Does media coverage of mass public shootings create a contagion effect?

Mass public shootings in the United States have increased in number and severity in recent years, and there has been a corresponding rise in media reporting of such incidents. Does media coverage of these events lead to a short-term increase in the probability of additional shootings? James Alan Fox, Nathan E. Sanders, Emma E. Fridel, Grant Duwe and Michael Rocque investigate

recent increase in deadly mass shootings taking place in public settings within the United States has become a source of concern for many people. According to polling, a majority of US citizens say they worry that a mass shooting will occur in their community (bit.ly/3EsZO4d), and as many as one-third admit to having avoided certain places because of that fear (bit.ly/31BaoYl).

Journalists have described mass shootings as an epidemic. But many observers have criticised the media for fostering a panic, if not contributing to an actual rise in the frequency of such attacks.

Highly publicised events can influence future occurrences of similar episodes in multiple ways. With respect to mass shootings, individuals who empathise with the assailant or simply seek their own opportunity for public attention may be inspired by notorious cases. Often referred to as a "copycat effect", this process of imitation is typically substantiated through isolated anecdotes. There is, additionally, the prospect of "contagion", which involves the more general spread of a phenomenon through the population. Less direct than imitation, contagion is typically identified through statistical patterns in the rate of occurrence.

A 2015 study that analysed the timing of incidents concluded that mass shootings are temporally contagious for approximately two weeks, each producing an average of 0.2–0.3 subsequent attacks.¹ Although this study was motivated by the hypothesis that media attention propagates the contagion effect, its claim of a short-term contagion was based on modelling that did not actually include a measure of media coverage. Implicit in the analysis, therefore, were the dual assumptions that all mass shootings receive substantial national coverage and that all types of massacres are equally contagious. However, neither assumption appears to be valid.

In our recent work, we have sought to integrate a refined data set of mass shootings together with information about related media coverage to address whether a contagion process does indeed lead to recurrence of these tragedies in the short term.² In other words, if the media spend more time covering particular mass shootings, do subsequent incidents occur more quickly over a period of several weeks?

Variables and data

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Although researchers have documented certain sensational homicides that inspired copycats, only a few studies to date have focused specifically on the statistical contagion of mass shootings, particularly those with large numbers of fatalities. As a whole, this burgeoning body of literature suffers from three key limitations: first, assuming that the public is generally aware of all mass shootings, despite evidence that most do not make national news; second, failing to account for transmission in the form of publicity, which may falsely suggest contagion based on purely random temporal clustering of events; and third, relying on a single news source (e.g., *The New York Times*), which may not fully represent patterns of coverage around the USA.

Over the past decade and a half, the USA has endured an annual average of about two dozen mass shootings with four or more victim fatalities, according to the Associated Press/USA Today/Northeastern University Mass Killing Database. Most, however, occurred in private homes or were connected to ongoing criminal activity, such as a robbery, gang conflict, or illicit drug trade. These incidents are seldom reported beyond



Figure 1: Major paper (MP) coverage and mass public shooting victim counts.



Figure 2: Major paper (MP) coverage before and after mass public shootings (solid line set at the overall mean).

the local area. By contrast, public massacres, especially those with large death tolls, often dominate the national news cycle for a week or longer.³ Although representing only about one-quarter of all mass shootings, these events generate the most public anxiety. After all, they can, without warning, affect anyone, almost anywhere, and at any time.

In our study of the contagion of mass shootings, we focused specifically on deadly attacks in public settings (a school, house of worship, restaurant, etc.) - the type of event that tends to generate significant news reporting - along with several indicators of the level of media coverage. We assembled a database of incidents with at least four victims fatally shot in a public location within a 24-hour period and in the absence of other criminal activity, such as robberies, drug deals, and gang conflict. The specific inclusion rules were as follows: first, at least four of the victims were killed by gunfire; second, at least four of the victims were killed in a public place or else at least half of all fatalities occurred in a public place; and third, although shootings in private residences were excluded, a few in nonprivate residences (e.g., group home or motel) were included. The final list of 89 mass public shootings from 2000 to 2018 resulted overall in 694 victim fatalities.

We constructed several measures of media coverage by consulting two electronic news archives for print and broadcast stories related to the topic of mass shootings. We searched the "Major Newspapers" and "Associated Press (AP) National Wire" sources in the Nexis database using a set of eight alternative phrases ("mass shooting", "mass killing", "rampage killing", "shooting massacre", "mass murder", "mass shooter", "mass murderer" and "mass killer") to avoid any biases related to the changing ways in which news organisations tend to characterise mass shootings.

A total of 16 major newspapers were consistently included in Nexis throughout the 19-year time frame, and these were then weighted by their circulation figures. Because this group of daily newspapers is somewhat dominated by east coast publications (e.g., three in New York City and three in Pennsylvania), the AP national wire provided a useful check on any regional biases in major newspaper coverage of events.

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We also searched the Vanderbilt Television News Archive using more generic terms ("shooting" and "shooter") to ensure a sufficient volume of stories from the limited array of networks included in this resource.

We then generated day-by-day tallies from 1 January 2000 to 31 December 2018 of the number and lengths of news stories in major newspapers, the Associated Press national wire, and network television news broadcasts on the general topic of mass shootings. These daily counts of media content were then merged with a binary indicator of whether there was a mass public shooting on each date (there was never more than one) and, if so, the number of victims killed.

Whereas the full report of this research includes analyses of public and non-public mass shootings, we present here only the findings related to public incidents. For the most part, non-public mass shootings received limited media coverage and did not produce any measurable contagion. Also, although we analysed the effects involving three distinct forms of news coverage, we limit the presentation here to just the major newspapers. Comprised of more than a dozen sources, this indicator of media attention produced higher counts than the single-source AP and TV variables, thus allowing for greater statistical power. James Alan Fox is the Lipman Family Professor of Criminology, Law, and Public Policy at Northeastern University. He is one of the principals in maintaining the Associated Press/USA Today/ Northeastern University Mass Killing Database.

Nevertheless, we found a strong temporal correlation in the coverage levels across the three news sources.

Trends in mass public shootings and media coverage

The growing awareness and concern associated with mass shootings raises the question of whether there has been a genuine increase in risk or mainly a greater extent of unsettling news coverage. Figure 1 (page 25) displays day-by-day patterns in the number of victims killed in mass public shootings along with the extent of media coverage based on the index of 16 major newspapers. As shown, the number of mass public shootings has increased, along with some clustering of cases since 2012. Specifically, the incidence rate per capita rose 24% in the post-2012 time-frame as compared to the earlier years. There has been a much greater surge, however, in the severity of mass public shootings, as the victimisation rate per capita jumped 110% since 2012 – a change that cannot be attributed to chance. In fact, 11 of the 14 incidents with double-digit death tolls and 4 of the 5 with more than 20 killed occurred since 2012. Figure 1 also reflects a corresponding growth in the extent of news coverage of mass shootings in the more recent years. Although not shown, similar

What is a mass shooting?

With interest in and concern about mass shootings growing rapidly in recent years among the public, politicians and academics alike, social scientists were frustrated by the lack of official data on the topic. In the absence of a reliable resource on cases, several news organisations and academic groups developed their own databases. However, because there was no consensus on definition, the competing databases told very different stories about incidence and trend. Some databases focused on the cases that make the headlines (deadly mass shootings in a public place), while others 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 killed ranging from three to six.

Even more problematic, there remains disagreement as to whether the victim threshold should include all those shot or just the fatalities. Because 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 a year.

In retaining the "four or more victim fatalities" criterion, we do not mean to minimise the pain and suffering caused by gunshot wounds, but death is different. Conflating fatalities with injuries, some of which may be minor, can be 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 (at least four victim fatalities).



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patterns of coverage were evident for the AP wire and network TV news.

The surge in the incidence and severity of mass shootings, as well as media reporting on the general topic, raises a fundamental question: is the heightened news coverage encouraging more people to commit mass shootings, or is the increase in mass shootings producing more news coverage as a response? Figure 2 (page 25) specifically addresses this matter by focusing on the average amount of news coverage in the 30 days before (i.e., leads –30 to –1) and the 30 days after a mass shooting (lags 1 to 30). Here we see no increase in news coverage before a mass shooting, but there is a surge in subsequent coverage – delayed for up to two days because of early morning newspaper publication deadlines - which then dissipates over a two-week time-frame.

Models of mass public shootings and media coverage

The level of news coverage before and after mass public shootings offers a glimpse of the connection between deadly mass shootings and coverage of the topic. We sought to build upon the basic lead/lag pattern using a point process model to examine the interdependence between media coverage and both the incidence and severity of mass public shootings.

Point process models are employed to describe an event that occurs at random times or locations. These models have been applied to such physical events as earthquakes and their aftershocks, as well as to such social events as gun violence.

Point process models rely on the basic assumption that events are triggered probabilistically by the occurrence of other events (of the same or different type).⁴ Temporal point process models are used to model how occurrences of events are patterned over time. For example, a temporal point process model for real estate sales may predict the time course of increased home sales following a spate of recent purchases. Self-exciting point process models specifically examine the extent to which the occurrence of an event elevates the likelihood of additional events of the same type in the near future.

Multivariate point process models capture how those patterns interrelate between



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Figure 3: The fitted impulse response function capturing excitation effects for the two-variable model of major paper (MP) coverage and mass public shooting (MPS) incidence.

multiple event types, incorporating triggering of the same event type (self-excitation) as well as interdependent triggering between event types (cross-excitation). A multivariate point process model therefore predicts the incidence rate of various event types over time based on the prior history of each event type. Such models can also incorporate other features such as background event rates and geographic (spatial) effects, making them quite powerful and generalisable statistical tools. For example, a spatio-temporal multivariate point process model for real estate transactions may predict that sale prices will increase if there have been many nearby property transactions accompanied by the arrival of new businesses to the locality.

In this study we use a multivariate point process model to capture the interdependence of mass public shootings and media coverage of the topic. We consider whether the likelihood of mass public shootings at a particular point in time is impacted by the occurrence of similar events in the recent past (self-excitation by shootings)



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Figure 4: The fitted impulse response function capturing excitation effects for the three-variable model of major paper (MP) coverage and mass public shooting (MPS) incidence, split by severity level.

as well as by prior news coverage of such crimes (cross-excitation by publicity). The same approach is applied to the self-excitation of media coverage and cross-excitation of media coverage by the occurrence of mass public shootings. Finally, we estimate the model without assuming any particular form to the relationships (such as exponential decay in the level of excitation over time).⁵

The model allows us to estimate the extent to which the occurrence of a mass public shooting excites a heightened probability of future incidents, and the extent to which they may be cross-excited by media coverage over a preceding time period. In addition, the model is flexible enough to allow splitting of mass public shootings into higherseverity events and lower-severity events, which would be expected to generate much different levels of media coverage.

Measuring possible contagion effects

First, we consider a simple two-variable model consisting of the daily count of mass public shootings and the level of media coverage in the form of major newspapers. Figure 3 shows the weighted impulse response functions, signifying the profile of how one instance of an event of a given type increases the probability of another given event type occurring over time. Each line represents the best estimate of the marginal change in probability along



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with a shaded region indicating the associated margin of uncertainty.

What we see from the top panel of Figure 3 is what we would expect to see: a quite strong cross-excitation effect of mass public shootings on media coverage (solid blue line), wherein the media coverage generated by a particular mass public shooting decays exponentially, falling effectively to zero after several days. Media coverage also exhibits a self-excitation effect (dashed orange line).

If we look at the bottom panel, we see essentially no excitation effect on mass public shootings over a period of 15 days. The impulse response functions acting on the mass public shootings variable are statistically indistinguishable from zero, both for the self-excitation of mass shootings on subsequent mass shootings and the cross-excitation of media coverage on mass shootings. In other words, we find no evidence of contagion effects spurring mass public shootings within the short term, either as a result of other similar events or media coverage thereof.

The modest number of mass public shootings (89 over the 6,940 observation days) constrains the statistical power of the analysis. However, the modelling approach allows for a robust characterisation of the upper limit of contagion effects. Specifically, the 97.5th percentile of the estimated number of events per day per historical event is 0.0016 for self-excitation of shootings and 0.00018 for cross-excitation of shootings by coverage.

Finally, we examine the role of mass public shooting severity in terms of victim count. We expand the model to a three-variable excitatory process for mass public shootings in which the shooting incidence variable is split into higher-severity (six or more killed) and lower-severity (four or five killed) components. We again find no appreciable self-excitation of mass shootings or crossexcitation of shootings by coverage. For lower-severity events, which represent the majority of incidents (N = 51), upper limits for the estimated number of events per day per historical event are 0.00098 (self-excitation) and 0.00010 (cross-excitation). For highseverity events, for which we have a smaller sample size (N = 38), the upper limits are 0.013 and 0.00012, respectively.

As shown in Figure 4, the excitation of media coverage is dominated by higher-

severity shootings (orange lines), with the more numerous lower-severity events (blue lines) contributing negligibly to exciting news coverage. In other words, media coverage of mass public shootings is driven strongly by reporting on severe events, with much lower coverage of events with four or five fatalities and a small amount of self-perpetuating coverage (media self-excitation). Moreover, the higher-severity events are responsible for exciting coverage at approximately three times the rate of coverage self-excitation. These models were also applied to the level of coverage by the AP national wire and network TV news broadcasts, yielding similar results.

Throughout all the analyses, we only considered excitation temporally and not spatially. Since mass public shootings tend to inspire national media coverage, we have a low expectation that spatial effects would exist. Furthermore, given the rarity of mass public shootings – those with four or more victim fatalities have averaged about a halfdozen annually and have never surpassed 10 in a single year – there would not be sufficient data points to estimate spatial effects reliably.

Discussion

The notion that highly publicised mass shootings may inspire the commission of future acts, in the short term or long term, has been a topic of debate both in academic circles and among the general public. However, that there is some temporal clustering of events does not necessarily mean that media coverage of mass shootings leads to a heightened risk of additional incidents. As criminologist Adam Lankford and psychologist Sara Tomek argue, "incident clusters could theoretically be attributable to many other social and environmental factors, such as political cycles, stock market gains or losses, or other news events unrelated to crime".6 Of course, clustering can also reflect the operation of chance.

The findings presented here, based on analyses explicitly incorporating measures of media reporting along with mass public shootings from 2000 to 2018, provide no support for the proposition that news coverage of such incidents inspires additional attacks, at least not in the relatively short term. Specifically, we find no evidence of contagion in mass shootings in terms of either self-excitation or cross-excitation from media coverage over a period of several weeks.

Mass shootings in public places with large numbers of fatalities often dominate the news cycle for several days and appear to have a strong effect on the perceptions of the American public regarding safety. We also examined data on non-public mass shootings since 2000 as well as mass shootings with four or more victims injured or killed since 2013, the earliest year available, using the same analytic methods (see the box on page 26 for a discussion of the different definitions of "mass shooting"). We found no evidence that either of these forms of gun violence is prompted by media coverage, as measured by our national indicators, nor did they tend to generate any significant surge in coverage.

Our results do not rule out the possibility of a long-term cumulative effect of media coverage of mass shootings. Such an effect would be difficult to disentangle from possible confounding background factors based on temporal patterns. Many other variables (e.g., political polarisation or number of guns in circulation) would likely increase monotonically on a similar time-scale, making it a challenge to isolate the impact of media coverage using time series models.

Notwithstanding the technical advance in the study of mass shooting contagion provided by the multivariate point process model used here, the results are subject to certain limitations. For example, all three measures of news coverage involved traditional outlets rather than the various types of social media. However, social media activity regarding mass shootings correlates strongly with more traditional media coverage, which would argue against shortening the analytic time-frame (and thus reducing the number of incidents) to accommodate data pertaining to social media of relatively recent popularity. Moreover, social media platforms and usage have expanded dramatically over the past few years, limiting the validity of such measures for analysing temporal effects.

An additional point of caution involves the statistical power afforded by the modest number of mass public shootings since 2000. Although every incident is tragic, these are inherently rare events with very different statistical properties and ability to inspire media coverage than more frequent, less severe crimes. Non-public mass shootings (such as massacres of family members or shootings involving rival gangs) are more frequent, yet do not typically receive much media coverage; the same holds for assaults in which multiple victims are injured but few, if any, are killed.

Given their high-profile nature, mass public shootings tend to generate proposals for change on a variety of fronts, including modifications to state and federal gun laws, improvements in the mental health system, and even controls on the sale of violent entertainment. Our findings suggest that, among the possible policy responses designed to limit the number or severity of such crimes, restricting news coverage should not be paramount.

Note

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Disclosure statement

The authors declare no competing interests.

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