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Project Title:

The Nature, Trends, Correlates, and Prevention of Mass Public Shootings in America, 1976-2018

Final Research Report

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PROJECT SUMMARY

Recent mass public shootings in venues as diverse as a school, a church, and a concert, have alarmed policymakers and the public alike. The massive amount of media attention given these tragedies has convinced many observers that such incidents are on the rise—that we are experiencing a virtual epidemic of bloodshed. Notwithstanding this widely-held perception, shootings in which four or more victims are killed in a public place unrelated to other criminal activity remain rare events, especially when adjusted for population growth. While there has been some increase in the number of cases, the severity—in terms of the number killed and wounded—has spiked over the past several years, with seven of the ten deadliest occurring since 2007. Because of this, and the associated news and social media obsession, the most pronounced increase has been in fear.

Despite mounting interest among journalists and academics, questions regarding the nature and prevention of mass shootings remain. For example, to what extent do mass shooters have histories of mental illness, substance abuse, or violence? Does strengthening or weakening gun control laws have an impact on the incidence or severity of mass public shootings? Are mass shooters influenced by media coverage of these events?

To address these questions and more, we embarked on a research initiative starting with the creation of a database of mass public shooting incidents, offenders,

and victims that occurred in the United States from 1976 forward. Notwithstanding the date range contained in the project title, we updated the data as the work progressed and used the most up-to-date data for analyses and associated publications as they became available. We defined mass public shootings as any event in which four or more individuals, not including the assailant(s), were killed by gunfire in a public setting within a 24-hour period, absent any associated criminal activity (such as robbery, gang conflict, or illicit drug trade). With this as the starting point, we then carried out a series of analyses using these and other data. Specifically:

- An in-depth description of mass public shooting incidents, offenders, and victims with a comparison to general homicide patterns;
- An evaluation of whether state-level gun legislation, such as concealed carry laws and prohibitions on large-capacity magazines, affect the incidence and severity of mass public shootings;
- An evaluation of whether the 1994 federal assault weapons ban had an impact on the incidence and severity of mass shootings;
- An examination of the incident, offender, and victim characteristics that impact the newsworthiness of mass public shootings;
- An assessment of the extent to which timing of mass public shootings suggests a contagion effect based on media coverage;
- A comparison between completed mass shootings and thwarted plots;
- A forecast of the severity of mass public shootings over the next couple decades; and

- An estimate of the global prevalence of mass public shootings accounting for missing data.

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PROJECT OUTCOMES

Criminologists have increasingly turned their attention to studying deadly mass shootings, especially those occurring in public settings—so much so that special issues featuring relevant research were published by *Homicide Studies* in 2014, the *American Behavioral Scientist* in 2018, and *Criminology and Public Policy* in 2020. However, this level of research attention is a relatively new development.

Until fairly recently, there was little interest among academics, and criminologists in particular, in conducting research on mass shootings—incidents in which four or more victims are killed by gunfire in a 24-hour period. Over the past four decades, by contrast, there has been a plethora of scholarship in the area of serial homicide, with killers such as Theodore Bundy, John Wayne Gacy, Jeffrey Dahmer, and Dennis Rader capturing the fascination of the American public and criminologists alike.

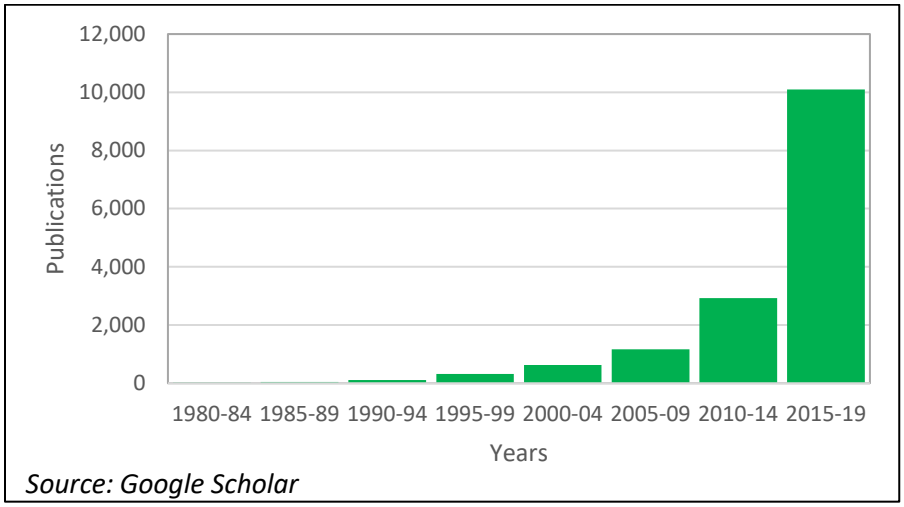
The relative dearth of research on mass shootings was not for lack of actual cases to examine. To the contrary, there were several mass public shootings during the 1980s and beyond, including a few with relatively large victim counts: the 1984 massacre of 21 at a California McDonald's; the 1986 fatal shooting of 14 postal workers in Oklahoma by a disgruntled letter carrier in the first of a series of similar slaughters that spawned the term "going postal"; and the shooting deaths of 23 customers at a Texas restaurant in 1991. Not only did many criminologists consider such events to be so rare and idiosyncratic that mass shooting was not a suitable focus for empirical analysis, but

some may just have assumed that mental illness played a prominent role, establishing this form of violent behavior as a more appropriate domain of forensic psychiatry.

Up until the past couple decades, mass shootings also did not have the same draw for the mass media as did serial homicide. Before that, the technology to provide viewers with live video coverage of unfolding tragedies did not exist, nor was there an array of cable news channels that could devote hour-upon-hour to these shootings and their aftermaths without having to preempt regularly scheduled programming. Plus, social media, which can rapidly and widely relay information and images surrounding rare and shocking events like mass shootings, had not yet been developed.

The year 2012, however, became a watershed when three large-scale shootings—at a California university, a Colorado movie theater, and especially a Connecticut elementary school—had criminologists, other social scientists, and the general public starting to take notice. The fatal shooting of 20 young children and six adults at the Sandy Hook Elementary School in Newtown, CT, dominated the news cycle for days, with all the major television news outlets maintaining remote studios across the street from the site of the massacre. The Sandy Hook school shooting was named the top news story of the year in the annual survey of Associated Press editors, eclipsing the other catastrophe named Sandy that devastated the eastern seaboard with powerful wind gusts and high tides, as well as the hotly contested presidential race.

Not only did the public begin to pay attention to the topic of mass shootings, but the academic community followed suit. As shown in Figure 1, the number of scholarly publications on the subject has risen exponentially since 2012. According to Google Scholar, the (approximate) number of books and articles pertaining to mass shooting increased from 48 in the 1980s, to 266 in the 1990s, to 1,080 in the 2000s, and surging to 11,300 in the past decade.



Source: Google Scholar

FIGURE 1: SCHOLARLY PUBLICATIONS ON MASS SHOOTINGS

SHOW ME THE DATA

With interest in the topic growing among the public, politicians and professors alike, criminologists and other social scientists were frustrated by the lack of official data on mass shootings. Some researchers looked to the FBI's Supplementary Homicide Reports (SHR) as a resource, focusing on incidents with four or more victims, consistent with the long-standing threshold for mass killing. Unfortunately, these data are quite flawed in coverage of mass killings (see Overberg et al., 2013). Many incidents, including

some with large body counts, are missing from the SHR. Also, in many cases, a police department will improperly include data on injured victims in a homicide incident record, making it appear as if it were a mass killing.

In the absence of a reliable resource on cases, several news organizations and academic groups attempted to build their own databases, some attempting to backfill cases retrospectively. Over a dozen databases were created, differing in the timeframe covered and definition of what constitutes a mass shooting in terms of victim threshold, whether the threshold was based on all victims shot or just those killed, motivation, location, and victim-offender relationship. Table 1 includes the eight databases that remained active through 2020, including the database developed for this project.

Because there was no consensus on definition, the competing databases tell very different stories about incidence and trend, including the number of incidents and victims. Some databases, such as the Mother Jones initiative, focused on the narrowest set of cases (indiscriminate fatal shootings in a single public setting generally by a lone gunman) while others, such as the project launched by Everytown for Gun Safety, included cases regardless of location, motivation, or victim-offender relationship. Besides differences in defining characteristics, there was also no agreement as to the minimum victim count, with thresholds for the number of victims killed ranging from three up to six.

TABLE 1: SELECTED MASS SHOOTING DATABASES

Database	Definition of Shooting Incident	Years Included	Incident Total	Victims Fatally Shot	Average Victims per Incident
Fox/Duwe/Rocque	4+ victims killed by gunfire in public within 24 hours excluding felony-related incidents	1976-2020	165	1,167	7.1
Peterson/Densley	4+ victims killed by gunfire in public	1966-2020	174	1,219	7.0
AP/USA Today/NU[a]	4+ victims killed by gunfire	2006-2020	345	1,866	5.4
The Washington Post	4+ victims killed by gunfire in public excluding felony-related incidents	1966-2020	177	1,251	7.1
Everytown for Gun Safety	4+ victims killed by gunfire	2009-2020	240	1,663	6.9
Mother Jones	4+ victims killed by gunfire in public excluding domestic/felony-related incidents[b]	1982-2020	119	957[c]	8.0
Gun Violence Archive	4+ victims killed or injured by gunfire	2013-2020	2,957	3161[d]	1.1
FBI Active Shooter Events	Killing or attempt to kill people in a confined and populated area with gunfire	2000-2019	345	1020	3.0

[a] The AP/USA TODAY/Northeastern University database also tracks mass killings by means other than gunfire
[b] The victim fatality threshold used by Mother Jones was reduced to 3 in 2013
[c] The fatality counts in the Mother Jones database frequently (but not always) include offender deaths
[d] The fatality counts in the Gun Violence Archive include offender deaths

Even more problematic, there remains disagreement as to whether the victim threshold should include all those shot or just the fatalities. Since nothing in the phrase "mass shooting" necessarily implies death, the Gun Violence Archive (GVA) adopted the definition of four or more victims shot regardless of the extent of injury, finding hundreds of incidents per year and as many as seven on the same day.

While the awful suffering that comes from gunshot injuries should not be minimized, death is different. Conflating fatalities with injuries, some of which may be minor, can be terribly misleading. Nearly half of the GVA mass shootings resulted in no fatalities, and less than one-quarter involved multiple deaths. Only 7% reached the threshold of a mass killing (i.e., at least four victim fatalities).

Mass confusion arises when figures associated with the broadest notion of mass shooting are referenced when reporting on an incident of much greater severity (Fox & Levin, 2015). Unfortunately, the GVA counts of mass shootings are frequently invoked to portray a horrific shooting with double-digit death counts as commonplace—the "new normal" as some contend (Holt & Gosk, 2018). News stories about mass killings often cite GVA statistics as context, showing more “mass shootings” than days (e.g., Silverstein, 2020). In May 2021, for example, the *New York Times* (see Victor & Taylor, 2021) published what was described as a “partial list” of the 13 mass shootings occurring up to that point in the year, adding that there were “many more” not included. However, the “partial list” of mass shootings was the *entire* list with four or more victims killed. The incidents not listed were the nearly 200 of lesser severity, half with no deaths. In effect, the “partial list” characterization misleadingly implied that the others were like the 13 deadliest.

Another source of confusion involves active shooter events in which a gunman is “actively engaged in killing or attempting to kill people in a populated area” (FBI, 2021). Imprecise reporting on these cases can easily deceive the public, inadvertently creating panic. News stories often conflate active shooter events with mass shootings. However, most of the wannabe mass killers fail to realize their goal. Nearly half of these events result in at most one victim fatality. One-quarter involve no deaths, and some result in no one even being injured.

BUILDING A DATABASE OF MASS PUBLIC SHOOTINGS IN THE UNITED STATES

There are many forms of mass shootings. In fact, according to the Associated Press/USA Today/Northeastern University Mass Killing Database, nearly half of all shootings with four or more fatalities involve a gunman who kills his family members (often followed by suicide), and nearly 20% are profit-motivated, such as an execution-style slaying to eliminate the witnesses to a robbery. Relatively few (23%) involve public shootings absent any connection to profit motivation. Although all mass shootings (as well as mass killings committed with weapons other than a firearm) are tragic in terms of the significant loss of life and injury, in this research we focus on those events that attract significant news coverage (see Duwe, 2000) and closely align with the fears that many Americans have concerning seemingly senseless and sometimes indiscriminate shootings with large numbers of fatalities that occur in a public place. Consistent with the NIJ solicitation that prompted this research initiative, we focused specifically on these mass shootings, as they are the ones that drive public opinion and public policy. Also, including all types of mass shootings in an analysis, without accounting for major differences in shooters' motive, intent, and context, would undermine researchers' ability to provide helpful answers to important policy questions.

In this project, we defined a mass public shooting as any event in which four or more individuals, not including the assailant(s), were killed by gunfire in a public setting within a 24-hour period. Mass shootings involving both private and public settings were included if either of these two conditions were met:

- For cases with fewer than seven fatalities, at least half of the victims were killed in a public place; or
- For cases with seven or more fatalities, at least four of the victims were killed in a public place.

Mass shootings that were associated with another form of criminal activity—such as gang conflict, illegal drug trade, and robbery—were excluded regardless of location.

A triangulation approach was utilized to create the database, incorporating the FBI's Supplementary Homicide Reports and media reports to provide a baseline for inclusion of cases. Datasets from various organizations and individuals (specifically, the Associated Press/USA Today/Northeastern University Mass Killing Database; The Washington Post; Mother Jones; Everytown for Gun Safety; The Violence Project; Grant Duwe; and Louis Klarevas) were consulted as well to ensure full coverage. Finally, for each possible case, the three members of the research team classified the incident as yes, no, or maybe in terms of the inclusion criteria. All three agreed on the classification being yes or no for 93% of the cases (with 95% concurrence when two agreed and the third was unsure). The handful of cases lacking full agreement were then resolved through discussion.

Detailed information on each case was drawn from open-source news archives and various other publicly available documents. The resulting database contains three relational data files with information about the incidents, the offenders, and their victims. The final database, which covers the years 1976-2020, includes 165 mass public shooting incidents, 169 offenders, and 1,208 victims (including 41 who were killed by

means other than a firearm). The database, archived at the Inter-university Consortium for Political and Social Research (ICPSR), includes 26 incident variables, 26 offender variables, and 12 victim variables (see Table 2).

Table 2: Variables in the mass public shooting database

Incident	Offender	Victim
Incident ID	Incident ID	Incident ID
Casename	Offender ID	Victim ID
Date	Date	Date
Month	Number of offenders	First name
Season	First name	Middle name
Year	Middle name	Last name
City	Last name	Suffix
State	Suffix	If shot
Region	Offender age	Victim age
Latitude	Offender sex	Victim sex
Longitude	Offender race	Victim race
Location	If suicide	Relationship
Number killed	If married	
Number fatally shot	Education	
Number of other fatalities	If employed	
Number injured	If criminal history	
Number injured by gunfire	Mental illness	
Number of offenders	If legal gun owner	
Number of guns	If legal gun acquisition	
Number of handguns	Family stressor	
Number of shotguns	Financial stressor	
Number of rifles	Work stressor	
Number of semiautomatic firearms	Relationship stressor	
Number of automatic firearms	Any stressor	
Number of other weapons	If leakage	
Narrative	Outcome	

TRENDS IN MASS SHOOTING INCIDENCE AND VICTIMIZATION

Survey after survey has found disturbingly high levels of fear connected to mass shootings. Nearly half of Americans report being worried about falling victim to a mass shooting (Brenan, 2019), and one-third say they avoid public places because of the threat of a mass shooting (American Psychological Association, 2019). Moreover, as many as one-quarter of Americans believe that mass shootings are responsible for the most gun fatalities—more than suicide, accidental shootings, and homicides other than mass shootings (APM Research Lab, 2019). These exaggerated perceptions may in part be the result of frequent media reporting on broad definitions of mass shootings, such as the *intent* to kill multiple victims (as in the FBI's active shooter data) or counting all victims regardless of the extent of injury (as in the Gun Violence Archive).

We begin with an examination of trends in mass public shooting incidents and victimization, both in terms of raw counts and population-based rates. In the series of figures presented below, the counts and rates are displayed using solid lines, which are superimposed by dotted straight lines depicting the underlying trend. To some extent, the facts belie these concerns and perceptions, suggesting a moral panic rather than an epidemic, as some have described the situation (Helenowski, 2019).

As shown in Figure 2a, the number of mass public shootings has indeed increased over the past four and one-half years, particularly over the past decade. However, even at its peak in 2018, the number of such incidents has not surpassed ten in any year, and

often has been much lower. Without minimizing the pain and horror associated with these extreme acts of gun violence, with a population surpassing 300 million, the rate is quite low. Moreover, at least some of the increase can be linked to growth in the U.S. population. Whereas the incident count tripled since the mid-1970s, the rate per 100 million population, as shown in Figure 2b, increased by a smaller factor of two.

The COVID-19 pandemic resulted in a considerable drop-off in cases, with only two mass public shootings occurring in 2020. In fact, there were none after mid-March of that year, once the pandemic altered our way of life. The virtual lockdown of the country forced many public venues to shutter, making it unlikely, if not impossible, for there to be a mass shooting at a school, movie theater, or house of worship. Moreover, smaller gatherings may not have been as enticing to would-be assailants seeking infamy.

Although not shown in Figures 2a and 2b, the year 2021 saw an unfortunate rebound in the number of mass public shootings as the nation gradually returned to some semblance of normalcy. In 2021, the U.S. experienced eight mass public shootings that resulted in a total of 52 victims killed and another 18 injured. This incident count was not quite as high as that in 2018 and 2019. However, it clear that the 2020 lull in mass public shootings ended as the calendar turned to a new year.

Figures 3a and 3b display trends in mass public shooting fatalities, respectively in total count and rate per 100 million population. These trend lines also increased partly as a function of the number of incidents and partly as a function of changes in the average severity of mass public shootings that did occur.

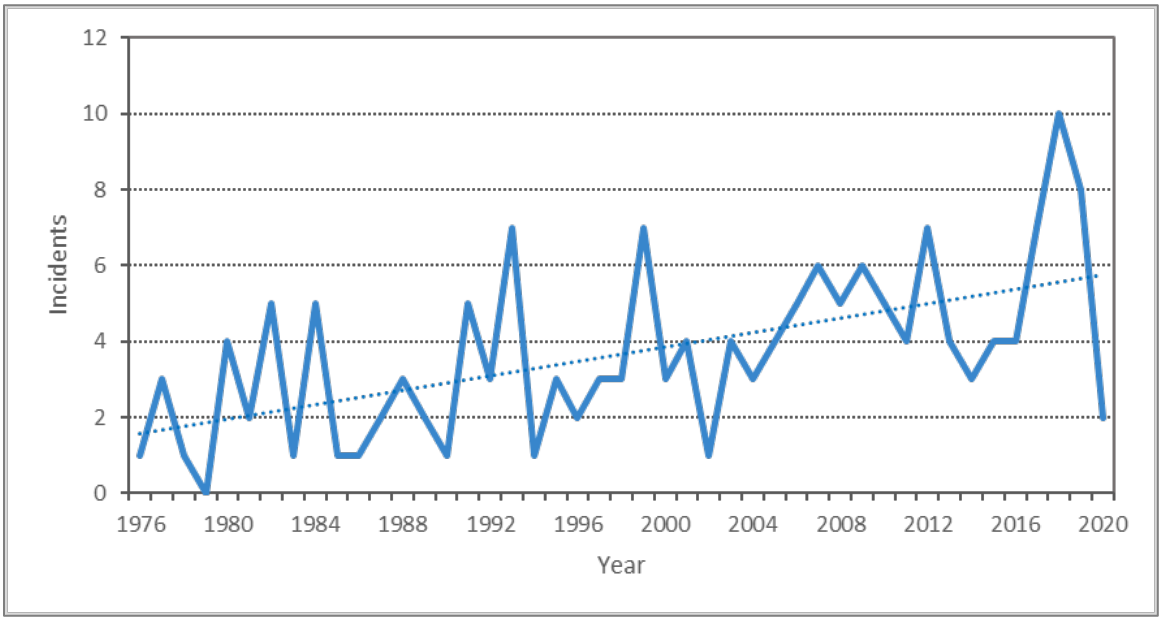


FIGURE 2A: MASS PUBLIC SHOOTINGS, 1976-2020

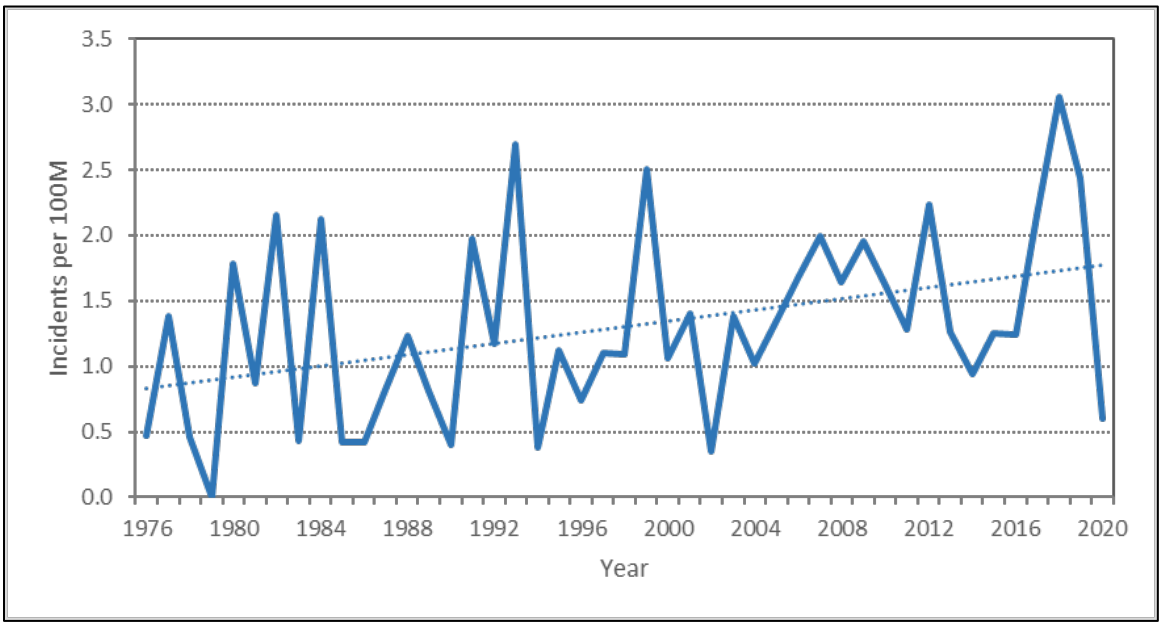


FIGURE 2B: MASS PUBLIC SHOOTINGS PER 100M POPULATION, 1976-2020

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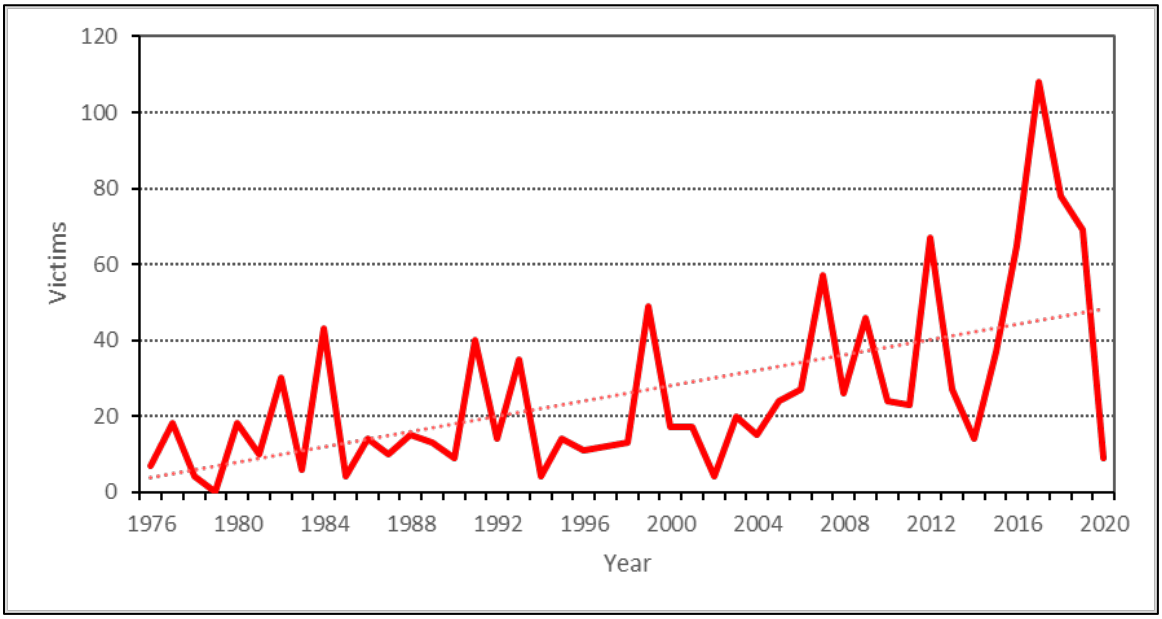

FIGURE 3A: MASS PUBLIC SHOOTING VICTIM FATALITIES, 1976-2020

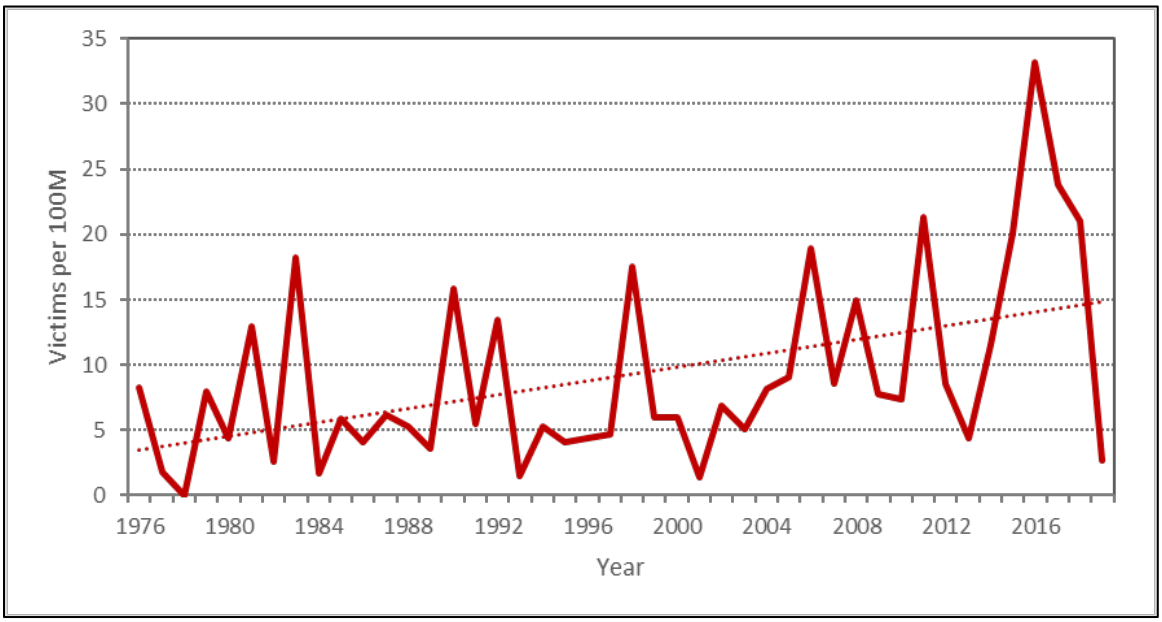

FIGURE 3B: MASS PUBLIC SHOOTING VICTIM FATALITIES PER 100M, 1976-2020

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Figure 4 isolates changes in the average severity of mass public shootings, aside from any shifts in their frequency. Except for random fluctuations, the average remained fairly stable, at about a half-dozen cases annually until 2015, after which the numbers increased primarily owing to four incidents with unusually large death tolls—specifically, the 49 killed at an Orlando, FL, nightclub in 2015; 25 (plus an unborn fetus) fatally shot at a Sutherland Springs, TX, church in 2017; 60 slain (including two victims who died years later from their injuries) at a Las Vegas, NV, outdoor concert; and 23 shot to death at an El Paso, TX, Walmart in 2019. The year with the highest victim count was 2018, with 108 deaths. None of the incidents in 2018 reached 20 victims fatally shot, but four had at least 10, including 17 at a high school in Parkland, FL, 10 at a high school in Santa Fe, TX, 11 at a synagogue in Pittsburgh, PA, and 12 at a bar in Thousand Oaks, CA. Once again, the pandemic impacted the numbers here, as there were very few victims in 2020.

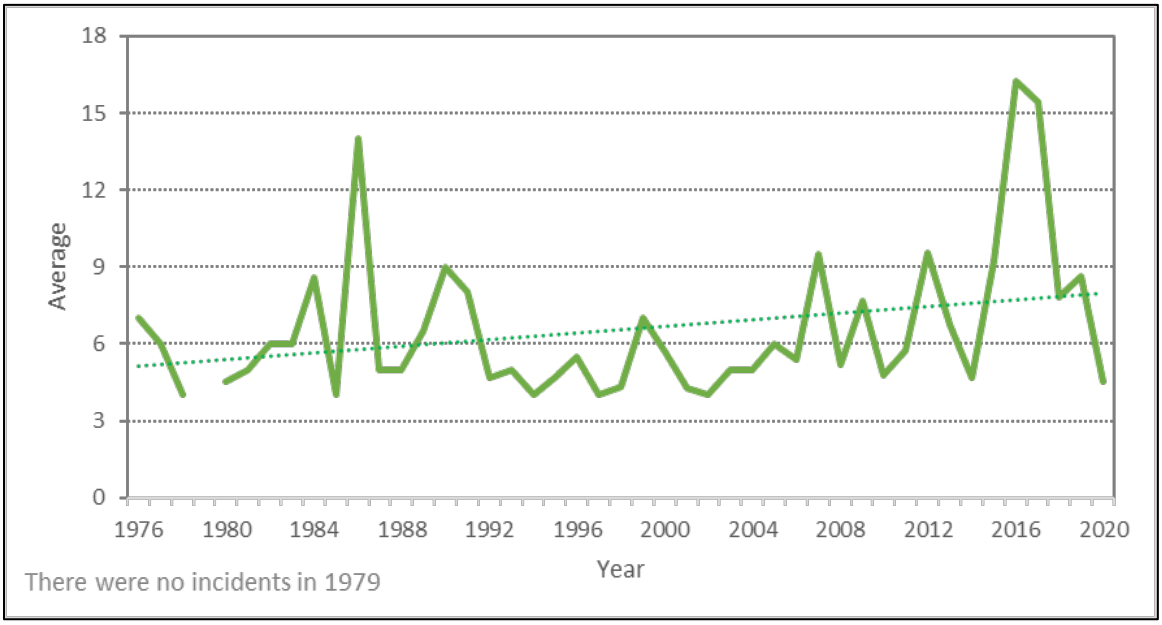

FIGURE 4: AVERAGE MASS PUBLIC SHOOTING VICTIM FATALITIES, 1976-2020

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INCIDENT, OFFENDER, AND VICTIM CHARACTERISTICS

Next, we explore incident, perpetrator, and victim characteristics. For certain variables, we contrast against patterns found in gun homicides generally over the same time period (1976-2020) based on a cumulative file of SHR cases with both item-missing (missing information on known cases) and unit-missing (cases missing altogether) estimated by means of multiple imputation (Fox, 2021).

Incident Characteristics

Table 3 presents breakdowns of several incident characteristics regarding timing, location, weaponry, and outcome. The seasonal distribution of mass public shootings, like gun homicides generally, is relatively even across the year, with summer showing a slightly higher incidence. Although not shown, more mass public shootings took place in July (11.5%) than the other months of the year.

In terms of geographic distribution, using the standard Census Bureau definition, the South had the highest percentage of mass public shootings (37.0%)—just a percentage point above that for gun homicides generally. Figure 5 offers a deeper look at geographic pattern in terms of the total number of mass public shootings in each state per million population, categorized by quartile. There is a large amount of variation, with higher rates in the Southeast and Northwest subregions. Alaska had the highest rate (6.7 incidents per million population), while eight states did not experience any mass public shootings during the 45-year timespan studied. Of course, rates for

sparsely populated states (such as Alaska) are somewhat volatile because of the low population figures used in the calculations.

Mass public shootings are typically committed by a lone gunman. Only four of the mass public shooting incidents included more than one perpetrator (2.4%), compared to a much higher percentage of multiple shooters in gun homicides overall (11.6%). Finally, the majority of mass public shootings involved a handgun (over 81.8%), somewhat higher than for gun homicides generally (71.4%).

TABLE 3: CHARACTERISTICS OF MASS PUBLIC SHOOTING INCIDENTS

Variable	Value	*N*	*%*
Season	Winter	43	26.1%
	Spring	36	21.8%
	Summer	47	28.5%
	Fall	39	23.6%
	Total	165	100.0%
Region	East	23	13.9%
	Midwest	27	16.4%
	South	61	37.0%
	West	54	32.7%
	Total	165	100.0%
Number of offenders	One	161	97.6%
	Multiple	4	2.4%
	Total	165	100.0%
Weapon	Handgun	135	81.8%
	Other firearm	30	18.2%
	Total	165	100.0%
Number of guns	One	85	51.5%
	Multiple	80	48.5%
	Total	165	100.0%
Location	School/College	21	12.7%
	House of worship	10	6.1%
	Government	10	6.1%
	Office	41	24.8%
	Retail/Restaurant	39	23.6%
	Entertainment	9	5.5%
	Other	35	21.2%
	Total	165	100.0%

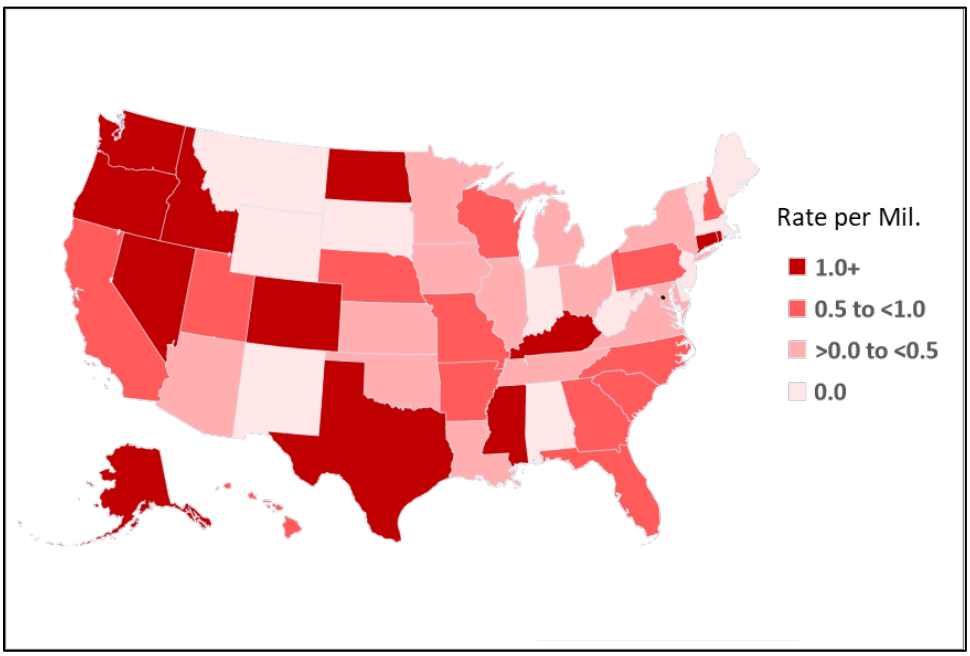

FIGURE 5: MASS SHOOTINGS FOR 1976-2020 PER MILLION POPULATION

Finally, we categorized the variety of locations into a set of frequently occurring types: schools/colleges, houses of worship, government facilities, offices, retail/restaurants, entertainment venues, and other. Only 12.7% of the shootings took place at schools or colleges, while the locations with the highest incidence included offices (24.8%) and retail/restaurants (23.6%).

Offender Characteristics

Table 4 displays the distributions for sex, age, and race of perpetrator. Consistent with previous work, the majority of offenders are male (97.6%), an even greater predominance than with gun homicides generally (91.6%). Mass public shooters are White more often than not (63.1% of cases with a known perpetrator) compared to gun homicides in general (42.6%), although this difference is actually understated, as the SHR includes some Hispanics among those classified as White. Additionally, those who

commit mass public shootings tend to be older than gun offenders generally: the modal age group for mass public shooters is 35-49 compared to 18-24 for general gun offenders. Moreover, the average (mean) age of mass shooters is 35.0 years old compared to 29.4 for their overall gun offender counterpart.

Among those mass shooters for whom data are available, more than three-quarters (78.7%) had at least a high school degree (or GED), and nearly half of those attended college for at least some period of time. Not quite half of the assailants (45.3%) were employed at the time of the shooting. Indeed, employment troubles, including being jobless, is a common precipitant to mass killing. Only three out of every ten perpetrators were married at the time of the mass shooting. A stable intimate relationship can serve as an important protective factor, while social isolation is often seen as contributor. Compared to the general U.S. population, mass public shooters are more likely to be undereducated, underemployed and unmarried.

There is little agreement in the literature about the role of mental illness, as studies vary in the severity threshold used to define impairment and the strength of evidence needed as documentation. Also, attempts to examine the matter may encounter barriers to acquiring mental health records. One-third of the offenders had been diagnosed with some condition, mostly prior to the shooting. There was suspicion of mental illness in just over one-quarter of the cases based on observations by family or friends after the fact or testimony given by defense experts when legal insanity was an issue. Finally, in about 40% of the cases, no evidence of mental illness was found.

TABLE 4: CHARACTERISTICS OF MASS PUBLIC SHOOTING OFFENDERS

Variable	Value	*N*	*%*
Sex	Male	165	97.6%
	Female	4	2.4%
	Total	169	100.0%
Race	White	106	63.1%
	Black	33	19.6%
	Hispanic	12	7.1%
	Other	17	10.1%
	Total	168	100.0%
Age	Under 18	7	4.2%
	18-24	35	21.0%
	25-34	43	25.7%
	35-49	61	36.5%
	50+	21	12.6%
	Total	167	100.0%
Education	No high school degree	25	21.4%
	High school graduate	47	40.2%
	Beyond high school	45	38.5%
	Total	117	100.0%
If employed	Yes	67	45.3%
	No	81	54.7%
	Total	148	100.0%
If married	Yes	43	29.1%
	No	105	70.9%
	Total	148	100.0%
Evidence of mental illness	Prior diagnosis	43	25.7%
	Subsequent diagnosis	13	7.8%
	Suspicion only	45	26.9%
	No evidence	66	39.5%
	Total	167	100.0%
Criminal record	Yes	91	62.3%
	No	55	37.7%
	Total	146	100.0%
Gun owner	Legal	84	68.9%
	Other	38	31.1%
	Total	122	100.0%
Gun acquisition	Legal	90	75.6%
	Other	29	24.4%
	Total	119	100.0%
Stressor (Mult. resp.)	Any	138	83.1%
	Relationship	46	27.7%
	Family	34	20.5%
	Work	68	41.0%
	Financial	21	12.7%
Outcome	Suicide	70	41.9%
	Killed by police/bystander	30	18.0%
	Arrested/Incarcerated	54	32.3%
	Death sentence	13	7.8%
	Total	167	100.0%

The majority of offenders (62.3%) had some type of criminal record—arrest or conviction, misdemeanor or felony. However, they may not have been legally prohibited from purchasing a firearm, depending on the exact nature of their criminal record and the specific details of their mental health history. In fact, just over two-thirds (68.9%) were legal gun owners and three-quarters (75.6%) acquired their firearms through legal means, such as from a licensed gun dealer or through a private sale not requiring a background check that would have disqualified prohibited purchasers.

A variety of stressors (which can occur in combination) have been known to serve as strong precipitants for mass murder, and the vast majority (83.1%) of the mass public shooters in our database were reported to have experienced some sort of stressor prior to the shooting. Many stressors were related to relationship problems (27.7%) or other forms of family discord (20.5%). More commonplace were work-related stressors (41.0%) or financial problems (12.7%).

Finally, as for outcome, most of the offenders did not survive the shooting: 41.9% committed suicide immediately or closely following their assault and another 18.0% were killed by responding police or a bystander. Except for the two assailants who were not captured, the remaining offenders were arrested. Some were convicted or committed to a psychiatric facility; 13 were sentenced to death.

Victim Characteristics

Characteristics of mass public shooting victims are shown in Table 5. With respect to sex and race, victims of mass public shootings diverge considerably from gun homicide victims generally. Specifically, 59.3% of mass public shooting victims were male, considerably lower than for general gun homicides (83.1%)—a difference largely due to the exclusion of family massacres from the former. The majority of mass public shooting victims were White (66.8%), more than for gun homicide generally (47.4%), also because of eliminating felony-related mass shootings cases in which minority victims are predominant.

TABLE 5: CHARACTERISTICS OF MASS PUBLIC SHOOTING VICTIMS

Variable	Value	*N*	*%*
Sex	Male	715	59.3%
	Female	491	40.7%
	Total	1,206	100.0%
Race	White	678	66.8%
	Black	81	8.0%
	Hispanic	164	16.2%
	Other	92	9.1%
	Total	1,015	100.0%
Age	Under 18	137	11.7%
	18-24	161	13.8%
	25-34	240	20.5%
	35-49	294	25.1%
	50+	338	28.9%
	Total	1,170	100.0%
Victim-perpetrator relationship	Intimate/Family	58	4.9%
	Aquaintance	376	31.9%
	Stranger	745	63.2%
	Total	1,179	100.0%

In terms of age, the majority of mass public shooting victims are 35 or over, and 28.9% are age 50 or above. The average (mean) age is 38.6 years old, which is substantially older than that for gun homicide victims generally (31.8). Finally, with respect to victim-offender relationship, nearly two-thirds (63.2%) of the victims did not know their assailant owing to the often-indiscriminate nature of mass public shootings—a level significantly greater than for gun homicides generally (26.4%).

ANALYZING MASS PUBLIC SHOOTINGS

Building a database of mass public shootings was just the first step in the project. Our primary objective was to perform a series of statistical analyses to answer certain empirical questions about this type of crime. Specifically, aside from describing long-term trends and the basic incident, offender, and victim characteristics, we set out to undertake a series of analytic projects, each of which would result in one or more peer-reviewed journal publications. The abstracts for the papers, along with information about the journals in which they were published, are presented below. The full details on methodology, results, and interpretation can be found in the associated publications. The four completed and published studies are described first, followed by three others that are nearing completion and include some preliminary results subject to change. Finally, we have produced four datasets for archiving at ICPSR: the main dataset of incident, offender, and victim characteristics for the years 1976-2020; the dataset for the newsworthiness paper; the dataset for the mass shooting contagion paper; and the

dataset for the averted mass public shooting study. The dataset and codebook for the state gun law paper was completed earlier and was separately submitted to ICPSR by Michael Siegel.

Published Papers

Title: The Relation Between State Gun Laws and the Incidence and Severity of Mass Public Shootings in the United States, 1976–2018

Authors: Michael Siegel, Max Goder-Reiser, Grant Duwe, Michael Rocque, James Alan Fox, and Emma E. Fridel

Published in: Law and Human Behavior

Digital link: http://dx.doi.org/10.1037/lhb0000378

Secondary publication:

Michael Rocque, Grant Duwe, Michael Siegel, James Alan Fox, Max Goder-Reiser, and Emma E. Fridel, "Policy Solutions to Address Mass Shootings." Rockefeller Institute of Government, August 13, 2021.

Summary:

The question of whether gun restrictions are effective in reducing the number or scope of mass shootings is a matter of continuing debate among politicians and the public alike. In this study, we analyzed the relationship between various state-level firearm laws and the incidence and severity (i.e., number of victims) of mass public shootings in the United States during the period 1976 –2018. We hypothesized that states requiring permits to purchase firearms would have a lower incidence of mass

public shootings and that states banning large-capacity ammunition magazines would experience a lower number of victims in mass public shootings that did take place.

The analysis was based on a 43-year panel of annual, state-specific data on firearm laws and mass public shooting incidents and victim counts. We employed generalized estimating equations (GEE) logistic regression to examine the relationship between eight state firearm laws and the likelihood of a mass public shooting. We then used a zero-inflated negative binomial model to assess the relationship between these laws and the number of fatalities and nonfatal injuries resulting from these incidents.

The findings confirmed our expectations that laws requiring a permit to purchase a gun are associated with a lower incidence of mass public shootings, and bans on large-capacity magazines are associated with fewer fatalities and nonfatal injuries when such events do occur. State laws requiring a permit to purchase a firearm were associated with 60% lower odds of a mass public shooting occurring in that state (with a 95% confidence interval of 32% to 76%). Large-capacity magazine bans were associated with 38% fewer fatalities (with a 95% confidence interval of 12% to 57%) and 77% fewer nonfatal injuries (with a 95% confidence interval of 43% to 91%) when a mass shooting occurred. Although the confidence intervals are somewhat wide owing to the limited number of mass public shootings, the estimated impacts are statistically significant, nonetheless.

* * *

Title: The Newsworthiness of Mass Public Shootings: What Factors Impact the Extent of Coverage?

Authors: James Alan Fox, Madison Gerdes, Grant Duwe, and Michael Rocque

Published in: Homicide Studies

Digital link: http://dx.doi.org/10.1177/1088767920974412

Summary:

Prior research has shown that mass shootings in public settings receive extensive news coverage, far more than other types of mass shootings such as family massacres and incidents related to underlying criminal enterprises (Duwe, 2000). This study took the next logical step by examining the specific characteristics of mass public shootings that impact the amount of news coverage each receives.

Other researchers in similar work have relied on a single news source (specifically, *The New York Times*). To avoid the potential for regional bias in any one newspaper (even the *Times* with its tri-state regional coverage), we instead used the Associated Press (AP) State and Local News Wire to determine the number of articles devoted to each of the 97 mass public shootings from 2000 through 2009.

A negative binomial regression predicting AP story counts clearly indicated that not all mass public shootings are treated equally in terms of the extent of coverage. Those incidents receiving the most exposure tended to have one or more of the following characteristics: a high number of casualties; targeting government facilities, schools, or houses of worship; perpetrated by younger assailants, particularly with indications of mental illness; involving terrorism or hate-motivated; ending in the

assailant's arrest rather than death; and, to a lesser extent, including larger shares of victims who are White, women, children, and strangers. Overall, the disproportionate coverage contributes to distorted perceptions of risk and reinforces inaccurate stereotypes about these crimes.

* * *

Title: Forecasting the Severity of Mass Public Shootings in the United States

Authors: Grant Duwe, Nathan Sanders, Michael Rocque, and James Alan Fox

Published in: Journal of Quantitative Criminology

Digital link: http://dx.doi.org/10.1080/2330443X.2021.1932645

Summary:

Mass shootings seemingly lie outside the grasp of explanation and prediction, because they are statistical outliers—in terms of both their frequency and severity—within the broader context of crime and violence. Innovative scholarship has developed procedures to estimate the future likelihood of rare catastrophic events such as earthquakes that exceed 7.0 on the Richter scale or terrorist attacks that are similar in magnitude to that of September 11, 2001. Because the frequency and severity of mass public shootings follow a distribution resembling these previously-studied rare, catastrophic event classes, we utilized similar procedures to forecast the future severity of these incidents within the United States.

Using a dataset containing 156 mass public shootings that took place in the U.S. between 1976 and 2018, we produced a forecast of the future probability of attacks reaching each of a variety of severity levels in terms of the number of victims killed and wounded by gunfire across three different model choices, three different scenarios (increasing, decreasing, or status quo) for future incident rates, and other parameters.

The projections vary, as expected, depending on the choice of modeling parameters. However, using a set of mid-range parameter values, we estimated, as shown in Figure 6, that the probability of an event as deadly as the 2017 massacre in Las Vegas (i.e., resulting in at least 60 fatalities) occurring before 2040 is 30% (with a 90% uncertainty interval of 8% to 72%). The results suggest an uncertain, but concerning, future risk of large-scale mass public shootings, while also illustrating how such forecasts depend on assumptions made about the severity distribution model.

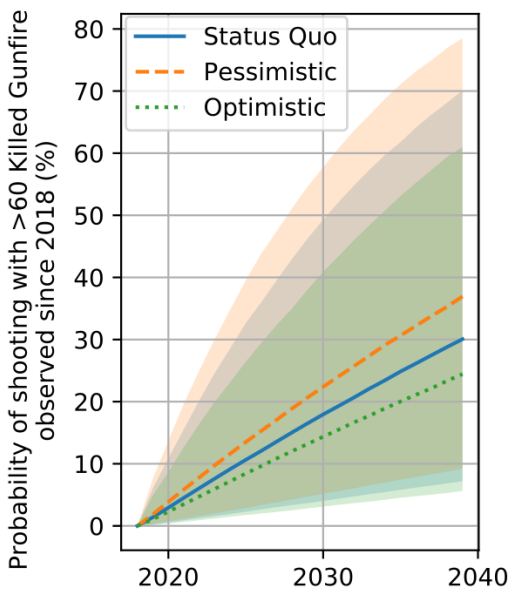

FIGURE 6: FORECAST OF THE PROBABILITY OF AN EXTREME (>60 FATALITY) MASS PUBLIC SHOOTING

* * *

Title: The Contagion of Mass Shootings: The Interdependence of Large-Scale Massacres and Mass Media Coverage

Authors: James Alan Fox, Nathan Sanders, Emma E. Fridel, Grant Duwe, and Michael Rocque

Published in: Statistics and Public Policy

Digital link: http://dx.doi.org/10.1080/2330443X.2021.1932645

Secondary publication:

James Alan Fox, Nathan R. Sanders, Emma E. Fridel, Grant Duwe, and Michael Rocque, "Does Media Coverage of Mass Public Shootings Create a Contagion Effect?" *Significance Magazine*, forthcoming.

Summary:

Mass public shootings have generated significant levels of fear in recent years, with many observers criticizing the media for fostering a moral panic, if not an actual rise in the frequency of such attacks. Scholarly research suggests that the media can potentially impact the prevalence of mass shootings in two respects: some individuals may be inspired to mimic the actions of highly publicized offenders, and a more general contagion process may manifest as a temporary increase in the likelihood of shootings associated with a triggering event. In this study of mass shootings from 2000 to 2018, we focused on short-term contagion, rather than imitation that can traverse years.

Several studies have analyzed the timing (and even location) of mass shooting incidents to assess the extent to which such events occur in non-random clusters,

suggesting possible contagion effects. Most notably, Towers and colleagues (2015) utilized a self-excitation modeling strategy on both school shootings and mass killings, concluding that incidents are temporarily contagious for approximately two weeks, producing an average of 0.2 to 0.3 subsequent attacks. However, this study, as with other similar attempts, did not include a measure of media coverage in the models. As such, these findings rest on the dubious assumption that all incidents receive considerable media coverage.

We examined the interdependence of mass shootings (public as well as non-public massacres) from 2000 through 2018 and the extent of media coverage before and after each incident using three different news sources: a collection of 16 major daily newspapers, the Associated Press National Wire, and network television news broadcasts. Figure 7 shows the pattern of coverage of the topic of mass shootings in major daily newspapers before and after actual incidents of mass public shootings. Clearly there was no increase in coverage in the month prior to an incident. Then, after a short delay in coverage level following a shooting as a consequence of morning publication timetables, the coverage peaked and then dissipated gradually over a two-week time frame. Similar patterns were observed for the other two coverage measures but with shorter incident-to-peak delay and speedier dampening thereafter by virtue of the differing nature of these media. Next, using a multivariate point process model, we found that mass public shootings do indeed have a strong effect on the level of news reporting, but that news reporting on the topic has little impact, at least in the relative

short-term, on the prevalence of mass public shootings. Finally, non-public mass shootings, the majority of which involve family members killed in private residences, showed no appreciable relationship to the extent of media coverage.

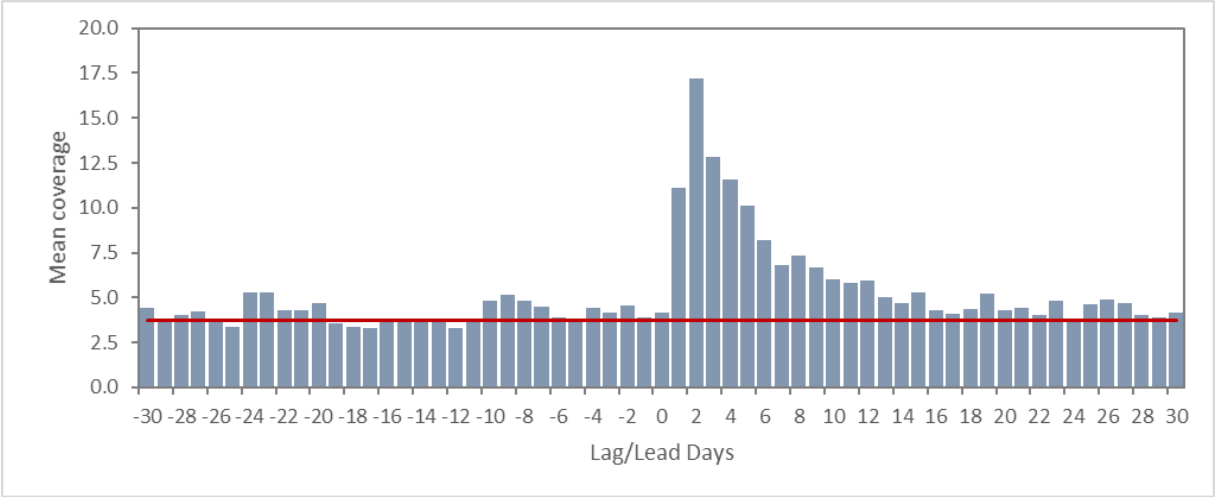

FIGURE 7: MEAN COVERAGE IN MAJOR DAILY NEWSPAPERS

In conclusion, the influence of the mass media in creating a short-term contagion effect that produces other mass shootings appears to have been overstated. However, this does not rule out contagion by other means of transmission, such as social media, nor the specific instances of copycat behavior that may emerge over the long term.

Papers in Progress

Title: Evaluating the Impact of the 1994 Federal Assault Weapons Ban on the Incidence and Severity of Mass Public Shootings

Authors: Nathan Sanders, Grant Duwe, Michael Rocque, and James Alan Fox

Summary:

This study applies a Bayesian nonparametric approach to evaluate whether the 1994 federal assault weapons ban (AWB) influenced the incidence and severity of mass public shootings using data on the 165 incidents that occurred between 1976 and 2020. In addition to identifying the specific date when the incidents occurred to form the time series, the dataset contains information on how many victims were killed and wounded in these events, as well as weapon type. We have completed the background for the paper, including a critical review of prior research on the AWB's effectiveness, and have developed a multivariate Bayesian Gaussian Process model to predict simultaneously the incidence and severity of mass public shootings over time. We anticipate validating and interpreting the model sometime in 2022. After doing so, we will complete the preparation of the manuscript and then submit it to a peer-reviewed academic journal.

* * *

Title: Averted Mass Public Shootings

Authors: Michael Rocque, Madison Gerdes, James Alan Fox, and Grant Duwe

Summary:

To date, the vast majority of research on mass public shootings has focused on attacks that resulted in injuries and deaths. However, from a prevention and theoretical perspective, there is much to be learned by investigating mass public shootings that were planned but did not take place. A small body of research has examined averted school shootings and attempted mass homicides more generally, cataloging descriptions

of the plots and would-be perpetrators. There are few studies on thwarted mass public shootings plans. Most notably, Silva (2021a,b) compared completed to averted mass public shootings from 2000-2019, finding differences between the two including perpetrator age, number of perpetrators, and targeted locations. This research serves as a foundation for the current work. Given the recent focus on replication and robustness of results in the social sciences, including criminology, additional research on understudied topics is important.

Data collection for this research has been completed covering the timeframe from 1999 to 2019. Currently, we are finishing up cleaning the data file and creating numeric codes for all fields where appropriate. For example, we had initially collected motivation data in a summary format. However, we recoded textual data to capture different types of motivation (e.g., grievance vs. autogenic). During initial data collection, we conducted a reliability assessment of perceived subjective fields to determine consistency of coding. For the most part, agreement was high (>80%), but some fields were problematic and, in certain cases, we revised coding procedures to increase consistency.

The dataset includes 194 averted incidents associated with 303 would-be offenders. The incident file contains such fields as location, planning, type of threat, how the threat was discovered, motivation, and weapon information. Meanwhile, the offender file covers basic demographic information as well as the outcome (e.g., arrest). The soon-to-be completed analysis and paper for publication will provide an overview of

both averted incidents and would-be offenders, as well as a comparison to the completed mass public shooting files.

* * *

Title: Estimating the Global Prevalence of Mass Public Shootings

Authors: Grant Duwe, Nathan Sanders, Michael Rocque, and James Alan Fox

Summary:

To date, few scholars have attempted to generate estimates of the number of mass public shootings outside of the United States. A notable exception, Lankford (2016) found that the United States is responsible for 31% of the world's mass public shootings (far greater than the population share) based on his assembled list of cases with at least four fatalities. Using a broader definition that included political terrorism, Lott (2018) determined that U.S. share of mass public shootings is less than 3%.

In this study, we compare Lankford's non-U.S. cases of mass public shootings for 1976-2012 with our data on U.S. cases over the same time frame. Figure 8 displays the distributions of U.S. and non-U.S. mass public shootings by the number of victims killed. As shown, the vast majority of mass public shootings in the U.S. (76%) included six or fewer deaths compared to only 40% of the non-U.S. incidents. This lends support to the proposition that for international cases, it is the extreme events (with many deaths) that reach the global media (and thus open-source news archives) while less extreme incidents remain obscure.

Utilizing methods designed for heavy-tail distributions to estimate the number of mass shootings worldwide (in effect measuring the extent of missing data in the non-U.S. list), we provide a more accurate accounting of the United States' share of mass public shootings worldwide. More specifically, we estimate the completeness of reporting of non-U.S. incidents as a function of severity (i.e., victims killed) based on deviations from the observed shape of the severity distribution in U.S. and non-U.S. cases. In the process, we assume that the U.S. incident reporting is complete and that the non-U.S. events are underreported in low-severity cases.

To model this probabilistically, we fit a hierarchical Bayesian model that draws severity distributions for the U.S. and non-U.S. groups from a common family of lognormal distributions and then estimate the non-U.S. distribution. In this way, we infer the underlying distribution of non-U.S. mass shooting events, adjusted for completeness in reporting.

From 1976-2012, the U.S. share of cases globally stood at 36.4%. However, after adding in the estimated number of missing non-U.S. cases, we estimate that the U.S. share of all mass public shootings is about 25.1%. With one-quarter of the mass public shootings worldwide, the United States is still overrepresented when compared to its population share by a factor of about six, but not quite as much as when one ignores the matter of underreporting of mass public shootings around the globe.

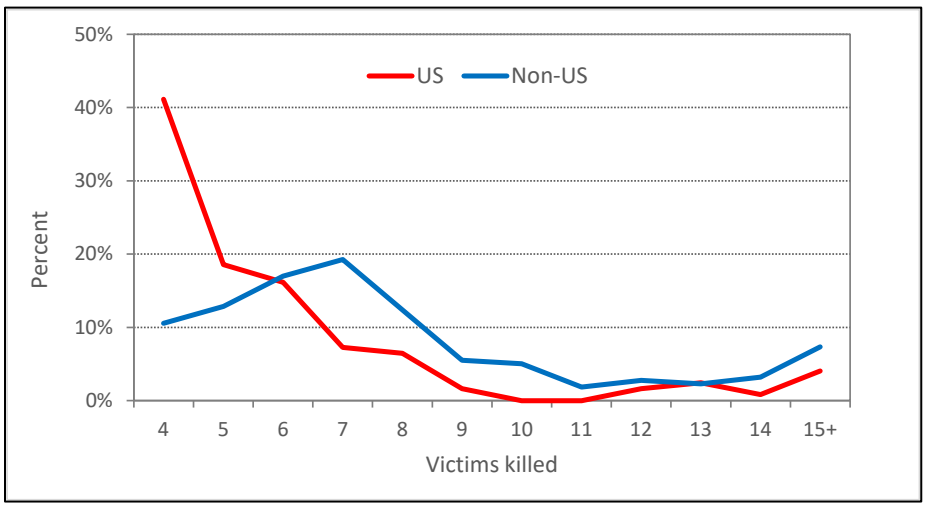

FIGURE 8: VICTIM COUNTS FOR U.S. AND NON-U.S. MASS PUBLIC SHOOTINGS, 1976-2012

DIRECTIONS FOR FUTURE RESEARCH ON MASS PUBLIC SHOOTINGS

As shown, there has been a significant acceleration of research in recent years related to mass shootings. This expansion in scholarly effort has centered heavily on the impact of gun policies, as well as the role of mental illness. Given the surge in gun sales in the past few years—especially during the COVID-19 pandemic—as well as the loosening criteria for concealed carry in certain states, this work should continue. Furthermore, in addition to the impact of gun regulations and the role of mental illness on mass shootings, there are some additional areas that future research might explore.

In the wake of the 2018 mass shooting at the Marjorie Stoneman Douglas High School in Parkland, FL, dozens of states responded by enacting various Extreme Risk Protection Order (ERPO) laws—or "Red Flag Laws," as they are often called. Prior research on the effectiveness of these provisions for temporarily taking guns away from individuals deemed to be dangerous to themselves or others has focused almost

exclusively on suicide prevention. Given that the primary impetus for passing ERPO laws has involved the potential for homicide—and mass shootings in particular—it would be worthwhile to evaluate the effectiveness of gun confiscation measures and suggest optimal ways to carry out such actions without inadvertently precipitating a violent response by the individual whose right to gun possession is being infringed.

Future research should also move beyond examinations of the number and type of stressors that mass public shooters experience. For example, are particular types of stressors linked to the severity of attacks? What are the correlates of particular stressors (e.g., demographics, mental illness)? A more nuanced study of how stressors are related to mass public shootings can be informative from a prevention standpoint.

Finally, distrust of traditional institutions and mainstream organizations (e.g., Congress, the mass media, big business, the police and the courts) has grown in American society (Brenan, 2021), serving as a powerful motivator for some individuals to seek justice—and oftentimes vengeance—through violence. Future research should, therefore, examine ways to improve the credibility of these entities so as not to give disgruntled Americans on the fringe reason for violent extremism.

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PROJECT ARTIFACTS

Publications:

Michael Siegel, Max Goder-Reiser, Grant Duwe, Michael Rocque, James Alan Fox, and Emma E. Fridel, "The association between state gun laws and the incidence and severity of mass public shootings in the United States, 1976-2018." *Law and Human Behavior*, November 2020.

James Alan Fox, Madison Gerdes, Grant Duwe, and Michael Rocque, "The newsworthiness of mass public shootings: What factors impact the extent of coverage?" *Homicide Studies*, 25(3), 239-255, 2021.

Grant Duwe, Nathan R. Sanders, Michael Rocque, James Alan Fox, and Emma E, Fridel, "Forecasting the severity of mass public shootings in the United States." *Journal of Quantitative Criminology*, March 2021.

James Alan Fox, Emma E. Fridel, Nathan R. Sanders, Grant Duwe, and Michael Rocque, "The contagion of mass shootings: The interdependence of large-scale massacres and mass media coverage." *Statistics and Public Policy*, June 2021.

Michael Rocque, Grant Duwe, Michael Siegel, James Alan Fox, Max Goder-Reiser, and Emma E. Fridel, "Policy solutions to address mass shootings." Rockefeller Institute of Government, August 13, 2021.

James Alan Fox, Nathan R. Sanders, Emma E. Fridel, Grant Duwe, and Michael Rocque, "Does media coverage of mass public shootings create a contagion effect?" *Significance Magazine*, forthcoming.

Presentations:

James Alan Fox, "Trends and contagion in mass public shootings." NIJ Webinar: Advancing, Understanding, and Informing Prevention of Public Mass Shootings: Findings from NIJ-Funded Studies, November 17, 2020.

Grant Duwe, "Forecasting the severity of mass public shootings." NIJ Webinar: Advancing, Understanding, and Informing Prevention of Public Mass Shootings: Findings from NIJ-Funded Studies, November 17, 2020.

Michael Rocque, "The effect of state gun laws on mass public shootings." NIJ Webinar: Advancing, Understanding, and Informing Prevention of Public Mass Shootings: Findings from NIJ-Funded Studies, November 17, 2020

Grant Duwe, "Extent to which the U.S. accounts for the global prevalence of mass public shootings." NIJ Webinar: NIJ-funded Research on Mass Shootings to Advance Evidence-based Policy and Practice, November 30, 2021.

Datasets:

The Characteristics of Mass Public Shootings, 1976-2020: Incident, Offender, and Victim Files

The Contagion of Mass Shootings, 2000-2018

The Newsworthiness of Mass Public Shootings, 2000-2019

Characteristics of Averted Mass Public Shooting Incidents and Offenders, 2000-2019