

**Why Have Public Mass Shootings Become More Deadly?
Assessing How Perpetrators' Motives and Methods Have
Changed Over Time**

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Why Have Public Mass Shootings Become More Deadly? Assessing How Perpetrators' Motives and Methods Have Changed Over Time

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Abstract

Research Summary: Public mass shootings in the United States have become substantially more deadly over time. We document this increase, offer a model to explain it, review supporting evidence for the model, and present new findings on offenders from 1966-2019. It appears that societal changes have led to more public mass shooters who are motivated to kill large numbers of victims for fame or attention, and more shooters who have been directly influenced by previous attackers. They often spend extended time planning their attacks and appear increasingly likely to acquire powerful weapons and develop specific strategies to enhance their lethality.

Policy Implications: New policies should address the aforementioned factors. For instance, the deadliest public mass shooters' desires for fame and attention might be countered by a change in media coverage policies. Additionally, the deadliest perpetrators' lengthy planning periods are associated with more warning signs being reported to police, so that information could justify denying many potential attackers access to firearms through extreme risk protection orders and red flag laws.

Keywords: public mass shootings; high-fatality incidents; lethality; fame-seeking; firearms

Introduction

In 2016, the number of people shot by public mass shooters in the United States reached a 40-year high, and in 2017, the number of people killed by active shooters surpassed any year since the FBI began recording data (Duwe, 2017; Hayes, 2017). Public "mass" and "active" shooters essentially refer to a single offender type; the most significant difference is that "mass" shootings are traditionally defined as incidents that result in four or more victim deaths, while "active" shootings have no minimum (Fox & Levin, 2015). Notably, these increases do not appear primarily attributable to population growth: they exist even when victimization figures are adjusted per capita (Duwe, 2017).

There has also been a marked rise in high-fatality attacks of this type. At the extreme, although the United States has experienced public mass shootings for more than 50 years, the five deadliest incidents in national history have all occurred since 2007 (Ahmed, 2018). During this span, the tragic "record" for number of victims killed in an American mass shooting has been set (at Virginia Tech where 32 victims died), broken (at the Orlando Pulse nightclub where

49 victims died), and then set again (on the Las Vegas strip where 58 victims died).¹

This disturbing trend seems counterintuitive. After all, there are many reasons why today's mass shootings should theoretically be less deadly than those from prior decades. Since the 1999 Columbine school shooting, there has been a sustained and dedicated effort to improve how law enforcement officers, medical personnel, and ordinary civilians respond to active and mass shootings (Blair et al., 2013; Pons et al., 2015). This is a priority area that receives more funding, training, and public outreach than ever before (Blair et al., 2013; U.S. Department of Justice, 2017). And there have been continued advancements in life-saving medical technology and techniques that help first responders and emergency room surgeons keep more shooting victims from perishing than in the past (Belluz, 2017; Smith & Delaney, 2013).

To date, no one has provided a clear and compelling explanation for why public mass shootings appear to have become deadlier over time. That may be because finding evidence-based answers is so challenging. Similar struggles are often encountered in other areas, such as scholars' attempts to explain changes in crime rates, climate patterns, or financial markets. Because the path of history provides a sample size of only one reality, it is extremely difficult to know what may have occurred if different variables were present.

In this paper, we offer an explanation for why public mass shootings have become more deadly by identifying several key changes in American society, and then providing evidence of their corresponding effects on the behavior of some shooters. First, however, we will briefly review the empirical evidence that there has indeed been a quantifiable change.

The Increased Lethality of Public Mass Shootings

To analyze changes in public mass shootings over time, we drew data from a publicly available list of qualifying incidents ($n = 165$) compiled by Berkowitz et al. (2019). According to the definition they used, public mass shootings must involve a firearm and result in at least four or more victims being killed.² Past attack locations for these incidents have included schools, colleges, workplaces, public businesses, government buildings, military facilities, and other popular locations. Shootings that arose from gang conflict or robberies or that took place exclusively in private homes were not included. The list compiled by Berkowitz et al. (2019) combined cases documented in prior scholarship—especially from Duwe (2007)—and news reports, and it was designed to capture all incidents from 1966 to present. The starting point of

¹ No names of mass shooters are included in this text, in accordance with the “No Notoriety” campaign and Lankford and Madfis’s (2018) proposal to deny offenders the attention they often seek.

² We focused on victim fatalities instead of total victim casualties (i.e. fatalities + injuries) for several reasons. First, because while fatalities provide a consistent measure of severity, injuries vary dramatically from being life-threatening to relatively minor. We do not have data to account for that variation. Second, because while the data on fatalities provide a consistent measure, data on injuries seem to use inconsistent criteria. For instance, in some cases, injury counts seem to include only victims who were non-lethally shot, while in other cases, counts seem to include people who were injured while fleeing, or who experienced cuts from shattered glass, etc. All that being said, when we analyzed a comparable sample of the worst 35 public mass shootings by total victim casualty count (fatalities + injuries), we found similar increases over time, despite using this less precise measure. Forty-nine percent of all high-casualty incidents (in which at least sixteen victims were killed *or* wounded) from 1966-2019 have occurred since the start of 2010.

1966 is widely recognized as the first year of modern mass shootings (with the University of Texas Tower attack); as an ending point, we obtained complete data through August 30, 2019 (which was our last opportunity to update our findings).

Table 1 is divided into decades and partial decades (1966-1969, 1970-1979, 1980-1989, 1990-1999, 2000-2009, and 2010-2019), and it provides the number of high-fatality public mass shootings that occurred in the United States in each of these time periods. For this study, we defined “high-fatality” incidents as attacks in which eight or more victims were killed, which is double the traditional standard for a public mass shooting. In the United States from 1966-2019, there were 34 high-fatality incidents that met this criterion, which means that our definition includes approximately the top 20% of all public mass shootings based on lethality ($34/165 = 20.6\%$). To ensure that this list of high-fatality mass shootings was accurate, we closely reviewed all cases with eight or more victims killed to make sure they did not include anyone killed prior to the mass shooting.

	8 or more victims killed	12 or more victims killed	16 or more victims killed
Time period	n (% of total)	n (% of total)	n (% of total)
1966-1969	1 (3%)	1 (5%)	0 (0%)
1970-1979	0 (0%)	0 (0%)	0 (0%)
1980-1989	5 (15%)	2 (11%)	1 (11%)
1990-1999	5 (15%)	2 (11%)	1 (11%)
2000-2009	5 (15%)	3 (16%)	1 (11%)
2010-2019*	18 (53%)	11 (58%)	6 (67%)
Total	34	19	9

Source: Berkowitz et al. (2019). The authors reviewed all cases with 8 or more victims killed to make sure they did not include anyone killed prior to the mass shooting incident. Percentages have been rounded to the nearest whole number. *Data collected through August 30, 2019.

As Table 1 shows, high-fatality incidents have become substantially more common over time: 53% of them occurred from 2010-2019. This trend is even more pronounced if we use increasingly stringent thresholds for what qualifies as “high fatality.” If the traditional threshold is tripled, 58% of public mass shootings that killed twelve or more victims have occurred from 2010-2019. And if the traditional threshold is quadrupled, 67% of shootings that killed sixteen or more victims have occurred during the 2010-2019 period. This indicates that the very deadliest incidents have been occurring more frequently as well.

Because more than three times as many high-fatality attacks (with eight or more victims killed) have occurred since the beginning of 2010 as during any prior decade analyzed in this

study, we considered 2010 the approximate “inflection point” of this change.³ By comparing incidents from before and after the start of 2010, we can understand the increasing deadliness of public mass shootings in several additional ways. For instance, it is not only the total number of high fatality incidents that has risen, but also the proportion of incidents that reached a high-fatality threshold. From 1966-2009, approximately 15% of public mass shootings resulted in eight or more victims killed (16/109), but from 2010-2019, that proportion more than doubled to 32% (18/56).

The increase in high-fatality incidents has also had a substantial impact on the overall deadliness of public mass shootings. We calculated the average number of victims killed in all incidents ($n = 165$) before and after the start of 2010, and found that from 1966-2009, public mass shootings averaged 6.2 victim fatalities, but from 2010-2019, these attacks averaged 9.1 victim fatalities. This means that the average number of victims killed per incident has risen by 47% since the beginning of 2010.⁴

A Proposed Model

To gather evidence on the motives and methods of public mass shooters, we drew data from a wide range of sources, including previous scholarship, government reports, primary sources documents (e.g., offender manifestos, journals, online posts, etc.), and news media reports that included information from law enforcement officers, investigators, or witnesses. Naturally, there have been some changes in the nature of this information over time: for example, the entire news media industry is larger than ever before, and perpetrators from earlier decades could not leave behind online posts like more recent attackers. However, we have no reason to think that investigations into extremely deadly public mass shootings during the 1960s, 1970s, or 1980s were any less serious or thorough than they have been in recent years. These incidents are so tragic that they are almost always followed by public demands for answers and in-depth investigations into attackers’ lives. Furthermore, the perpetrators themselves have always had the opportunity to reveal their motives in a variety of ways. Social media posts from a recent mass shooter may essentially be the equivalent of hand-written threats or manifestos from earlier periods.

In Figure 1, we offer a model to explain the increased lethality of public mass shootings. As we will discuss and document in more depth, changes in American society—including increased desires for fame, blurring of the distinction between fame and infamy, and an increased number of high-profile public mass shooters since the mid-1960s—seem to have led to a corresponding rise in the number of public mass shooters and plotters who seek fame and attention through their attacks. There also appears to have been an increase in the number of public mass shooters who were directly influenced by previous attackers. These individuals are

³ Although we considered 2010 the approximate inflection point of the change in the deadliness of public mass shootings, the *causes* that led to this change almost certainly occurred years earlier.

⁴ This study was mostly focused on the nature and impact of high-fatality attacks, which are by definition “outliers.” However, it is worth noting that overall, the median number of victims killed per public mass shooting was five for both the 1966-2009 and 2010-2019 time periods. This illustrates the impact of high-fatality incidents on the overall average. Not all public mass shootings have changed; in fact, many incidents from 2010-2019 were no more lethal than those from prior decades. However, there has been a significant change in the deadliest attacks, and presumably in the behavior of the subset of perpetrators who commit them.

often motivated to kill large numbers of victims because of the widespread attention that will bring them, and some specifically attempt to surpass the body counts killed by their predecessors.

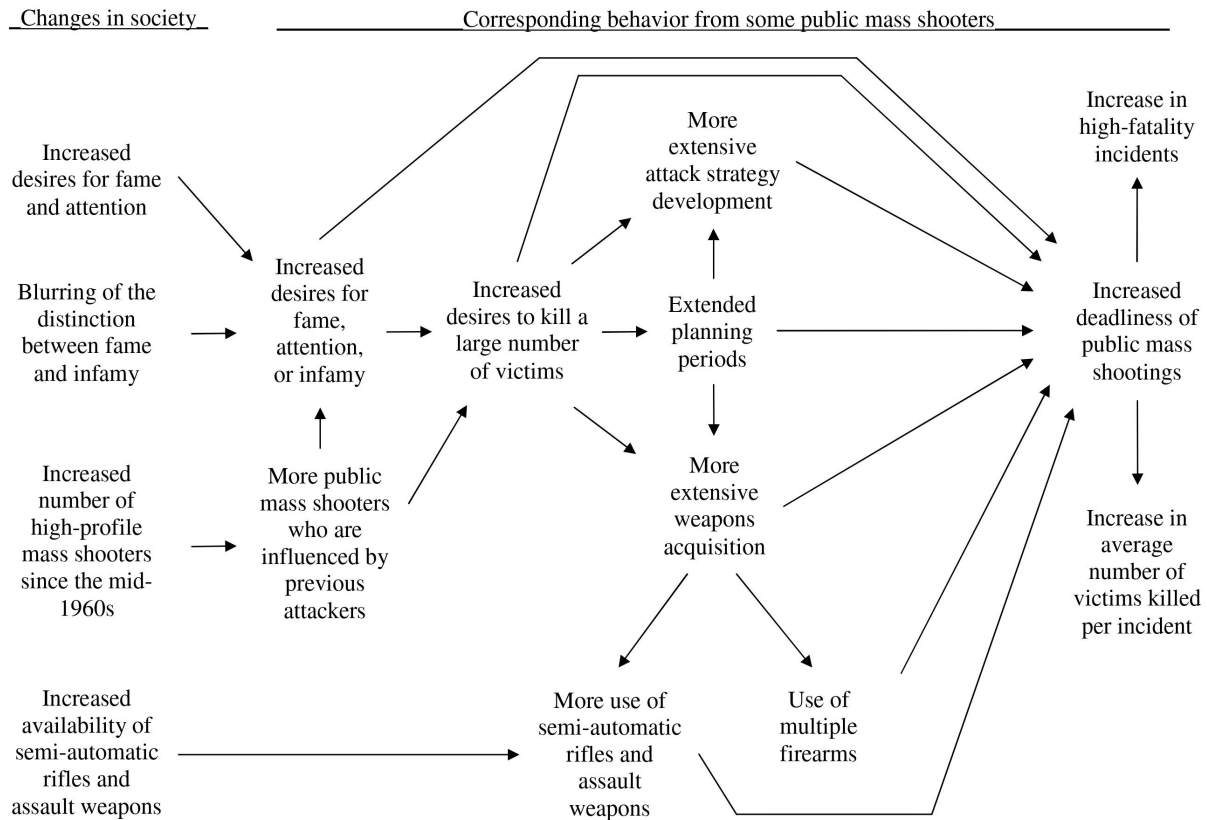


Figure 1. Proposed Model of Increased Deadliness of Public Mass Shootings

These increasingly common motives seem to have caused a change in perpetrators' most common methods of attack. Put simply, public mass shooters who want to kill large numbers of victims appear more likely to take specific steps to accomplish those goals. In particular, they often engage in extended planning periods, they develop more extensive attack strategies, and they seem more driven to acquire weapons that will increase their lethality. In many cases, this weapons acquisition involves obtaining multiple firearms and at least one semi-automatic rifle or assault weapon. And those who seek these powerful weapons benefit from another key change in American society: the increased availability of semi-automatic rifles and assault weapons for consumers (Bureau of Alcohol, Tobacco, Firearms and Explosives, 2018; Heath et al., 2017).

Of course, this model does not describe all offenders, and other variations do exist. For example, some public mass shooters have wanted fame or expressed the desire to kill large numbers of victims but lacked the means to achieve those goals (Lankford, 2016b). There have

also been public mass shooters who had highly lethal weapons but did not appear to care about producing a particularly high death toll (Berkowitz, et al., 2019).

As we will discuss and demonstrate in more detail, however, the proposed factors seem to explain why public mass shootings have become increasingly deadly over time.

Increased Desires for Fame and Attention in Society

Within American society, desires for fame, attention, and celebrity status seem more widespread and powerful than ever before (Lankford, 2016b; Sternheimer, 2011; Twenge, 2014; Uhls & Greenfield, 2011). For instance, when children aged 10-12 are asked about the most important thing for their future, their most common answer is “to be famous,” not to be financially successful, be part of a community, or be nice (Uhls & Greenwood, 2012). And far more middle school students say they would like to work as an assistant to a famous celebrity than express interest in becoming a CEO or United States senator (Stein, 2013). Along similar lines, whereas people from prior generations put a premium on becoming more spiritual, helping others, and becoming leaders in their community, 51% of Americans aged 18-25 say that “to be famous” is one of their generation’s most important goals in life (Pew Research Center, 2007). Additionally, 50% of millennials (i.e., people born between approximately 1981-1996) say they believe “their life should be made into a movie” (Business Wire, 2017).

Notably, many Americans also seem increasingly desperate for fame and attention regardless of the cost to themselves or others. One in six millennials say they would “forego having children for the possibility of fame,” one in nine say they would “rather be famous than get married,” and one in twelve say they would “completely detach themselves from their family to become famous” (Clapit, 2017). Some Americans also appear increasingly willing to sacrifice their integrity and values for fame and attention, or to engage in outrageous, salacious, morally questionable, or even criminal behavior to reach such goals (Lankford, 2016b; Twenge, 2014; Sternheimer, 2011; Uhls & Greenfield, 2011).

Perhaps as a result, the distinction between fame and infamy also seems to be disappearing. This is apparent in many segments of American society. Magazine covers no longer feature only “good” celebrities, they increasingly showcase rapists, child abusers, drug addicts, and murderers (Levin et al., 2005). Reality TV shows are filled with many people who appear happy to engage in immoral and illicit behavior as long as they get to be seen on television (Lankford, 2016b). And social media has become a competitive battlefield for people who will say or post seemingly anything to get noticed (Lankford, 2013; Rossi & Rubera, 2018). Even the president of the United States has suggested that “all press is good press.” Overall, many people seem to have become so desperate for attention that they would rather get negative attention than feel like they are being ignored (Lankford, 2016b; Levin et al., 2005; Pinsky & Young, 2008).

Increased Desires for Fame, Attention, or Infamy Among Public Mass Shooters

Unfortunately, these widespread changes in American society seem associated with a corresponding rise in the number of public mass shooters who seek fame, attention, or infamy. Although many of these perpetrators commit suicide or are shot and killed during their attacks,

that does not seem to detract from their desire for widespread attention (Langman, 2018; Lankford, 2016). In fact, it may exacerbate it. Some of these shooters attempt to compensate for their failures in life by creating legacies that will persist long after their deaths (Bushman, 2018; Follman & Andrews, 2015; Langman, 2017, 2018; Lankford, 2016).

In addition to perpetrators who want to become famous, there are also some public mass shooters who seek attention for an ideological cause. And much like perpetrators who want fame for themselves, these ideologically-driven attackers often recognize that killing innocent people will garner substantial media attention. However, prior research suggests that these two types may often overlap (Lankford, 2013, 2018b). There have been some public mass shooters, including the Columbine shooters and the Virginia Tech shooter, who expressed radical ideologies despite having no formal connection to an extremist group. Conversely, some ideologically-driven attackers have sought fame or attention for themselves, in addition to the attention they hoped to bring to their cause (Kruglanski, Chen, Dechesne, & Fishman, 2009; Lankford, 2013, 2018b). In fact, terrorist organizations have often marketed the opportunity to be a “martyr” as a way for people who struggled in life to create a powerful legacy (Hoffman, 2006; Lankford, 2013; Pedahzur, 2005).

Overall, the chronological increase in perpetrators seeking fame, attention, and infamy can be documented in several different ways. For one thing, it can be found among active and public mass shooters in general, regardless of how many victims they kill. For instance, Lankford (2016b) found that more fame-seeking shooters attacked in the United States from 2006-2015 than over the previous thirty years combined. Notably, these fame-seeking motives appear especially common among the deadliest offenders. From 1966-2015, fame-seeking mass and active shooters averaged more than twice as many victims killed as perpetrators who were not known to have this motive (Lankford, 2016b).

In addition, Capellan, Johnson, Porter, & Martin (2018) found that a higher proportion of active and mass shooters since 2010 have been ideologically-driven than during any prior decade since the 1960s, so a significant proportion of these perpetrators may have been seeking attention for their cause (and/or themselves). In fact, committing a public mass shooting may have become significantly more attractive to ideological extremists than attacking with other weapons, because the likelihood of “success” is so much higher. As Lankford (2013) noted several years ago, “mass-shooting attacks are much simpler to prepare for than elaborate bombings or hijackings” (p. 164), and the data bear that out. Since 9/11, there has not been a single bombing or hijacking in the United States that killed eight or more victims—despite dozens of attempts—and only one vehicle attack which reached that level of deadliness (Bergen et al., 2019). By contrast, there have been 23 public mass shootings over the same time span that killed eight or more victims, which suggests that this method of attack is a significantly better way to get fame and attention.

To document the increase in fame- and attention-seeking among public mass shooters, we closely studied all high-fatality incidents in which eight or more victims were killed in the United States from 1966-2019. Although verifying these motives can be difficult, we have found perpetrators who exhibited them as far back as 1966. We coded each incident based on whether there was explicit evidence of fame- or attention-seeking, explicit or circumstantial evidence of fame- or attention-seeking, or no evidence of fame- or attention-seeking. We defined “explicit evidence” to mean that the offender openly admitted seeking fame or

attention, directly contacted the media to get it, or made public statements about the attack, before or during the attack, that were intended for a wide audience. We defined “circumstantial evidence” to mean that the offender engaged in other attention-seeking behavior, attacked to bring attention to an ideological cause, or was believed to be seeking fame or attention by people intimately familiar with his case. All remaining incidents were coded as “no evidence.”

As shown in Table 2, among perpetrators of high-fatality public mass shootings, there appears to have been a clear increase in fame- and attention-seeking motives over time. From 1966-2009, only 25% of cases had explicit evidence of fame- or attention-seeking, but from 2010-2019, 56% of cases had explicit evidence of this type. Similarly, from 1966-2009, 44% of cases had explicit or circumstantial evidence of fame- or attention-seeking, but from 2010-2019, that evidence was present in 78% of cases.

	1966-2009 (n = 16)	2010-2019* (n = 18)
Variable	Mean/%	Mean/%
Perpetrator age	37.9	29.9
Perpetrator below age 30	25%	67%
Number of victims killed	13.1	18.0
Explicit evidence of fame-seeking or attention-seeking	25%	56%
Explicit or circumstantial evidence of fame-seeking or attention-seeking	44%	78%
Direct evidence that perpetrator was influenced by another specific attacker or attackers	25%	50%
Planned mass shooting for more than 1 year	38%	50%
Attack strategy was developed to increase fatalities	31%	61%
Semi-automatic rifle or assault weapon	31%	56%
Multiple firearms	81%	78%

High-fatality incidents were defined as those that resulted in eight or more victims being killed, and did not include anyone killed prior to the mass shooting. Because the unit of analysis was incidents, for the two incidents with dual perpetrators, the perpetrator ages were averaged. Percentages have been rounded to the nearest whole number.
*Data collected through August 30, 2019.

A closer look at the public mass shooters who sought fame or attention revealed that not only were they more lethal, but also that most of them fit squarely within the age demographic of Americans who are more likely to prioritize becoming famous. Although the Las Vegas shooter was a clear exception, overall, high-fatality mass shootings were committed by substantially younger perpetrators from 2010-2019 ($M = 29.9$) than from 1966-2009 ($M = 37.9$). In fact, 67% of high-fatality incidents from 2010-2019 were committed by perpetrators younger than 30, compared to only 25% of high-fatality incidents from 1966-2009. (The offender's age was unknown for one case.) Overall, this supports the possibility that these perpetrators' more common desires for fame and attention may be affected by changes in their social context.

Increased Desires to Kill Large Numbers of Victims

For public mass shooters who want fame or attention, there is an obvious answer: kill a large number of victims. Perpetrators who do so almost always get the reward they seek (Lankford, 2018a; Lankford & Madfis, 2018a).

The relationship between high death tolls and high levels of media attention has been demonstrated empirically. For instance, prior studies have shown that for a mass shooter, more victims killed equals more front page photos of you in the newspaper, more days that you stay on the front pages, more likelihood of you appearing in the *New York Times*, and more articles and longer articles (based on word count) published about you (Dahmen, 2018; Duwe, 2004; Schildkraut et al., 2018).

Of course, many perpetrators do not ever declare exactly how lethal they intended to be, so it is impossible to quantify this motive for them. However, anecdotal evidence suggests that there has been a dramatic rise in public mass shooters and plotters who wanted to kill large numbers of victims.

Although there were a few perpetrators from earlier decades who expressed the desire to kill many victims, the most influential case may have been the 1999 Columbine shooting. The fame-seeking perpetrators of that attack—who like many other members of their age cohort, wanted a movie made about their lives—stated that their goal was “The most deaths in U.S. history” and suggested they “hope we kill 250 of you” (Lankford, 2016b, p. 126). Fortunately, they failed to reach those objectives, but they did succeed in both committing the worst school shooting in U.S. history at that time and in inspiring many copycats (Follman & Andrews, 2015).

More recently, the 2011 Tucson shooter wrote “I HAVE THIS HUGE GOAL AT THE END OF MY LIFE: 165 rounds fired in a minute!” (Lankford, 2016b, p. 126), which seems indicative of his highly lethal goals. Similarly, the 2014 Santa Barbara shooter wrote that he wanted “to destroy the entirety of Isla Vista, and kill every single person in it” (Duke, 2014). In turn, a teenager whose attack on a Minnesota high school was thwarted in 2014 admitted to police that “I just wanted as many victims as possible” (Gladwell, 2015). Likewise, the 2015 Charleston Church shooter told a friend he wanted to “kill a bunch of people” (Paddock, 2015), and the 2015 Umpqua Community College shooter wrote that “the more people you kill, the more you're in the limelight” (Lankford, 2016b, p. 126).

In another recent example, the 2018 Parkland shooter stated in his cell phone video that “My goal is at least 20 people,” which would have made him one of the deadliest mass shooters

in national history. His social media posts included statements such as “I wanna die fighting killing shit ton of people” and “I wish to kill as many as I can” (Marjory Stoneman Douglas High School Public Safety Commission, 2019). In a separate case a few weeks later, police arrested a man in Vermont who had acquired weapons, was planning to attack his former school, and had written in his journal that “I’m aiming to kill as many as I can” (Bidgood, 2018). In turn, shortly after his arrest for the 2018 Pittsburgh synagogue shooting, that perpetrator told police that “all these Jews *need to die*” (Scolforo, Breed, & 2018). Similarly, following his arrest, the 2019 El Paso shooter told investigators that “he wanted to shoot as many Mexicans as possible” (Francescani, Katersky, Hoyos, et al., 2019).⁵ He had reportedly participated in an online forum where mass shooting death counts are referred to as the “score”—with the most lethal shooter in history having the “high score” (Ailworth, Wells, & Lovett, 2019).

Circumstantial evidence suggests that many of the other deadliest shootings in U.S. history were also intended to produce a high death toll. As just one example, the 2017 Las Vegas shooter’s brother Eric “believed...[he] would have planned the attack to kill a large amount of people because he would want to be known as having the largest casualty count. [He] always wanted to be the best and known to everyone...[he] needed to be seen as important” (Las Vegas Metropolitan Police Department, 2018). This appears consistent with other elements of the Las Vegas shooter’s behavior, such as his lethal attack strategy and extreme weapons acquisition (Las Vegas Metropolitan Police Department, 2018).

Increased Number of High-Profile Public Mass Shooters Since the Mid-1960s – and Their Influence

Another important factor may be the overall increase in the number of high-profile public mass shooters since the mid-1960s. As noted earlier, 1966 is widely recognized as the beginning of the rise in these types of shootings (with the University of Texas Tower attack), and multiple data sources indicate that public mass shootings in the United States have become more frequent since that time (Berkowitz et al., 2019; Bagalman, Caldwell, Finklea & McCallion, 2013). Over the same general period, news media and information dissemination technologies have grown exponentially, resulting in far more high-profile attackers than ever before (Lankford, 2016b). These killers are no longer covered only by newspapers, radio, and network news; they are now also featured on 24/7 cable news, online news, blogs, podcasts, and social media platforms.

One consequence of the existence of more high-profile public mass shooters is that they can influence subsequent attackers. To get a better sense of changes in these influences over time, we coded each high-fatality incident for evidence that the perpetrator was directly influenced by a previous attacker or attackers. To avoid any ambiguity, we only counted perpetrators who were known to have directly cited, referenced, or studied a previous public mass killer. Naturally, this does not account for the more subtle ways that most members of

⁵ Although we were not able to measure how much hatred different mass shooters felt for their victims, and whether those who espoused particularly hateful ideologies were also more motivated to kill a higher number, extreme ideological beliefs could have an important effect on homicidal intent. For instance, killers who subscribe to ideologically-driven conspiracy theories and view their victims as evil or subhuman enemies who pose an existential threat may also be more prone to want to kill as many victims as possible.

society are affected by their general awareness of national news.

As shown in Table 2, we found that from 1966-2009, only 25% of high-fatality public mass shootings were committed by perpetrators known to have been specifically influenced by a previous attacker or attackers. But from 2010-2019, that proportion rose to 50%.

These types of influence have been analyzed by scholars using a variety of terms, including contagion, imitation, inspiration, and copycat behavior (Kissner, 2016; Langman 2017, 2018; Lankford & Madfis, 2018a,b; Meindl & Ivy, 2018; Towers et al., 2015). Although the precise effects of such influence are impossible to determine for every case, prior research suggests that high-profile public mass shooters may increase some at-risk individuals' desires to attack at all, to kill for fame and attention, and/or to kill a large number of victims for a correspondingly larger amount of fame and attention (Kissner, 2016; Langman 2017, 2018; Lankford, 2016b; Lankford & Madfis, 2018a,b; Meindl & Ivy, 2018; Towers et al., 2015). For instance, sometimes the role model may primarily serve as inspiration, while in other cases, the role model is influential by vividly demonstrating that high-fatality killers of this type are consistently rewarded by the media with fame (Lankford, 2016b; Meindl & Ivy, 2018; Lankford & Madfis, 2018a,b).

Because these perpetrators are often competing for fame, attention, and legacy, many of them also view body counts as a competition, and therefore may attempt to surpass the death tolls of previous attackers. Among our sample of high-fatality public mass shootings from 1966-2019 ($n = 34$), we found that attacks that were directly influenced by a previous attacker or attackers were 48% more deadly, on average, than attacks for which there was no evidence of such influences.

There are also other indications of this relationship between previous attackers' influence and subsequent attackers' highly-lethal intentions. For example, there have been at least thirteen cases of plotters who specifically referenced Columbine and stated that they wanted to exceed its body count (Follman & Andrews, 2015). Along similar lines, prior to his 2012 attack, the Sandy Hook shooter posted online that he was impressed that a mass shooter in Norway had set the world record for victims killed—and then he personally went on to commit the second deadliest public mass shooting in United States history, at that time (Lankford, 2016b).

In another case, the 2015 Roanoke shooter wrote in his manifesto that he “was influenced” by the Virginia Tech shooter: “That’s my boy right there. He got NEARLY double the amount that [the Columbine shooters] got” (Stein, 2015). Likewise, the 2016 Townville shooter wrote “I HAVE TO BEAT [the Sandy Hook shooter]...At least 40,” before increasing his goal: “I think I’ll probably most likely kill around 50 or 60...If I get lucky maybe 150” (Cox, 2018). Subsequent investigations revealed that he had used his phone to Google “deadliest U.S. mass shootings” and “top 10 mass shooters” (Cox, 2018). Even more recently, a thwarted 2018 school shooting in Maine was motivated by the suspect’s “express intention to become the most notorious school shooter in American history by exceeding the number of people killed recently in Florida” (Associated Press, 2018). In online posts, he “estimated he could kill as many as 30” (Associated Press, 2018). Fortunately, not all of these attackers were successful in killing as many people as they intended, but their statements suggest a possible rise in the number of public mass shooters who want to kill large numbers of victims to surpass the previous attackers who influenced them.

Extended Planning Periods

In general, most public mass shootings are premeditated, but the amount of planning varies considerably. In one of the first studies to measure this variable, Vossekuil et al. (2002) found that 51% of school shooters planned their attacks for at least one month. More recently, Silver et al. (2018) found that among cases where there was sufficient evidence to make a determination, 77% of active shooters planned their attacks for more than one week, 62% planned for more than one month, and 9% planned for more than one year.

To better understand planning among the deadliest perpetrators, we coded each high-fatality incident from 1966-2019 for evidence that it was planned for more than one year, which represented the highest threshold found in prior research. Because it is impossible to read perpetrators' minds, we calculated duration of planning based on the first point at which they were known to have expressed interest in committing a mass killing or to have taken specific steps to prepare for their attack.

As shown in Table 2, we found only a small increase in duration of planning over time. From 1966-2009, 38% of high-fatality incidents were planned for more than one year, while from 2010-2019, that proportion rose to at least 50%. (We say "at least" because planning data are not yet available for some of the most recent incidents.) Because this chronological increase is relatively small, it suggests that perpetrators from the last decade are only moderately more likely to engage in extended planning periods than their predecessors.

What seems far more clear, however, is that perpetrators who planned their attacks for more than one year have been substantially more deadly, on average, than those who planned for less time. Overall, we found that at least 44% of high-fatality attacks were planned for a year or more, compared to only 9% of active shootings overall (Silver et al., 2018). And within our sample of 34 high-fatality incidents, those that were planned for more than one year resulted in 85% more victims being killed than those with shorter planning periods.

Further research could yield valuable insights on why extended planning periods seem associated with increased lethality. Some perpetrators who spend a long time planning may be more likely to develop attack strategies and acquire weapons that directly increase their lethality. However, a full year is certainly not required to prepare for a mass shooting, so the explanation may involve psychological factors as well. For example, a year of fantasizing about becoming a famous public mass shooter may increase perpetrators' homicidal resolve and commitment to killing many victims. Perpetrators who spend a long time planning, ruminating, and fantasizing may also be more susceptible to the influence of other attackers they see in the news, and thus more likely to be inspired by them, to copy them, to compete with them, or to want to surpass them.

More Extensive Attack Strategy Development

Public mass shooters who want to kill large numbers of victims often develop an attack strategy to accomplish that goal. This appears far more effective than simply walking into a public place and opening fire. To measure the presence of this variable, we coded each high-fatality incident from 1966-2019 for evidence that it involved an attack strategy designed to

produce a high death toll. Qualifying strategies included perpetrators' research and analysis of prior public mass shootings (if it appeared tactical and seemed separate from inspiration or curiosity), their calculated selection of victim-rich target locations, their attempts to prevent victims from escaping, and other tactics designed to increase their lethality.⁶

During the same period when public mass shootings have become increasingly deadly, the number of perpetrators who used these attack strategies appears to have increased as well. From 1966-2009, 31% of high-fatality incidents involved strategies to increase the perpetrators' lethality, but from 2010-2019, that proportion grew to 61% (see Table 2). As expected, we found that perpetrators who used attack strategies of this type killed more victims, on average, than perpetrators who did not.

There are a few notable examples from the earlier period. For example, the 1966 University of Texas shooting involved the perpetrator bringing his weapons to the tower's observation deck, so he could shoot from a tactically advantageous position. The 1991 Luby's cafeteria shooter crashed his truck through the front window of that restaurant before opening fire, combining a vehicle attack with his mass shooting. And the 2007 Virginia tech shooter deliberately chained three school doors shut to prevent victims from escaping.

However, such strategies appear far more common since 2010. For instance, the 2012 Aurora shooter wrote that he selected a particular movie theater because it would have many people "packed in single area" so his mass shooting would result in "maximum casualties" (Follman, 2015). The 2012 Sandy Hook shooter prepared for his attack by creating and analyzing a "7-by-4-foot spreadsheet documenting the names, body counts, and weapons from previous mass murders" that "sounded like a doctoral thesis," according to law enforcement (The Week, 2015). And the 2015 Umpqua Community College shooter analyzed prior perpetrators and wrote that "they don't work fast enough and their death toll is not anywhere near where it should be. They shoot wildly instead of targeted blasts. They also don't take on the cops." (Anderson, 2017). He then engaged in a firefight with police during his own attack.

In other recent examples, the 2016 Orlando Pulse nightclub shooter considered several well-populated attack locations, including Disney World, before deciding on the Pulse nightclub because it was a softer target. The 2017 Las Vegas shooter searched online for "biggest open air concert venues in USA," and "how crowded does Santa Monica Beach get" before deciding on his attack location (Las Vegas Metropolitan Police Department, 2018). He also decided to shoot from an elevated position, use a bump stock to increase his firing rate, and shoot incendiary rounds at nearby fuel tanks in an attempt to spark an explosion. And the 2018 Parkland shooter apparently selected a "a unique building" at the school where he would be "unchallenged" and "unfettered," according to law enforcement, and he kept reminders on his phone to improve his killing ability ("Control your breathing and trigger pull...same thing every time") (Camp et al., 2019; Mazzei, 2018). Perhaps copying the 1966 Texas shooting and 2017 Las Vegas shooting, the Parkland shooter also "tried to set up a sniper position from the windows" to shoot fleeing students from above, but fortunately his bullets could not penetrate the hurricane-resistant

⁶ We did not classify wearing a ballistic vest or purchasing large amounts of ammunition as attack strategies designed to produce high death tolls. A ballistic vest is primarily aimed at protecting the offender, not harming others. And although obtaining large amounts of ammunition may indeed be associated with increased lethality, that variable seems more like a form of weapons acquisition, and we could not find reliable information on the amount of ammunition obtained by most offenders in this study.

glass (Mazzei, 2018). More recently, the 2019 Virginia Beach shooter used a silencer to muffle the sound of his shots, which made it more difficult for both potential victims and law enforcement to pinpoint his location.

More Extensive Weapons Acquisition

There is strong empirical evidence that weapons choice affects lethality. Multiple data sources indicate that active and public mass shootings committed with semiautomatics rifles and assault weapons result in more victims killed, on average, than attacks with less powerful weapons (Follman et al., 2018; Klarevas, 2016; de Jager et al., 2018). Similarly, previous research has found that active and public mass shootings committed by perpetrators with multiple firearms also result in more victims killed, on average, than attacks with a single firearm (Klarevas, 2016; Lankford, 2015, 2016a). Our analysis of all public mass shootings ($n = 165$) compiled by Berkowitz et al. (2019) also found the same relationship between multiple firearms and higher fatality counts. (Data on use of semiautomatics rifles and assault weapons were not available for all 165 cases).

It is therefore no surprise that attackers who want to kill large numbers of victims often increase their lethality by arming themselves with a semi-automatic rifle or assault weapon and/or obtaining multiple firearms. In this way, motive can affect weapons acquisition. Not all public mass shooters with powerful weapons seem to care about producing high death tolls, but virtually all public mass shooters who want to produce high death tolls seem to care about having powerful weapons.

Overall, there appears to have been an increase over time in public mass shooters' use of semi-automatic rifles and assault weapons (Follman et al., 2018; Klarevas, 2016), and we similarly found an increase in the use of these weapons by the deadliest attackers. From 1966-2009, 31% of high-fatality public mass shootings were committed by perpetrators armed with a semi-automatic rifle or assault weapon, while from 2010-2019, that proportion rose to 56% (see Table 2). As expected, we also found that within this sample, perpetrators with semi-automatic rifles/assault weapons killed more victims, on average, than perpetrators without them.

On the other hand, although we did find that the deadliest attackers usually armed themselves with multiple weapons, we did not find an increase in this variable over time. From 1966-2009, 81% of high-fatality incidents were committed by perpetrators who had acquired multiple weapons, while from 2010-2019, that proportion was slightly lower at 78% (see Table 2). The lack of change in this variable over time is not particularly surprising, given that for most of American history, people who have wanted to purchase multiple firearms have encountered few barriers to doing so.

However, there does appear to have been a substantial increase in the availability of semi-automatic rifles and assault weapons. Although the Bureau of Alcohol, Tobacco, Firearms and Explosives (2018) does not provide details on the production of these specific firearm types, the overall number of rifles manufactured in the United States grew from under 1 million in 1986 to more than 4 million in 2016. And in particular, AR-15 styled weapons have constituted an increasingly large proportion of total rifles manufactured each year (Heath et al., 2017). There was a temporary limit to this growth from 1994-2004—when the Federal Assault

Weapons Ban increased the obstacles and costs—but the assault rifle market quickly rebounded after the ban’s expiration. For instance, the number of assault rifle manufacturers rose by approximately 1700% from 2000 to 2015 (Archer, 2015). And by 2016, more than 60% of all rifles sold in the United States were AR-15 styled (Heath et al., 2017). Furthermore, as the available supply has spiked, prices from some retailers have dropped precipitously, making it even easier for public mass shooters to purchase the weapons they want (Heath et al., 2017).

Overall, the increased use of semi-automatic rifles and assault weapons seems like an important reason why public mass shootings have become more deadly over time. This makes sense: motivated offenders with more lethal weapons should be expected to do more harm. However, it should also be noted that even when holding firearm use constant, fatalities have risen. For instance, data from Klarevas (2016) show that attacks with assault weapons from 2006-2015 were more deadly than attacks with assault weapons from 1966-2005. And data from Follman et al. (2018) show the same general trend: perpetrators with semi-automatic rifles and assault weapons averaged more victims killed from 2010-2018 than perpetrators with those same types of weapons killed in previous decades. We also found that public mass shootings committed with multiple firearms from 2010-2019 were more deadly than attacks with multiple firearms from earlier time periods.

In other words, weapons make a difference, but they do not tell the whole story. This is consistent with our proposed model. To understand why public mass shootings have grown deadlier over time, multiple factors—and their interaction—must be considered.

The Worst of the Worst

In an early section of this study, we provided data illustrating that high-fatality public mass shootings have become more common over time, even if “high-fatality” incidents are defined in several different ways. In fact, the more extreme the definition, the more extreme the increase.

Now that we have presented our model and the evidence for each of its factors, we thought it worthwhile to closely reexamine the most deadly cases. In Table 3, we list all public mass shooters who killed sixteen or more victims in the United States from 1966-2019. For each perpetrator, we identified whether there was (1) explicit evidence of fame-seeking, (2) explicit or circumstantial evidence of fame-seeking or attention-seeking, (3) direct evidence of being influenced by another specific attacker or attackers, (4) planning for more than one year, (5) a specific attack strategy developed to increase fatalities, (6) the acquisition of a semi-automatic rifle or assault weapon, and (7) the acquisition of multiple firearms.

(See Table 3 at end of document.)

The results show a clear increase in many of these factors over time. Although the extremely lethal public mass shooters from 1984 and 1991 both had multiple firearms (and one had an assault weapon), they lacked some of the other factors that seem to have sparked an increase in the deadliness of public mass shootings in recent years. For example, the earlier perpetrators did not appear to have been fame-seekers or attention-seekers or to have planned their attacks for more than one year. And back then, that may not have mattered as much. Their attacks—and the large number of victims they killed—occurred in another social context, long before Columbine awakened America to the nature of this threat, and long before police,

civilians, and emergency medical personnel were trained on how to respond to these shooters.

By contrast, the more recent public mass shootings adhere to a very consistent profile. Without exception, these perpetrators appear to have sought fame or attention, and most of them were directly influenced by previous attackers. They almost all planned their attacks for more than one year. And in most cases, they developed a specific attack strategy to kill more victims, acquired a semi-automatic rifle or assault weapon, and armed themselves with multiple firearms. This deadly combination of factors describes many of the “worst of the worst” public mass shooters and their increasingly frequent attacks.

Policy Recommendations

New policies should address the factors that appear to be making public mass shootings more deadly. However, it seems unlikely that we could successfully counter all of the key variables. Among Americans, for instance, the pursuit of fame and attention has become so pervasive that it seems unlikely to be mitigated any time soon, even though psychological studies have shown that fame-seeking is often unhealthy (Nickerson et al., 2003). Similarly, the blurring of fame and infamy seems like an unfortunate but inevitable result of the competition for attention, because many people accurately recognize that outrageous behavior increases the chances of them getting noticed.

Changing Media Coverage of Public Mass Shooters

Fortunately, it may be possible to disrupt the reward system that incentivizes public mass shooters to kill large number of victims for fame and attention. The key is changing how the news media cover these attacks. Although the media landscape is more disaggregated than ever before, traditional media organizations are still the primary vehicle that transform perpetrators into celebrity killers (Lankford, 2018a). In fact, most social media discussions of individual mass shooters start with people disseminating, reposting, and reacting to reports from traditional news outlets.

How exactly should the media change their approach? The consensus from scholars and law enforcement appears clear: stop publishing the names and photos of public mass killers (except during ongoing searches for escaped suspects), but continue reporting the other details of these crimes in a responsible manner. An open letter calling for this approach has been signed by 149 criminologists, professors, and law enforcement professionals (“Dear Members of the Media,” 2017). And similar recommendations have been supported by the FBI, the International Association of Chiefs of Police, the International Police Association, and the advocacy group “No Notoriety,” along with some political leaders, families of victims, and media members themselves (Federal Bureau of Investigation, 2017; Lankford & Madfis, 2018a). If this approach is implemented nationwide, it could deter a substantial proportion of fame- and attention-seekers from committing public mass shootings, while also removing the incentive for them to kill large numbers of victims to forge a legacy. The strategy of refusing to publish their names and photos would also be consistent with the core tenets of deterrence theory (Stafford & Goodrum, 2001): it would be swift, certain, and severe.

But media organizations that adopt this policy need to be loud and clear about their

intentions by letting everyone know—including potential perpetrators. As an analogy, removing cash from bank vaults would only deter bank robbers if they were *aware* that their incentive for robbing a bank was no longer present. If we reach a point when killing a large number of innocent people is no longer rewarded with fame and attention, the news of this important change needs to become common knowledge. Otherwise, we would expect a substantial lag between the reduced rewards for criminal behavior, and criminals' perception that the rewards have been reduced.

In addition to deterring some public mass shooters and removing their incentive for killing large numbers of victims, another potential benefit of not giving them publicity is that it could limit their influence on copycats and imitators. As a reminder, this study found that from 2010-2019, at least 50% of high-fatality public mass shootings were committed by perpetrators who were specifically influenced by a previous attacker or attackers. It is important to both prevent future perpetrators from becoming dangerous role models and to reduce the influence of past attackers. In their aforementioned letter to the media, 149 criminologists, professors, and law enforcement professionals called for the coverage to “stop using the names, photos or likenesses of past perpetrators” (“Dear Members of the Media,” 2017). Similarly, Follman (2019) recently suggested that “it’s time to bury the Columbine shooters,” because although those perpetrators have been deceased for more than twenty years, their influence has been kept alive by the continued fixation on them as historic figures. Of course, a complete elimination of references to past public mass shooters is not realistic, but it should be possible to let their influence fade if their identities are not constantly re-published.

Although the ideal approach might be for the news media to stop publishing mass shooters' names and photos altogether, Lankford (2018c) identified a middle ground that some outlets might find more palatable. He challenged editors and reporters to ask themselves “How *often* does the public need to read/hear a mass shooter’s name [or]...see a mass shooter’s face in the news?” Thoughtful people may disagree about whether perpetrators' names and photos should be published at all, but few would claim that they need to be repeatedly regurgitated in news coverage for weeks, months, and years following an attack—as has been the standard operating procedure for decades.

The advantage of a moderate approach is that it may be less intimidating for media companies to implement. The disadvantage is that the benefits are less assured. One likely benefit is that reducing the amount of coverage perpetrators receive should reduce the number of copycats and imitators. After all, in accordance with basic advertising principles, if public mass shooters receive less attention, there should be fewer at-risk consumers who become attracted to the criminal opportunity they are promoting (Lankford & Madfis, 2018b). However, it is less clear whether a moderate approach to deterrence would make a meaningful difference. Would potential attackers be deterred by knowing they would get *less* fame and attention than past shooters have received, if they would still receive far more than they could acquire through conventional means?

We may find out. As public mass shootings have continued to grow more deadly—both in the United States and abroad—a few media organizations have begun to alter their approach. For instance, after the 2019 New Zealand attack that killed 51 victims, *The New York Times* published the suspect’s name and photo, but kept his name out of the headlines and his photo off the front page (Ingber, 2019). Additionally, *The New York Times* did not run any

portions of the gunman's manifesto or video of his attack, and did not publish links to that content (Ingber, 2019).

This seems like an admirable decision, but there are still many unanswered questions. Will *The New York Times* remain fully committed to its new approach, even when there are highly lethal mass shootings in the United States? And how will other major media organizations react—or fail to react—to calls from scholars and law enforcement officials for more responsible coverage? Will they follow *The New York Times's* lead, or cling to their policies from the past? Furthermore, how will the news media handle their references to past perpetrators? For instance, criminal trials for the Parkland school shooter and the El Paso shooter could become significant news events. Will the media repeatedly publish these shooter's names and faces in their coverage? Or will they refuse to give them any celebrity treatment?

Reducing Firearms Access for Potential Attackers

In addition to policies designed to reduce the number of people who want to kill large numbers of victims, there are also some policies which could help counteract potential public mass shooters' methods. In particular, although it may be impossible to keep these offenders from engaging in long planning periods or developing extensive attack strategies, we may be able to significantly reduce their access to firearms. This would represent important progress because the majority of active and public mass shooters have obtained their weapons legally (Lankford, Adkins, & Madfis, 2019; Silver, Simons, & Craun, 2018).

The key would be to exploit some of the factors that make the deadliest attackers different from other perpetrators. Research has shown that compared to less lethal offenders, the deadliest perpetrators appear much more likely to (1) plan their attacks for more than one year, (2) reveal their violent thoughts/intent prior to attacking, (3) reveal their specific interest in mass killing, (4) be reported to law enforcement for their concerning behavior, and (5) be reported to law enforcement for their concerning interest in homicide (Lankford, Adkins, & Madfis, 2019).

In other words, the deadliest public mass shooters' murderous intent appears larger, but so does their criminal footprint. And this makes sense: when more ambitious attacks are planned over a longer period of time, that creates more opportunity for perpetrators to make mistakes and let incriminating information slip out, along with more opportunity for warning signs to be observed by the public and reported to law enforcement. The deadliest public mass shootings have the worst impact on society, but they should actually be the easiest to prevent.

Policymakers and practitioners should capitalize on these frequent warning signs to deny more potential perpetrators access to firearms. One way would be to expand the use of "red flag laws," "extreme risk protection orders," and "gun violence restraining orders," which are essentially just different labels for similar state laws which temporarily prevent at-risk or dangerous people from legally possessing firearms. Depending on the state, these orders allow families, household members, law enforcement officers, mental health providers, and/or school administrators to petition a court for the removal of firearms, based on evidence that the individual poses a threat to himself/herself or others (Giffords Law Center, 2019; Roskam & Chaplin, 2017). As of this writing, seventeen U.S. states and Washington, DC have adopted

these laws, but the implementation procedures and the evidentiary requirements vary considerably (Giffords Law Center, 2019; Roskam & Chaplin, 2017). Because public mass shootings are a national problem, red flag laws and extreme risk protection orders should be present in all 50 U.S. states.

To make these laws as effective as possible, further work is needed. For instance, in places where the procedure for getting an order approved and executed is too cumbersome, or where the standard of evidence is too high, revisions to the law may be helpful. It is also imperative that evidence-based findings from threat assessment research are used to inform court decisions about which individuals actually pose a serious threat. Otherwise, some judges may be hesitant to prohibit firearms access for individuals who have not yet committed a crime, even if they have exhibited dangerous warning signs that are well established in the scientific literature.

As an example, an Orlando judge ruled in 2018 that a university student who posted online that the Las Vegas and Parkland shooters were his “heroes” should have the right to purchase firearms (Torralva, 2018). When interviewed by police, the student had said “It would take a lot to push me over the edge,” but that if he had a romantic breakup or was fired from a good job, he might attack the middle or high school where he was bullied growing up (Torralva, 2018). The judge apparently agreed with the student’s attorney, who argued that the young man just “wanted to look like a badass on Reddit” and was exercising his freedom of speech in praising mass shooters. However, prior research has shown that a number of copycat attackers have similarly praised previous mass shooters as “heroes” (Langman, 2017, 2018), and that the types of personal crises this student referenced as possible triggers—which most people experience at some point in their lives—commonly precede public mass shootings (Lankford, 2013; Newman et al., 2004; Silver et al., 2018). Regardless of whether this particular individual ends up harming anyone, in the aggregate, more Americans are likely to be killed by public mass shooters if those who make such statements are able to legally access firearms.

Another way to improve the effectiveness of red flag laws and extreme risk protection orders would be to extend their duration. Currently, these orders expire after six months or one year unless they are renewed (Giffords Law Center, 2019), but the threat posed by the deadliest public mass shooters often lasts far longer. Nearly half of the high-fatality attacks we studied were planned for more than one year, so delaying these perpetrators for only 6-12 months would probably not be sufficient. Instead, an initial term of four or five years—renewable for similar length terms, as needed—would provide more assurance that the risk has been mitigated.

It would also make sense to require that extreme risk protection orders be entered into the National Instant Criminal Background Check System (NICS), so that federally-licensed firearm dealers would be prohibited from selling to these individuals. This would also affect sellers in states that have enacted a background check requirement at the point of transfer of any firearm.

Table 4. Evidence for Chronological Increases of Factors in Proposed Model		
Changes in society	Types of evidence	Sources
Increased desires for fame and attention	empirical & anecdotal	Pew Research Center (2007); Pinsky & Young (2008); Sternheimer (2011); Twenge (2014); Uhls & Greenfield (2011, 2012)
Increased blurring of fame and infamy	empirical & anecdotal	Lankford (2016b, 2018); Levin et al. (2005)
Increased number of high-profile mass shooters since the mid-1960s	empirical	Berkowitz et al., 2019; Bagalman, Caldwell, Finklea & McCallion, 2013
Increased availability of semi-automatic rifles and assault weapons	empirical	Bureau of Alcohol, Tobacco, Firearms and Explosives (2018); Heath et al. (2017)
Changes among some public mass shooters	Types of evidence	Sources
Increased desires for fame, attention, or infamy	empirical	Lankford's (2016b) findings on active shooters ($n = 219$); current study's findings on high-fatality public mass shootings ($n = 34$)
More public mass shooters who were influenced by previous attackers	empirical	current study's findings on high-fatality public mass shootings ($n = 34$)
Increased desires to kill large numbers of victims	anecdotal	current study's findings on public mass shootings and thwarted shootings in which offender commented on desired death toll
Extended planning periods	n/a*	current study's findings on high-fatality public mass shootings ($n = 34$)
More extensive attack strategy development	empirical & anecdotal	current study's findings on high-fatality public mass shootings ($n = 34$)
More use of semi-automatic rifles and assault weapons	empirical	Klarevas's (2016) findings on gun massacres ($n = 111$); Follman et al.'s (2018) data on public mass shootings ($n = 86$); current study's findings on high-fatality public mass shootings ($n = 34$)
Use of multiple firearms	n/a*	current study's findings on high-fatality public mass shootings ($n = 34$)
Increase in high-fatality public mass shootings	empirical	current study's findings on high-fatality public mass shootings ($n = 34$)
Increase in average victims killed per public mass shooting	empirical	current study's findings on public mass shootings ($n = 165$)
*We found only a small chronological increase in high-fatality public mass shooters' planning periods, and no chronological increase in their use of multiple firearms, even though both variables appear substantially more common among the deadliest perpetrators than among less-lethal attackers.		

Conclusion

Scientific progress requires contributions from a community of scholars, working both independently and in concert. To that end, we have summarized the types of evidence for our model and its key factors and presented that information in two final tables. Our hope is that this summary will assist other researchers in identifying further areas for study that could enhance, extend, or refine our understanding of this subject.

Factor associated with increased lethality	Types of evidence	Sources
Desires for fame, attention, or infamy	empirical & anecdotal	Lankford's (2016b) findings on active shooters ($n = 219$); current study's findings on high-fatality public mass shootings ($n = 34$)
Desires to kill large numbers of victims	anecdotal	current study's findings on public mass shootings and thwarted shootings in which offender commented on desired death toll
Perpetrator was influenced by another specific attacker or attackers	empirical	current study's findings on high-fatality public mass shootings ($n = 34$)
Extended planning periods	empirical & anecdotal	current study's findings on high-fatality public mass shootings ($n = 34$) and comparison with Silver et al.'s (2018) findings on active shooters ($n = 34$)
Extensive attack strategy development	empirical & anecdotal	current study's findings on high-fatality public mass shootings ($n = 34$)
Use of semi-automatic rifles and assault weapons	empirical	de Jager et al.'s (2018) findings on active shootings ($n = 249$); Follman et al.'s (2018) data on public mass shootings ($n = 86$); Klarevas's (2016) findings on gun massacres ($n = 111$); current study's findings on high-fatality public mass shootings ($n = 34$)
Use of multiple firearms	empirical	Klarevas's (2016) findings on gun massacres ($n = 111$); Lankford's (2015) findings on active shootings ($n = 185$); Lankford's (2016a) findings on public mass shootings ($n = 292$); current study's findings on public mass shootings ($n = 165$) and high-fatality public mass shootings ($n = 34$)

It should be acknowledged that the level of evidence varies. For some factors, many scholars have independently collected evidence that provides empirical support for our assertion, while for others, our study appears to have been the first to ever examine a given relationship. Accordingly, further research and replication may be most valuable in some of

the new areas we have identified here. As one example, we found that perpetrators who planned their attacks for more than one year killed more victims, on average, than those with shorter planning periods, but additional research on this variable could yield valuable insights. Future studies could also attempt to statistically test our entire model, but running tests with sufficient statistical power would require in-depth research and investigation of a large sample of public mass shooters across varying levels of lethality.

In the meantime, deadly mass shootings continue to devastate far too many American communities, and something needs to be done. We do not claim to have a magical solution that would completely eliminate this problem. However, the potential benefits of implementing our policy recommendations may outweigh the risks of maintaining the status quo. A society in which dangerous and disturbed people have reduced access to firearms and reduced incentives to kill large numbers of victims would be at least a little bit safer for everyone.

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Incident	(1) Explicit evidence of fame-seeking or attention-seeking	(2) Explicit or circumstantial evidence of fame-seeking or attention-seeking	(3) Direct evidence perpetrator was influenced by another specific attacker(s)	(4) Planned mass shooting for more than one year prior to attack	(5) Attack strategy developed to increase fatalities	(6) Semi-automatic rifle or assault weapon	(7) Multiple firearms	Total # of exhibited factors
1984 San Ysidro McDonald's shooting	no	no	no	no	no	yes	yes	2
1991 Luby's cafeteria shooting	no	no	yes	no	yes	no	yes	3
2007 Virginia Tech shooting	yes	yes	yes	yes	yes	no	yes	6
2012 Sandy Hook shooting	yes	yes	yes	yes	yes	yes	yes	7
2016 Orlando Pulse nightclub shooting	yes	yes	yes	yes	yes	yes	yes	7
2017 Las Vegas shooting	no	yes	no	yes	yes	yes	yes	5
2017 Sutherland Springs shooting	yes	yes	yes	yes	no	yes	yes	6
2018 Parkland shooting	yes	yes	yes	yes	yes	yes	no	6
2019 El Paso shooting	yes	yes	yes	no	no	yes	no	4