention-seeking, we hypothesized (H3) that mass shooters' leakage and threats would be associated with higher rates of (a) prior arrest and a history of domestic violence (criminal propensity), (b) mental health problems and suicidal ideation (cry for help), and (c) fame-seeking and ideological motives (attention-seeking). This hypothesis was strongly supported. When violent signaling is analyzed as a composite measure involving leakage or threats, all three theories play an important explanatory role. When leakage and threats are disaggregated, the cry for help theory applies to both, leakage seems better explained by attention-seeking, and threats seem better explained by criminal propensity. In retrospect, these differences make sense. Attention-seeking individuals may recognize that leaking to a third party achieves that goal without the risks of threat-making (which is more often reported). By contrast, individuals with criminal propensity may care less about the risks and more about the coercive power of making threats, which they know from past behavior.

Nearly Half of All Incidents With Leakage or Threats Go Unreported by the Public

We hypothesized (H4) that the public reports leakage and threats less consistently than the criminal justice system responds to those reports. This hypothesis was supported: 54% of all mass shootings involving leakage or threats were reported by the public prior to the attack, meaning 46% (nearly half) went unreported. In turn, 83% of reported incidents resulted in a criminal justice response. These findings suggest the greater problem of inaction (and greater opportunity for improvement) lies with public reporting rather than the criminal justice system. This pattern is consistent with bystander effect theory (Latané & Darley, 1969), as the public may assume others will respond (diffusion of responsibility) or interpret the lack of prior reports as evidence that the situation is not an emergency (pluralistic ignorance). The public may also be less apt to trust their judgment about whether someone poses a serious threat (evaluation apprehension).

Public Uncertainty: The Greatest Barrier to Reporting?

We made multiple hypotheses about key factors associated with the public's willingness to report. We expected reporting would be more common when shooters made threats than when they leaked (H5), when they revealed specific interest in committing mass violence rather than interest in committing other violence (H6), and when they revealed information through multiple modes or to multiple recipient types (H7). We also hypothesized that reporting would be less common when shooters had a prior arrest or history of domestic violence (H8) or were fame-seeking (H9). Hypotheses 5, 6, and 7 were supported, but hypotheses 8 and 9 were not.

Collectively, these findings have important implications. Although it might be assumed that the largest barrier to the public's reporting of potential mass shooters is their fear of retribution (i.e., being harmed by someone they consider dangerous), that is not what our results show. Instead, the public's uncertainty about whether someone is dangerous may be the greatest barrier to reporting. Mass shooters were reported *more often*—not less—when they directly threatened a potential victim or had a prior arrest record or history of domestic violence. They were also reported more often if they had a history of suicidal ideation or mental health problems—factors sometimes stereotyped as signs of dangerousness, even though this association is overstated (Metzl & MacLeish, 2015).⁹ Additionally, reporting was more common when clearer signals of dangerousness were present, including (a) specific interest in committing mass violence, (b) leakage or threats via multiple modes or to multiple recipient types, and (c) expression of both leakage and threats.

That the public's certainty (or uncertainty) about dangerousness largely guides their reporting behavior might also fit our other findings. For instance, fame-seeking shooters were reported more than average, and ideologically motivated shooters were reported less. This would make sense if, when mass shooters want fame, they do more to signal their violent intent and thus provide more clarity to potential reporters about the danger they pose. By contrast, it may be difficult for the public to differentiate between people who intend to commit ideologically motivated attacks and others who are ideologically extreme but not violent. This challenge is experienced by threat assessment officials as well, because radicalized or extremist beliefs are not a strong predictor of extremist attacks (Khalil et al., 2022).

Criminal Justice Practitioners Could Help Increase Public Reporting Rates

Although we found criminal justice practitioners actively respond to reports of leakage and threats 83% of the time—and their response rate is even better for family and felony mass shooters—there may be more they can do. Criminal justice practitioners might help increase public reporting rates by (a) educating the public about evidence-based signs of dangerousness, including leakage and threats, (b) encouraging the public to report leakage and threats even when they are uncertain if a concerning individual will commit violence, (c) making it easier for the public to report information easily and any-

⁹ Some of these individuals may have been reported because they were accurately assessed as being a danger to themselves.

mously, and thus avoid judgment, and (d) bolstering public confidence in the system and its personnel as fair, equitable, and legitimate (Department of Homeland Security, 2023; FBI, 2026; Kane et al., 2023; National Threat Assessment Center, 2024). Additionally, if criminal justice professionals increase their rate of successfully preventing mass shootings by responding to leakage and threats, that could inspire the public to report more frequently. It might be helpful to publicize these “success stories” and showcase how the heroic actions of community members directly helped save lives (FBI, 2026).

Limitations

This study has several important limitations. First, we tested for associations between leakage, threats, and important life factors that could help explain why mass shooters signal their violent intent, but we could not actually test for causation. Further insights could be gained by asking surviving perpetrators why they revealed that information, but their answers could be undermined by falsehoods or lack of self-awareness. Second, we focused on documenting whether reports were made (and to whom), and whether there was a criminal justice response (and what it was), but assessing the quality of each report and response would require far more details. In some cases, the public may have shared only some of what they knew, and in others, law enforcement may have been limited by the legal options at their disposal. A case study method is better suited to that type of analysis (Lankford et al., 2019). Similarly, while we identified whether leakage or threats involved multiple recipient types, we did not capture the number of individual recipients within each type or examine whether patterns of leakage versus direct threats varied across recipient types (see Greene-Colozzi et al., 2025). Future research should consider these distinctions, particularly because the number and type of observers may influence reporting behavior and the potential for diffusion of responsibility. Finally, we should acknowledge that our assessment of public reporting was not based on surveys or interviews, but rather on the publicly available facts of each case. The limitation is that we did not study what community members were thinking when they made reporting decisions, but the benefit is that we avoided potential distortions in their post-attack explanations of what they did and why.

Conclusion

By studying all types of U.S. mass shootings from 2000 to 2023 ($N=483$), accounting for both leakage and threats, testing explanations for why mass shooters reveal this information, and closely analyzing public reporting and criminal justice responses, we have tried to contribute to existing knowledge in multiple ways. However, future research could provide many additional insights. For example, it is unclear how far in advance mass shooters’ leakage or threats typically occur, or when the best opportunities exist for intervention. Studies that account for the temporal nature of perpetrators’ path to violence could fill this gap. Additionally, the mass shootings we studied were all completed, not prevented. It would be helpful to learn whether key differences between tragic outcomes and bloodless ones are rooted in the type of information perpetrators revealed, the public’s reporting behavior, the responses to such

reports, or other factors—and what best practices should be promoted nationwide. Finally, our data suggest that public reporting of leakage and threats may be increasing over time, but this study was not focused on longitudinal trends. In the future, researchers may be able to improve our understanding of the evolving nature of both these crimes and society's attempts to stop them. It may be impossible to prevent all mass shootings, but substantial improvement seems entirely realistic.

Appendix 1

Comparing mass shootings with and without leakage and threats

Variables	Leakage/Threat (<i>n</i> = 197)		No Leakage/Threat (<i>n</i> = 286)		χ^2 /T-test	
	<i>n</i>	%/Mean	<i>n</i>	%/Mean		
<u>Primary Location</u>						
Commerce	53	27%	36	13%	15.91	***
Healthcare	2	1%	1	0%	0.84	
House of Worship	7	4%	2	1%	5.19	*
Education	14	7%	2	1%	14.95	***
Government	7	4%	3	1%	3.61	
Open-area	16	8%	21	7%	0.10	
Residence	98	50%	221	77%	39.41	***
More Than 1 Location	58	29%	43	15%	14.64	***
Workplace	21	11%	16	6%	4.23	*
<u>Firearms</u>						
Handgun	147	78%	224	84%	3.04	
Shotgun	26	14%	32	12%	0.29	
Rifle	51	27%	42	16%	8.56	**
Assault Weapon	45	24%	23	9%	20.37	***
More than 1 Gun	59	30%	80	29%	0.07	
<u>Victims</u>						
# of Victims Injured	-	3	-	1	4.14	***
# of Victims Killed	-	6	-	5	3.65	***
<u>Victim/Offender Relationship</u>						
% Romantic Partner	-	8%	-	8%	-0.05	
% Offenders Child	-	13%	-	19%	-2.15	*
% Other Family	-	20%	-	21%	-0.20	
% Coworker	-	8%	-	5%	1.57	
% Other Non-stranger	-	20%	-	30%	-2.73	**
% Stranger	-	31%	-	18%	3.39	***
<u>Shooter(s) Resolution</u>						
Suicide	82	42%	109	38%	0.60	
Killed	23	12%	16	6%	5.81	*
Arrested	92	47%	161	56%	4.30	*

Notes: There was some missing information for firearms variables. The 2017 Las Vegas shooting was a high injury outlier incident, and it was thus removed from the # of victims injured

p* < .05. *p* < .01. ****p* < .001

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Declarations

Competing interests The authors report there are no competing interests to declare.

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Jason R. Silva is an Associate Professor in the Department of Sociology, Criminal Justice & Social Work at William Paterson University. His research examines mass shootings, school violence, and terrorism. Silva's recent publications have appeared in *Justice Quarterly*, *Homicide Studies*, *Journal of Interpersonal Violence*, *Aggression & Violent Behavior*, *Journal of Threat Assessment and Management*, and *Journal of Criminal Justice*.

Adam Lankford is a Professor and Chair of the Department of Criminology and Criminal Justice at The University of Alabama. He is the author of two books and many peer-reviewed studies on criminal behavior. His findings have been published in a variety of scientific journals and cited by The White House, by every major media outlet in the United States, and by international media from more than 40 countries.