

DISCUSSION PAPER SERIES

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## ABSTRACT

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# The Effect of Media Coverage on Mass Shootings\*

Can media coverage of shooters encourage future mass shootings? We explore the link between the day-to-day prime time television news coverage of shootings on ABC World News Tonight and subsequent mass shootings in the US from January 1, 2013 to June 23, 2016. To circumvent latent endogeneity concerns, we employ an instrumental variable strategy: worldwide disaster deaths provide an exogenous variation that systematically crowds out shooting-related coverage. Our findings consistently suggest a positive and statistically significant effect of coverage on the number of subsequent shootings, lasting for 4-10 days. At its mean, news coverage is suggested to cause approximately three mass shootings in the following week, which would explain 55 percent of all mass shootings in our sample. Results are qualitatively consistent when using (i) additional keywords to capture shooting-related news coverage, (ii) alternative definitions of mass shootings, (iii) the number of injured or killed people as the dependent variable, and (iv) an alternative, longer data source for mass shootings from 2006-2016.

**JEL Classification:** C26, D91, F52, L82

**Keywords:** media effects, mass shootings, contagion hypothesis, instrumental variable estimation

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# 1 Introduction

Mass shootings have become a gruesome regularity in the US: Columbine (1999), Virginia Tech (2007), Sandy Hook (2012), Orlando (2016), Las Vegas (2017), and Parkland, Florida (2018), are just some of the deadliest examples. How can we explain the frequent occurrence of such tragedies? One hypothesis put forth by criminologists, psychologists, and popular commentators suggests that the media coverage mass shootings receive could systematically encourage future perpetrators. For example, the criminology professor Adam Lankford argues that “there is no doubt that there is an association between media coverage that these offenders [mass shooters] get and the likelihood that they will act” (Christensen, 2017; also see Towers et al., 2015, or Lankford and Madfis, 2018).<sup>1</sup> Indeed, records of shooters indicate they model their behavior on past shooters, such as the Columbine shooters and their ‘manifesto’ (e.g., see Gladwell, 2015). A 2015 shooter who murdered two people live on air stated: “[s]eems like the more people you kill, the more you’re in the limelight” (Perez et al., 2015); a 2007 shooter attested: “[j]ust think tho [sic], I’m gonna be (expletive) famous” (Gun, 2007).<sup>2</sup>

Despite these theoretical priors and anecdotal evidence, the media has largely failed to implement a more prudent approach to reporting on mass shootings, contrary to other domains where extensive coverage could produce harmful consequences, such as suicides.<sup>3</sup> What has remained elusive is an empirical test to move beyond correlational evidence and investigate causality between media attention devoted to shootings and subsequent mass shootings. Endogeneity concerns plague a basic regression analysis since, in reality, a range of factors may influence both the degree of media coverage and the occurrence of future shootings. For instance, national trends in gun violence and ownership, as well as the importance of individual fame remain difficult to pin down in consistent variables; media consumers may demand more coverage of shootings as they become more prevalent; and supply-side considerations of media stations may urge for more sensationalist coverage to compete for viewers. In sum, omitted variable bias remains virtually impossible to circumvent in a traditional regression framework.

The following pages present what is, to our knowledge, the first empirical approach to test for a causal effect between television news coverage of shootings and the occurrence of future mass shootings. To isolate causality, we employ an instrumental variable (IV) approach based on natural disasters. Our identification strategy rests on the

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<sup>1</sup>Auxemery (2015) provides a historical overview of mass murders from a psychology perspective and notes “[t]he media appears to play a crucial role in preventing the occurrence of imitation or copycat tragedies.” For recent discussions in the media, we refer to Rogers (2016a,b), among many others.

<sup>2</sup>A hypothesis that is closely related to fame being the main motivation considers ‘contagion’ or ‘ripple’ effects, where observing others behaving in a certain way (i.e., committing a violent shooting) moves that behavior into the realm of feasibility (e.g., see Larkin, 2009, for the effect of Columbine on subsequent shootings). We refer to Gould and Olivares (2017) for a recent summary of the existing evidence related to the contagion hypothesis, whereas Madfis (2017) gives a general overview of the existing literature on school shootings. Cantor et al. (1999) investigate the ripple effect related to the media coverage of seven mass homicide events in Australia, New Zealand, and the United Kingdom. We also refer to Paton (2012) for shooters’ emulating behavior of prior events.

<sup>3</sup>The contagion phenomenon pertaining to suicide has long been suspected, at least since Goethe’s 1774 publication of *The Sorrows of Young Werther*, which was thought to have inspired numerous suicides (Niederkröthenthaler et al., 2007). Gould et al. (2014) explore the role of newspapers in suicide clusters, whereas Corbo and Zweifel (2013) discuss how the media should report suicides, referring to contagion. Pirkis et al. (2006) offer media guidelines in how suicide should be reported. For example, Dahmen et al. (2018) surveys reporters and even though they agree that coverage of mass shootings has become routine and “sensational,” most reporters remain strongly supportive of reporting on shootings.

assumption that media coverage dedicated to shootings (conditional on victims and date-specific characteristics) diminishes when more people die worldwide from natural disasters. Indeed, a measure of global disaster deaths emerges as a strong negative predictor of television news segments that mention the terms ‘shooter’ or ‘shooting.’ In turn, we find no evidence that would suggest shooters systematically anticipate and avoid days with more victims from natural disasters worldwide. This IV strategy allows us to test for a causal effect in the second stage, when regressing the number of subsequent shootings on the predicted media coverage of shootings.

Accessing the Gun Violence Archive (GVA from hereon) and the Vanderbilt Television News Archive (VTNA) for information from *ABC World News Tonight*, we explore daily data from January 1, 2013 to June 23, 2016 (when our data collection for the VTNA ends). The corresponding results suggest a positive and statistically significant effect of media coverage dedicated to shootings on the number of shootings in the subsequent week. This effect emerges when predicting attacks between four and ten days after the initial coverage and returns back to zero after twelve days. At its mean, ABC news coverage is suggested to cause approximately three mass shootings in the subsequent week, equivalent to 58 percent of all mass shootings in the United States. The qualitative conclusions remain robust to a range of robustness checks and alternative specifications, such as (i) accounting for outliers in disaster deaths, (ii) including additional terms to capture news coverage of shootings (i.e., ‘amok,’ ‘rampage,’ ‘gunman,’ and ‘gunmen’), (iii) employing alternative outcome variables for mass shootings with deaths and injured victims, or (iv) accessing an alternative data source for mass shootings from USA Today that spans over ten years.

We hope this project can contribute to two distinct areas of research. First, we extend recently emerging empirical evidence studying the power of the mass media in influencing a range of outcomes. For example, television has been shown to meaningfully affect voting behavior (DellaVigna and Kaplan, 2007; Enikolopov et al., 2011; Campante and Hojman, 2013; DellaVigna et al., 2014; Schroeder and Stone, 2015; Philippe and Ouss, 2018), disaster relief efforts (Eisensee and Strömberg, 2007), politicians’ resignations (Garz and Sörensen, 2017), capturing criminals (Webbink et al., 2016), terrorism (Durante and Zhuravskaya, 2018; Jetter, 2017a,b), fertility decisions (Kearney and Levine, 2015), divorce rates (Chong and Ferrara, 2009), and economic and social development (La Ferrara, 2016; also see Kleemans and Vettehen, 2009, for an overview of the causes and effects of television sensationalism). In a related test of the ‘copycat’ effect, Dahl and DellaVigna (2009) find violent movies to *decrease* the number of violent crimes – a result that is suggested to operate via a substitution effect away from pursuing violent crimes to watching violence in movies. Our results suggest different dynamics when it comes to potential mass shooters as more television exposure of shooters appears to encourage them, which likely offers some objective insight as to motives of potential shooters. Second, we contribute to the ongoing public policy debate about how to prevent mass shootings and gun violence.<sup>4</sup> Our findings suggest that decreasing the amount

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<sup>4</sup>We refer to Duggan (2001) for the effects of gun ownership on gun violence. Duggan et al. (2011) consider the impact from gun shows, whereas Edwards et al. (2017) explore the effect of regulatory delays to purchase a handgun on homicides and suicides. Yousaf (2018) explores the political consequences of mass shootings.

of television coverage shooters receive could limit further tragedies. To our knowledge, these results provide the first empirical evidence for the theoretical predictions made by a range of scholars in the criminology and psychology disciplines, such as [Gould and Olivares \(2017\)](#) or [Lankford and Madfis \(2018\)](#). We discuss potential policy implications in [Section 4](#).

## 2 Data and Methodology

### 2.1 Data

#### 2.1.1 Sources and Descriptive Statistics

The data for our main empirical estimations are derived from three sources: the Gun Violence Archive ([GVA, 2018](#)), the Vanderbilt Television News Archive ([VTNA, 2016](#)), and EM-DAT (see [Guha-Sapir et al., 2014](#)).

The GVA, a “not for profit corporation formed in 2013 to provide free online public access to accurate information about gun-related violence in the United States” ([GVA, 2018](#)), provides information on the date, the number of deaths, and the number of people injured for each shooting. The GVA database includes all shootings where four or more people are shot or killed, providing data since January 1, 2013. Our results are consistent for alternative definitions of mass shootings, as well as an alternative source for data on mass shootings ([Section 3.3](#)). Overall, this captures 912 mass shootings and [Table 1](#) documents descriptive statistics of shootings in the top row. On an average day, 0.76 shootings occurred across the US with a maximum of six shootings on a given day (07/05/2014 and 11/22/2015).

**Table 1:** Summary statistics of main variables for all 1,205 days for which VTNA data for ABC news coverage are available between January 1, 2013 and June 23, 2016.

Variable	Mean	(Std. Dev.)	Min.	Max.	N	Description (if necessary)
Shootings (source: GVA)	0.76	(1.04)	0	6	1,205	# of shootings today
ABC coverage (source: VTNA)	3.70	(8.67)	0	95.68	1,205	Seconds of news segments headlining ‘shooting’ or ‘shooter’ divided by total seconds of ABC news today (multiplied by 100)
Deaths from natural disasters (source: EM-DAT)	0.10	(1.36)	0	22.30	1,205	# of deaths from extreme temperatures and wildfires worldwide today in 10,000
Deaths from shootings (source: GVA)	0.88	(2.26)	0	50	1,205	# of deaths from shootings today

To derive day-to-day information for television news coverage of shootings, we access the VTNA, following other researchers who study media effects in the US (e.g., see [Eisensee and Strömberg, 2007](#), [Jetter, 2017b](#), or [Durante and Zhuravskaya, 2018](#)). Specifically, we employ data for *ABC World News Tonight*, the 30-minute flagship evening television news format of ABC News. Averaging a viewership of 8 million people across the US,

the program ranks first among all evening news programs (Joyella, 2018). We focus on television news (as opposed to newspapers, for example) since prime time news draw a viewership that usually exceeds the readership of major newspapers (e.g., the New York Times) by a factor of five or more (US Securities and Exchange Commission, 2017, p.2). The VTNA contains data for 1,205 of the 1,270 days (or 95 percent of all days) between January 1, 2013 and June 23, 2016 (when our data collection stops).<sup>5</sup> Robustness checks suggest that the few omitted days are not influencing our results (Section 3.3).

To derive a comparable measure of news coverage devoted to shooters and shootings, we first identify each news segment that mentions either the term ‘shooter’ or ‘shooting’ in its headline (including upper- and lower-case spellings). In alternative estimations, we amend our search with the terms ‘amok’, ‘rampage’, ‘gunman’, and ‘gunmen’ to minimize type II errors and the corresponding results are consistent (Section 3.3). It is important to highlight that we are not arguing that these terms identify *all* news segments related to shootings or shooters; however, these simple terms provide a straightforward identification strategy. Manually browsing the days of and immediately following some particularly deadly shootings (e.g., Dylan Roof’s church shooting on June 17, 2015) shows that either the word ‘shooting’ or ‘shooter’ commonly appears in the respective headlines. If anything, misidentifying some news segments would introduce measurement error that would make it more difficult to identify a statistically meaningful effect.

Second, we sum the seconds devoted to these news segments and divide that number by the total seconds devoted to all news segments on the respective day.<sup>6</sup> The second row of Table 1 lists summary statistics of the media coverage variable and, on average, 3.7 percent of the ABC evening news coverage mentions the term shooting or shooter. The maximum coverage during our sample, in which 96 percent of the day’s news were dedicated to such shooting-related terms, occurred on December 2, 2015 when the San Bernardino mass shooting occurred as well as a mass shooting in Savannah, Georgia (see Nagourney et al., 2015, and Paquette, 2015). In general, we identify at least one shooting-related news segment on 468 of the 1,205 sample days.

Finally, we access EM-DAT to derive a daily measure of global deaths from extreme weather and wildfires. We first divide the total number of deaths from a disaster by the number of days the disaster lasted and then assign that average to each day of the disaster. Second, we aggregate those disaster-specific values on the daily level to produce one daily measure of deaths from the respective disasters for every day throughout the sample period (this methodology is analogous to that employed by Jetter, 2017a,b).

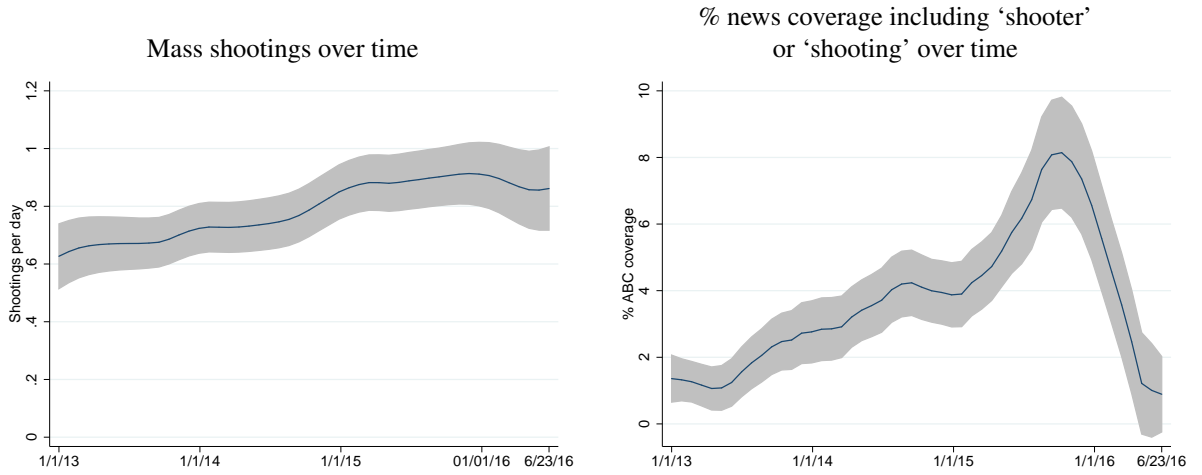
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<sup>5</sup>The VTNA includes less information for the *NBC Nightly News* and the *CBS Evening News* with 696 and 542 days (i.e., 55 and 43 percent of all 1,270 days). Shooting-related coverage (see explanation in the upcoming paragraph) correlates highly between news programs, as the NBC and CBS programs show correlation coefficients of 0.81 and 0.68 with the *ABC World News Tonight*.

<sup>6</sup>For example, assume three segments on a given day with the lengths of 80, 50, and 100 seconds, where the first two segments mention one of the shooting-related terms, whereas segment three does not. The share of ABC coverage dedicated to shootings of that day becomes  $\frac{80+50}{80+50+100} \times 100 = \frac{130}{230} \times 100 = 56$  percent.

### 2.1.2 Time Trends

To illustrate the developments of mass shootings and our media coverage variable, Figure 1 visualizes time trends throughout our sample period. The left graph documents the persistent rise in the number of shootings per day, whereas the right graph shows that ABC news segments mentioning the terms shooter or shooting consistently increased until the end of 2015 before falling again to 2013 levels. This fall in coverage since the beginning of 2016 is likely owed to the increased media coverage dedicated to the US election campaign. Indeed, tracing news segments including respective terms show a continuous rise from early 2016 onwards until the end of our sample (see appendix Figure A1). All results are consistent when excluding 2016 from our sample (see Section 3.3). Figure 1 shows that any empirical analysis of mass shootings and the associated media coverage needs to account for time trends.

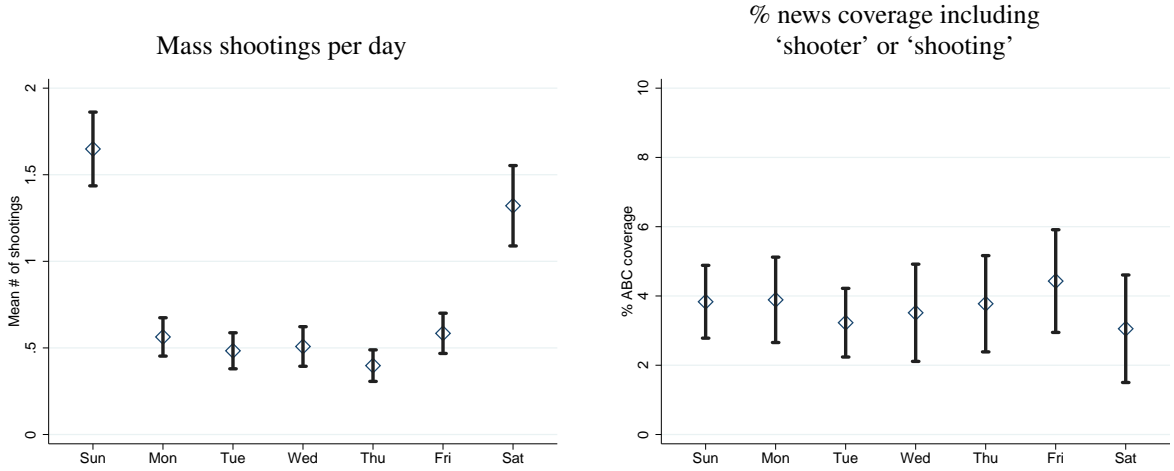


**Figure 1:** Mean shootings per days and ABC television news coverage including the term ‘shooter’ or ‘shooting’ per day over time, displaying kernel-weighted local polynomial smoothing graphs with 95 percent confidence bands.

Figures 2 and 3 display shootings and ABC coverage by weekday and month to explore other time-specific characteristics. The left graph of Figure 2 shows that mass shootings are indeed more likely to occur on weekends, consistent with findings by Towers et al. (2015). Nevertheless, ABC news coverage including the shooting-related terms does not vary much throughout the week.

Further, it is possible that certain months are more prone to shootings than others, perhaps because of major holidays or school vacations. The GVA documents more than one shooting per day in June, July, and August but fewer than 0.5 shootings per day in January, for example. The vertical confidence bands indicate statistical differences between some of these months. However, our ABC news variable finds especially increased coverage in December. The large confidence interval associated with that coefficient indicates that a couple of days with unusually large coverage are driving that statistic, i.e., those surrounding the San Bernardino shooting. Figures 2





**Figure 2:** Mean shootings by weekday and ABC television news coverage including the term ‘shooter’ or ‘shooting’ by weekday, displaying kernel-weighted local polynomial smoothing graphs with 95 percent confidence bands.

and 3 suggest that accounting for weekday- and month-fixed effects can systematically influence the likelihood of shootings and media coverage.

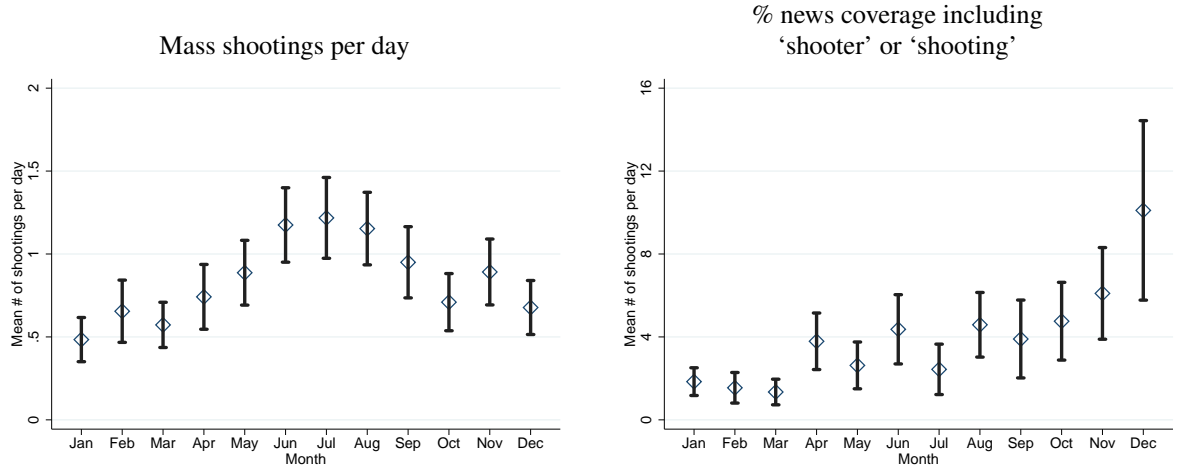
## 2.2 Empirical Methodology

We begin with a standard linear regression analysis, predicting the number of mass shootings on days  $t + 1$  until  $t + 7$  with our ABC news variable. In Section 3.2, we also consider alternative timeframes of the dependent variable. Formally, we estimate

$$(Shootings)_{t+1,\dots,t+7} = \beta_0 + \beta_1 (Coverage)_t + \mathbf{X}'_t \beta_2 + \epsilon_t, \quad (1)$$

where  $\mathbf{X}'_t$  contains a linear time trend, fixed effects for each weekday and month of the year, as well as variables measuring the number of deaths from mass shootings on day  $t$  and the number of mass shootings in the previous seven days. Including these characteristics aims to account for any dynamics related to shootings immediately preceding day  $t$ .  $\epsilon_t$  denotes the conventional error term and we employ robust, heteroskedastic-, and autocorrelation-consistent (HAC) standard errors for the previous seven days.

If media coverage of shooters and shootings was indeed encouraging future shootings, we should expect  $\beta_1$  to be positive, as well as statistically and economically meaningful. However, the discussed endogeneity concerns make it difficult to move beyond correlation. Perhaps most concerning are omitted variable issues. For example, country-wide political or social tensions and protests (e.g., a crime wave) could decrease the coverage of shootings, but increase the likelihood of subsequent shootings, thereby introducing a downward bias into  $\beta_1$ . In turn, consider



**Figure 3:** Mean shootings by month and ABC television news coverage including the term ‘shooter’ or ‘shooting’ by month, displaying kernel-weighted local polynomial smoothing graphs with 95 percent confidence bands.

a ‘summer slump’ of few newsworthy events occurring. It is possible that the media would therefore report more extensively on a shooting, but other shooters may aim to exploit that drought in news. If that were the case,  $\beta_1$  could be biased upwards.

To circumvent these endogeneity concerns, we propose an IV strategy, where media coverage dedicated to shootings and shooters is first predicted by the number of global deaths from extreme temperature and wildfires on days  $t$  and  $t - 1$ .<sup>7</sup> Formally, the first stage becomes

$$(Coverage)_t = \alpha_0 + \alpha_1(Disaster\ deaths)_{t,t-1} + \mathbf{X}'_t\alpha_2 + \delta_t. \quad (2)$$

The predicted  $Coverage_t$  values are then used in the second stage to predict the number of mass shootings on days  $t + 1$  until  $t + 7$ , following equation (1). This identification strategy is akin to Jetter (2017a,b) and Garz and Pagels (2018) who employ natural disasters as an exogenous variation when predicting terror attacks and participation in tax amnesties.

### 2.3 Excludability Restriction

As with any IV analysis, our strategy crucially relies on two characteristics: statistical power and excludability. If the number of deaths from worldwide disasters were systematically related to the occurrence of subsequent mass shootings in ways other than via the media coverage of shooters and shootings initially, our estimates could be

<sup>7</sup>Results are consistent when only using deaths on day  $t$ , but the corresponding first stage becomes marginally weaker (see Section 3.3).

biased. Most importantly, potential shooters may be aware of the increased news pressure from disaster deaths and delay their actions; alternatively, if few deaths from natural disasters occur, they may be more enticed to strike.

Table 2 displays results from regressing the number of disaster deaths on day  $t$  on the number of shootings on day  $t$ . If shooters indeed anticipate and avoid days with many disaster fatalities, we should derive a negative and statistically significant coefficient. However, that is not the case even in a univariate framework (column 1). Adding a linear time trend, as well as fixed effects for weekdays and months leaves the respective coefficient far from any conventional levels of statistical relevance.

**Table 2:** Testing the exclusion restriction to see whether the number of disaster deaths on day  $t$  predicts the number of shootings on the same day, using OLS regressions.

Dependent variable: # of shootings (mean = 0.76)		
	(1)	(2)
Disaster deaths	-0.002 (0.010)	0.016 (0.012)
Time trend, fixed effects for months and days of the week		yes
$N$	1,205	1,205

*Notes:* Robust standard errors are displayed in parentheses and \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$  indicate conventional levels of statistical significance.

### 3 Empirical Findings

#### 3.1 Main Results

Table 3 displays our baseline results, where columns (1) and (2) present coefficients from OLS regressions and columns (3) and (4) turn to our IV strategy. A univariate approach shows a positive correlation between ABC news coverage of the terms shooter or shooting and the number of mass shootings in the subsequent week. However, the respective coefficient remains indistinguishable from zero in statistical terms and virtually meaningless in economic terms. Even if the coefficient were statistically powerful (perhaps because our data may include measurement error, artificially inflating standard errors), the mean ABC coverage (3.7 percent) would be able to explain 0.7 percent of all mass shootings in the GVA sample (see third last row of Table 3). Once we account for the control variables introduced in Section 2.2, we still derive a precisely estimated null effect in column (2). A

simple Durbin-Wu-Hausman test (following [Davidson et al., 1993](#)) reveals strong concerns about the endogeneity of media coverage (p-value of 0.00).

**Table 3:** Results from OLS and IV regressions predicting the number of shootings on days  $t + 1$  until  $t + 7$  with television news coverage on ABC.

Estimation method:	OLS		IV	
	(1)	(2)	(3)	(4)
<b>Panel A: Predicting # of shootings on days <math>t + 1</math> until <math>t + 7</math></b>				
ABC news coverage	0.011 (0.009)	-0.002 (0.009)	0.914*** (0.131)	0.830*** (0.261)
Control variables <sup>a</sup>		yes		yes
<b>Panel B: 1<sup>st</sup> stage predicting media coverage</b>				
Deaths from extreme temperature or wildfires on days $t$ and $t - 1$			-0.187*** (0.026)	-0.133*** (0.036)
Control variables <sup>a</sup>				yes
% of mass shootings explained at mean of ABC news coverage	0.7	0	61	55
F-test insignificance of IV <sup>b</sup>			51.90***	14.00***
$N$	1,205	1,198	1,205	1,198

*Notes:* All estimations are conducted using the *ivreg2* command in Stata with robust, heteroskedastic-, and autocorrelation-consistent (HAC) standard errors (option *robust* in Stata). \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$  indicate conventional levels of statistical significance.

<sup>a</sup>Includes a linear time trend, fixed effects for each weekday and month, as well as variables measuring (i) the number of shootings on day  $t$ , (ii) the number of deaths from shootings on day  $t$ , and (iii) the number of shootings within the past 7 days. <sup>b</sup>Displaying results from the Sanderson-Windmeijer multivariate F test of excluded instruments (see [Baum, 2007](#), and [Sanderson and Windmeijer, 2016](#)).

Turning to the IV result, our conclusions change. Ignoring all control variables in column (3), the second-stage coefficient for ABC news coverage turns positive and statistically significant. The associated magnitude also increases markedly to 0.9, indicating that the mean ABC news coverage of 3.7 percent can explain 3.4 mass shootings in the upcoming week or 0.48 shootings per day. Out of 0.76 shootings on an average day, this would result in 61 percent of all mass shootings in our sample being explainable by news coverage alone. Nevertheless, column (3) does not account for our familiar set of control variables. Once these are included, the effect of news coverage only decreases marginally to 0.83. Still, such a magnitude implies that news coverage can explain 55 percent of all mass shootings. Panel B displays the key results from the first-stage and, as expected, more disaster

deaths means less ABC news coverage that include the terms shooter or shooting. Finally, the penultimate row of Table 3 shows that the first stage remains powerful even when controlling for the remaining covariates with F-values that pass the commonly employed threshold of ten (Stock et al., 2002; Stock and Watson, 2012).

### 3.2 Timeframe of Subsequent Shootings

With the results from Table 3 in mind, an important question concerns the timeframe of the derived effect. First, equation (1) can appear ad-hoc in predicting shootings in the next seven days. The literature lacks theoretical fundamentals that would suggest how quickly media coverage could drive future incidents, if at all. For example, it remains unclear *how long* a potential shooter plans an attack – a decision that likely depends on a range of circumstances that can differ across cases.<sup>8</sup> In a related context, Dahl and DellaVigna (2009) study violent movies in cinemas and potential effects on actual violence, finding short-run effects of up to three days. In a correlational study, Towers et al. (2015) find evidence for contagion in mass killings for up to 13 days (also see Gould, 2001, for suicide contagion effects).

To check whether the results presented in Table 2 are sensitive to the chosen timeframe, Figure 4 visualizes second stage coefficients for ABC news coverage from a variety of individual estimations, where we adjust the timeframe of the outcome variable. To begin, the two far-left coefficients show results from predicting shootings in the previous week and day. These estimations serve as placebo regressions as one should not expect today’s media coverage to predict past shootings in our IV setting. In other words, the statistical variation in ABC news coverage today derived from disaster deaths today should not predict shootings in the past. As expected, the respective coefficients remain statistically and economically irrelevant and standard errors remain relatively small, which indicates a precisely estimated null effect.

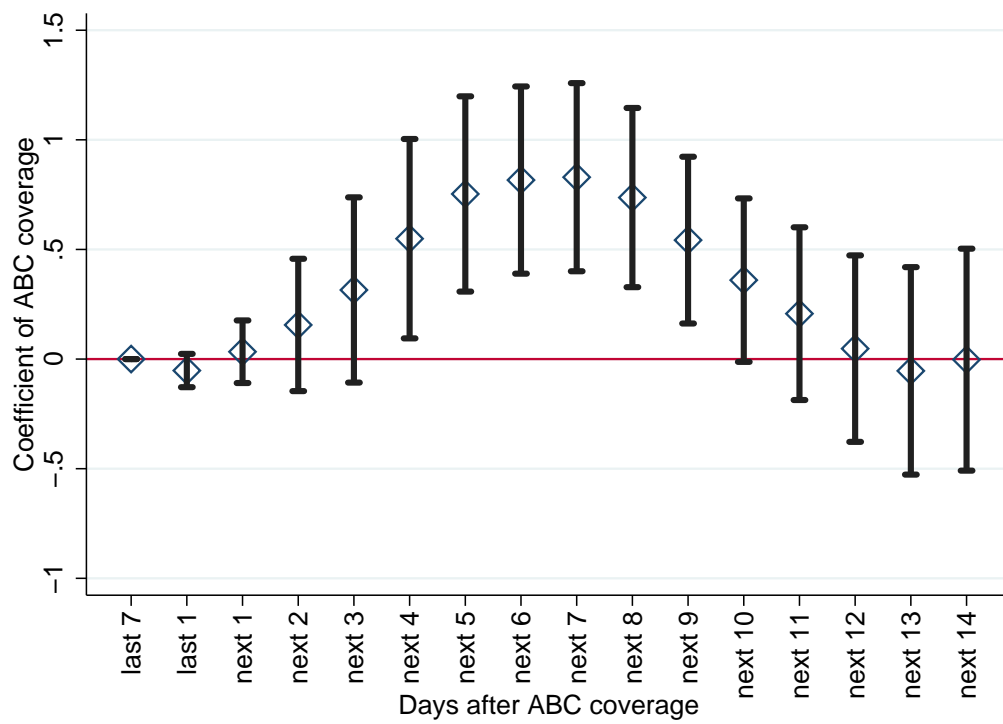
The remaining coefficients in Figure 4 then show how the derived effect systematically increases until seven days after the initial news coverage. After that, the effect fades away and then becomes statistically meaningless after ten to 12 days. This length of effect seems plausible given Towers et al.’s (2015) finding of a contagion effect that is suggested to last up to 13 days. (Note that Towers et al., 2015, do not empirically consider the role of media attention in contagion effects.)

### 3.3 Robustness Checks

Tables 4 and 5 display results from several robustness checks, using the results from column (4) of Table 3 as a benchmark. In columns (1) and (2), we exclude disasters on day  $t - 1$  and disasters in the US when calculating the IV. Especially the latter test aims to ensure that domestic disasters in the US are now in any other way influencing

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<sup>8</sup>For example, the time to plan differs whether the shooter is already in the possession of weapons and if they have thought about committing a shooting beforehand. Edwards et al. (2017) find that mandatory handgun purchase delays can significantly reduce firearm-related suicides, but not homicides.



**Figure 4:** Predicted additional shootings for various lengths of the dependent variable. Each point represents one regression outcome and all regressions include the control variables presented in equation (1) and Table 2. Two-sided 95 percent confidence intervals are displayed.

potential shooters in the US. In column (3), those days with the top one percentile of disaster deaths (above 20,000) are excluded. The results displayed in column (4) come from stopping our sample at the end of 2015 to account for the possibility that the 2016 presidential election campaign could somehow bias media coverage of shootings (see Figure 1). In column (5), we include additional keywords when determining news segments that cover shootings or shooters: ‘amok,’ ‘rampage,’ ‘gunman,’ and ‘gunmen’. Finally, columns (6) and (7) display results from addressing the missing VTNA days – once when assuming all of these days had zero coverage of shooting-related terms and then assuming the mean ABC coverage on those days. In all these alternative estimations, media coverage remains a positive and statistically powerful predictor of subsequent mass shootings. In terms of magnitude, the respective estimations suggest that between 32 and 57 percent of all mass shootings are explainable by the average news coverage (see third last row of Table 4).

**Table 4:** Robustness checks I, exploring alternative estimations for the instrument and news coverage, predicting the number of shootings on days  $t + 1$  until  $t + 7$ . All estimations include the comprehensive set of control variables from equation 1 and Table 3.

	(1) Excluding disasters on day $t - 1^c$	(2) Excluding disasters in the US	(3) Excluding disaster outliers <sup>d</sup>	(4) Excluding 2016	(5) Additional shooting- related terms <sup>e</sup>	(6) Coding missing days as zero coverage	(7) Coding missing days as mean coverage
<b>2<sup>nd</sup> stage coefficients, predicting the number of shootings on days <math>t + 1</math> until <math>t + 7</math></b>							
ABC news coverage	0.743*** (0.237)	0.838*** (0.262)	0.742** (0.341)	0.484*** (0.139)	0.832*** (0.261)	0.854*** (0.273)	0.839*** (0.258)
Control variables <sup>a</sup>	yes	yes	yes	yes	yes	yes	yes
% of mass shootings explained at mean of ABC news coverage	49	56	49	32	55	57	56
F-test insignificance of IV <sup>b</sup>	14.87***	13.75***	8.22***	24.18***	13.76***	14.17***	14.54***
N	1,198	1,198	1,194	1,026	1,198	1,263	1,263

Notes: All estimations are conducted using the *ivreg2* command in Stata with robust, heteroskedastic-, and autocorrelation-consistent (HAC) standard errors (option *robust* in Stata). \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$  indicate conventional levels of statistical significance.

<sup>a</sup>Includes a linear time trend, fixed effects for each weekday and month, as well as variables measuring (i) the number of shootings on day  $t$ , (ii) the number of deaths from shootings on day  $t$ , and (iii) the number of shootings within the past 7 days. <sup>b</sup>Displaying results from the Sanderson-Windmeijer multivariate F test of excluded instruments (see Baum, 2007, and Sanderson and Windmeijer, 2016). <sup>c</sup>The IV only considers disaster deaths on day  $t$ , not  $t - 1$ . <sup>d</sup>Excludes top percentile of disaster deaths, i.e., those with more than 22,000 deaths. <sup>e</sup>Also includes the keywords ‘amok,’ ‘rampage,’ ‘gunman,’ and ‘gunmen’ (lower- and upper-case first letters) in searches for shooting-related news segments.

Table 5 turns to the outcome variable to measure mass shootings. Some definitions suggest a threshold of four deaths, as opposed to four people being shot (e.g., see Towers et al., 2015) and column (1) presents the corresponding results when employing that definition. In general, one may care more about the actual number of deaths or injured victims, as opposed to the number of shootings (see results in columns 2 and 3). Finally, the results displayed in column (4) are derived from exploring an alternative data source for mass shootings with the USA Today dataset, where mass killings are defined as four or more killed. This produces a sample ranging

from January 1, 2006 to June 23, 2016, producing 3,594 observations.<sup>9</sup> The corresponding summary statistics are referred to the appendix Table A1. As with the previous robustness checks, all estimations produce consistent findings in that ABC news coverage remains a positive and statistically significant predictor of mass shootings. Quantitative interpretations suggest that between 47 and up to 96 percent of the respective outcome variables are explainable by news coverage.

**Table 5:** Robustness checks II, exploring alternative measures of mass shootings on days  $t + 1$  until  $t + 7$  as outcome variables. All estimations include the comprehensive set of control variables from equation 1 and Table 3.

	(1) Predicting shootings with 4+ deaths	(2) Predicting # of people killed in mass shootings	(3) Predicting # of people injured in mass shootings	(4) Using USA Today data on mass shootings
<b>2<sup>nd</sup> stage coefficients, predicting the corresponding outcome variables on days <math>t + 1</math> until <math>t + 7</math></b>				
ABC news coverage	0.085* (0.051)	1.650*** (0.506)	2.770*** (1.011)	0.093*** (0.034)
Control variables <sup>a</sup>	yes	yes	yes	yes
% of mass shootings explained at mean of ABC news coverage	51	96	47	79
F-test insignificance of IV <sup>b</sup>	13.73***	13.73***	13.73***	34.93***
N	1,198	1,198	1,198	3,594

*Notes:* All estimations are conducted using the *ivreg2* command in Stata with robust, heteroskedastic-, and autocorrelation-consistent (HAC) standard errors (option *robust* in Stata). \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$  indicate conventional levels of statistical significance.

<sup>a</sup>Includes a linear time trend, fixed effects for each weekday and month, as well as variables measuring (i) the number of shootings on day  $t$ , (ii) the number of deaths from shootings on day  $t$ , and (iii) the number of shootings within the past 7 days. <sup>b</sup>Displaying results from the Sanderson-Windmeijer multivariate F test of excluded instruments (see Baum, 2007, and Sanderson and Windmeijer, 2016).

## 4 Conclusions

This paper presents an empirical test for a potentially causal relationship between the television news coverage of shootings (measured via the *ABC World News Tonight*) and subsequent mass shootings. Although theoretical hypotheses nested in criminology and psychology have long suggested such a link, we believe this is the first approach using an identification strategy that allows for causal conclusions. To circumvent the latent endogeneity concerns, we use the day-to-day measure of deaths from natural disasters (extreme temperature and wildfires) as an instrumental variable. We posit that media coverage dedicated to shootings and shooters decreases when more people die worldwide from such disasters. However, it is difficult to argue that the actions of *future* shooters are in

<sup>9</sup>In this case, the VTNA contains data on ABC news coverage for 3,594 out of the 3,827 days, equivalent to 94 percent.



any other way directly influenced by deaths from natural disasters anywhere in the world. Indeed, the data support these assumptions regarding the excludability restriction.

Our findings consistently suggest that media coverage systematically *causes* future mass shootings. These findings are consistent when accounting for weekday- and month-fixed effects, time trends, as well as characteristics of preceding mass shootings. A range of robustness checks support these conclusions. Using our benchmark estimation, a simple back-of-the-envelope calculation suggests that 55 percent of all mass shootings between January 1, 2013 and June 23, 2016 are explainable by news coverage. In terms of timeframes, news coverage seems to systematically raise the number of mass shootings in the following four to ten days and the effect reverts back to statistical insignificance after approximately 12 days.

Our study is of course not without caveats and we want to briefly discuss what we believe to be the main concerns and potential avenues for future research. First, we capture headlines of news segments that include the terms ‘shooter’ or ‘shooting.’<sup>10</sup> Thus, type I and type II errors are possible, i.e., we may pick up some news segments that include one of these terms, but do not discuss any shootings (e.g., shooting of a movie), and we may miss news segments that do discuss shooters. Second, our study focuses on the *ABC World News Tonight* because of data availability in the VTNA. Thus, we cannot provide a measure of *all* news media coverage dedicated to shootings. Nevertheless, exploring the most-watched prime time evening news program on television is likely to produce a representative measure of media attention.

With these considerations in mind, what can policymakers, media representatives, and commentators take away from our findings? Most importantly, our results advise journalists to report less on mass shootings. While our approach does not explore the content of news segments, it does speak to the volume of coverage that shooters and shootings receive. For example, [Perrin \(2016\)](#) and the [Meindl and Ivy \(2018\)](#) advocate for a more cautious approach in covering mass shootings, precisely because of the potential for contagion. Interestingly, such self-imposed media guidelines are employed in other areas where unintended consequences could emerge from increased coverage, such as the media attention devoted to suicides (e.g., see [Pirkis et al., 2006](#), [King, 2010](#), or [Reporting on suicide, 2017](#)). Perhaps the respective guidelines could serve as a starting point for a discussion regarding media coverage when it comes to mass shootings as well. We hope that this study helps to make such adverse consequences more salient in the mind of journalists and perhaps stimulates further research into identifying the causal relationships between media coverage of mass shootings and its potential consequences.

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<sup>10</sup>In additional estimations, we also add the terms ‘amok,’ ‘rampage,’ ‘gunman,’ and ‘gunmen.’

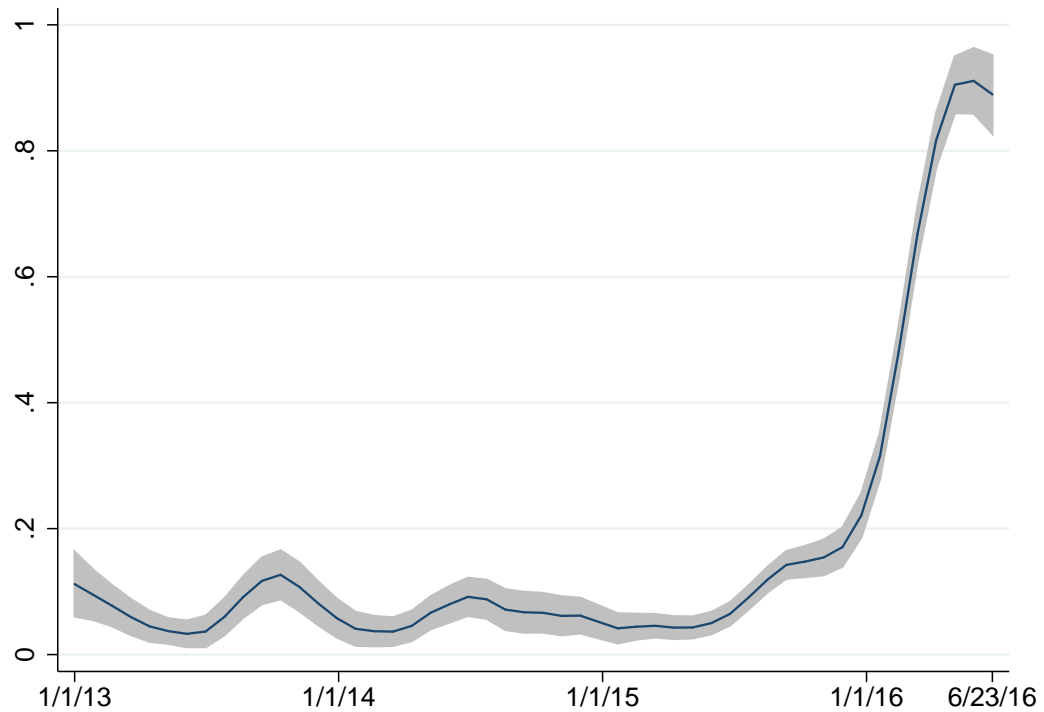
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## Appendix



**Figure A1:** Displaying the share of ABC television news coverage including any of the terms ‘Trump’, ‘election’, ‘Clinton’, ‘campaign’, ‘Republican’, ‘Democrat’, ‘Obama’, or ‘border’ over time, displaying kernel-weighted local polynomial smoothing graphs with 95 percent confidence bands.

**Table A1:** Summary statistics of main variables for all 3,600 days for which VTNA data for ABC news coverage and USA Today are available between 01/01/2006-06/23/2016.

Variable	Mean	(Std. Dev.)	Min.	Max.	N	Description (if necessary)
Shootings (source: USA Today)	0.06	(0.25)	0	2	3,600	# of shootings today
ABC coverage (source: VTNA)	1.96	(7.20)	0	95.68	3,600	Seconds of news segments headlining 'shooting' or 'shooter' divided by total seconds of ABC news today (multiplied by 100)
Deaths from natural disasters (source: EM-DAT)	0.04	(0.79)	0	22.30	3,600	# of deaths from extreme temperatures and wildfires worldwide today in 10,000
Victims from shootings (source: USA Today)	0.32	(1.66)	0	49	3,600	# of deaths from shootings today