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UNITED STATES DISTRICT COURT

CENTRAL DISTRICT OF CALIFORNIA

SOUTHERN DIVISION

STEVEN RUPP, et al.,

Plaintiffs,

vs.

ROB BONTA, in his official capacity as Attorney General of the State of California,

Defendant.

Case No.: 8:17-cv-00746-JLS-JDE

DECLARATION OF SEAN A. BRADY IN SUPPORT OF PLAINTIFFS' MOTION TO EXCLUDE THE TESTIMONY OF DEFENDANT'S EXPERT WITNESS LOUIS KLAREVAS UNDER FEDERAL RULE OF EVIDENCE 702

Hearing Date: April 28, 2023
Hearing Time: 10:30 a.m.
Courtroom: 8A
Judge: Hon. Josephine L. Staton

DECLARATION OF SEAN A. BRADY

I, Sean A. Brady, am an attorney at the law firm Michel & Associates, P.C., attorneys of record for Plaintiffs in this action. I am licensed to practice law before the United States Court for the Central District of California. I have personal knowledge of the facts set forth herein and, if called and sworn as a witness, I could and would testify competently to the truth of the matters set forth herein.

1. On January 6, 2023, Defendant served Plaintiffs with the Supplemental Expert Report and Declaration of Louis Klarevas. A true and correct copy of Mr. Klarevas's expert report, is attached hereto as **Exhibit 1**.

I declare under penalty of perjury that the foregoing is true and correct. Executed within the United States on March 24, 2023.

/s/ Sean A. Brady
Sean A. Brady
Declarant

EXHIBIT 1

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IN THE UNITED STATES DISTRICT COURT

FOR THE CENTRAL DISTRICT OF CALIFORNIA

WESTERN DIVISION

STEVEN RUPP; STEVEN DEMBER; CHERYL JOHNSON; MICHAEL JONES; CHRISTOPHER SEIFERT; ALFONSO VALENCIA; TROY WILLIS; and CALIFORNIA RIFLE & PISTOL ASSOCIATION, INCORPORATED, Plaintiffs, **v.** **ROB BONTA, in his official capacity as Attorney General of the State of California; and DOES 1-10,** Defendants.	8:17-cv-00746-JLS-JDE **SUPPLEMENTAL EXPERT REPORT AND DECLARATION OF LOUIS KLAREVAS** Courtroom: 8A Judge: The Honorable Josephine L. Staton Action Filed: April 24, 2017

[1] Rob Bonta has succeeded former Attorney General Xavier Becerra as the Attorney General of the State of California. Pursuant to Federal Rule of Civil Procedure 25(d), Attorney General Bonta, in his official capacity, is substituted as the defendant in this case.

SUPPLEMENTAL EXPERT REPORT AND DECLARATION OF LOUIS KLAREVAS

I, Louis Klarevas, declare under penalty of perjury:

1. I have been asked by the Office of the Attorney General for the State of California to prepare an expert report and declaration addressing the relationship between assault weapons and mass shootings, including how restrictions on assault weapons impact mass shooting violence. This supplemental expert report and declaration is based on my own personal knowledge and experience, and, if I am called as a witness, I could and would testify competently to the truth of the matters discussed in this supplemental expert report and declaration ("Report" hereinafter).

PROFESSIONAL QUALIFICATIONS

2. I am a security policy analyst and, currently, research professor at Teachers College, Columbia University, in New York. I am also the author of the book *Rampage Nation*, one of the most comprehensive studies on gun massacres in the United States.[2]

3. I am a political scientist by training, with a B.A. from the University of Pennsylvania and a Ph.D from American University. My current research examines the nexus between American public safety and gun violence.

4. During the course of my 20-year career as an academic, I have served on the faculties of the George Washington University, the City University of New York, New York University, and the University of Massachusetts. I have also served as a Defense Analysis Research Fellow at the London School of Economics and Political Science and as United States Senior Fulbright Scholar in Security Studies at the University of Macedonia.

5. In addition to having made well over 100 media and public-speaking appearances, I am the author or co-author of more than 20 scholarly articles and

[2] Louis Klarevas, Rampage Nation: Securing America from Mass Shootings (2016).

over 70 commentary pieces. In 2019, my peer-reviewed article on the effectiveness of restrictions on large-capacity magazines (LCMs)—ammunition-feeding devices holding more than 10 rounds of ammunition—in reducing high-fatality mass shooting resulting in six or more victims killed was published in the *American Journal of Public Health*.[3] This study found that jurisdictions with LCM bans experienced substantially lower gun massacre incidence and fatality rates when compared to jurisdictions not subject to similar bans. Despite being over 3 years old now, this study continues to be one of the highest impact studies in all of academia. It was recently referred to as "the perfect gun policy study," in part due to the study's "robustness and quality."[4]

6. Besides the present case, I have been retained by the California Attorney General's Office in the following cases: *Duncan v. Bonta*, Case No. 17-cv-1017-BEN-JLB, Southern District of California; *Wiese v. Bonta*, Case No. 2:17-cv-00903-WBS-KJN, Eastern District of California; *Miller v. Bonta*, Case No. 3:19-cv-1537-BEN-JBS, Southern District of California; *Jones v. Bonta*, Case No. 3:19-cv-01226-L-AHG, Southern District of California; and *Nguyen v. Bonta*, Case No. 3:20-cv-02470-WQH-MDD, Southern District of California. *Duncan* and *Wiese* both involve challenges to California's regulation of LCMs, and *Miller* concerns a challenge to California's restrictions on assault weapons. *Jones* involves a challenge to California's regulation of firearm sales to individuals 18 to

[3] Louis Klarevas, et al., *The Effect of Large-Capacity Magazine Bans on High-Fatality Mass Shootings*, 109 American Journal of Public Health 1754 (2019), *available at* https://ajph.aphapublications.org/doi/full/10.2105/AJPH.2019.305311 (last accessed December 27, 2022).

[4] Lori Ann Post and Maryann Mason, The Perfect Gun Policy Study in a Not So Perfect Storm, 112 American Journal of Public Health 1707 (2022), *available at* https://ajph.aphapublications.org/doi/full/10.2105/AJPH.2022.307120 (last accessed December 27, 2022). According to Post and Mason, "Klarevas et al. employed a sophisticated modeling and research design that was more rigorous than designs used in observational studies. Also, they illustrated the analytic steps they took to rule out alternative interpretations and triangulate their findings, for example examining both state bans and federal bans. They helped build the foundation for future studies while overcoming the limitations of previous research." *Ibid.*

20 years old. *Nguyen* involves a challenge to California's regulation limiting the sale of certain firearms to one purchase per month.

7. In 2017, I served as an expert for the State of Colorado, as it defended a legal challenge to its restrictions on large-capacity magazines in *Rocky Mountain Gun Owners, et al. v. Hickenlooper*, Case No. 2013CV33879, District Court, City and County of Denver, Colorado.

8. While I was never deposed in *Wiese*, *Jones*, or *Miller*, I was deposed in *Duncan*, *Nguyen*, and *Rocky Mountain Gun Owners*. I also testified in court in *Rocky Mountain Gun Owners* and *Miller*.

9. In 2021, I was retained by the Government of Canada in the following cases which involved challenges to Canada's regulation of certain categories of firearms: *Parker and K.K.S. Tactical Supplies Ltd. v. Attorney General of Canada*, Federal Court, Court File No.: T-569-20; *Canadian Coalition for Firearm Rights, et al. v. Attorney General of Canada*, Federal Court, Court File No.: T-577-20; *Hipwell v. Attorney General of Canada*, Federal Court, Court File No.: T-581-20; *Doherty, et al. v. Attorney General of Canada*, Federal Court, Court File No.: T-677-20; *Generoux, et al. v. Attorney General of Canada*, Federal Court, Court File No.: T-735-20; and *Eichenberg, et al. v. Attorney General of Canada*, Federal Court, Court File No.: T-905-20. I testified under oath in a consolidated court proceeding involving all six cases in the Federal Court of Canada.

10. A true and correct copy of my current curriculum vitae is attached as **Exhibit A** to this Report.

11. I have been retained by the California Department of Justice to render expert opinions in this case. I am being compensated at a rate of $600 per hour for testimony (in deposition and in court) and $480 per hour for all other services.

OPINIONS

12. It is my professional opinion, based upon my extensive review and analysis of the last 50 years of data, that (1) in terms of individual acts of intentional criminal violence, mass shootings presently pose the deadliest threat to the safety of American society in the post-9/11 era, and the problem is growing nationwide; (2) mass shootings involving assault weapons, on average, have resulted in a substantially larger loss of life than similar incidents that did not involve assault weapons; (3) mass shootings resulting in double-digit fatalities are relatively modern phenomena in American history, largely related to the use of large-capacity magazines and assault weapons; (4) assault weapons are used by private citizens with a far greater frequency to perpetrate mass shootings than to stop mass shootings; and (5) jurisdictions that restrict the possession of assault weapons experience fewer mass shooting incidents and fatalities, per capita, than jurisdictions that do not restrict assault weapons. Based on these findings, it is my opinion that restrictions on assault weapons have the potential to save lives by reducing the frequency and lethality of mass shootings.[5]

[5] For purposes of this Report, I employ two prominent definitions of mass shootings from the field of firearm violence research. "High-fatality mass shootings" (also referred to as "gun massacres") are shootings resulting in 6 or more fatalities, not including the perpetrator(s), regardless of location or underlying motive. "Mass public shootings" are shootings resulting in 4 or more fatalities, not including the perpetrator(s), occurring largely in a public setting and not undertaken in pursuit of an underlying criminal objective (e.g., robbery, illicit trafficking, organized crime, gang violence, or domestic violence). Unfortunately, long-term, publicly-available, exhaustive data on all mass shootings resulting in 4 or more fatalities, not including the perpetrator(s), regardless of location or underlying motive, are presently not available. This limits comprehensive scholarly analyses over a long period of time to the above two types of mass shooting violence: high-fatality mass shootings and mass public shootings. The data on high-fatality mass shootings is from a data set that I maintain and continuously update. This data set is reproduced in **Exhibit B**. The data set of mass public shootings that I analyzed is publicly available from The Violence Project. The creation of this data set was funded by the National Institute of Justice, which is part of the U.S. Department of Justice. In addition to basic variables, such as incident dates and locations, casualty counts, and information on offenders, The Violence Project data set also identifies whether an assault weapon was used to perpetrate a mass public shooting. The Violence Project data set is available at https://www.theviolenceproject.org/mass-shooter-database (last accessed December 27, 2022). The Violence Project data set

I. MASS SHOOTINGS ARE A GROWING THREAT TO PUBLIC SAFETY

13. Examining mass-casualty acts of violence in the United States points to two disturbing patterns. First, as demonstrated in Table 1, the deadliest individual acts of intentional criminal violence in the United States since the terrorist attack of September 11, 2001, have all been mass shootings. Second, as displayed in Figures 1-4, the problem of mass shooting violence is on the rise. To put the increase over the last 50 years into perspective, between the ten-year-period of 1973-1982 and the ten-year-period of 2013-2022, the average population of the United States increased approximately 47%. However, the number of people killed in high-fatality mass shootings and mass public shootings between these two ten-year-periods, respectively, reflect 178% and 523% increases. In other words, the rise in mass shooting violence has far outpaced the rise in national population. The obvious takeaway from these patterns and trends is that mass shootings pose a significant—and growing—threat to American public safety.

Table 1. The Deadliest Acts of Intentional Criminal Violence in the U.S. since 9/11

	Deaths	Date	Location	Type of Violence
1	60	October 1, 2017	Las Vegas, NV	Mass Shooting
2	49	June 12, 2016	Orlando, FL	Mass Shooting
3	32	April 16, 2007	Blacksburg, VA	Mass Shooting
4	27	December 14, 2012	Newtown, CT	Mass Shooting
5	25	November 5, 2017	Sutherland Springs, TX	Mass Shooting
6	23	August 3, 2019	El Paso, TX	Mass Shooting
7	21	May 24, 2022	Uvalde, TX	Mass Shooting

is reproduced in **Exhibit C**. Unless stated otherwise, all of the data used to perform original analyses and to construct tables and figures in this Report are drawn from **Exhibits B and C**.

Figure 1. Annual Trends in High-Fatality Mass Shooting Incidents, 1973-2022

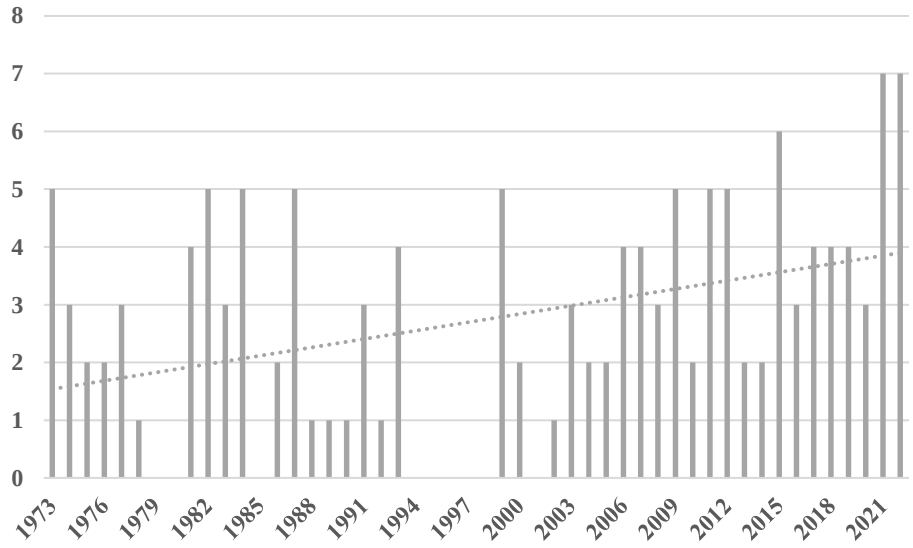


Figure 2. Annual Trends in High-Fatality Mass Shooting Fatalities, 1973-2022

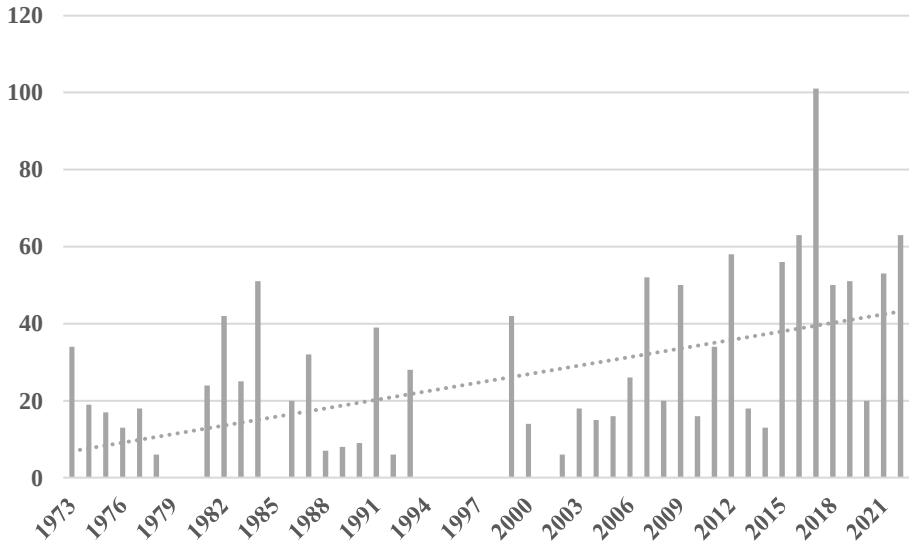


Figure 3. Annual Trends in Mass Public Shooting Incidents, 1973-2022

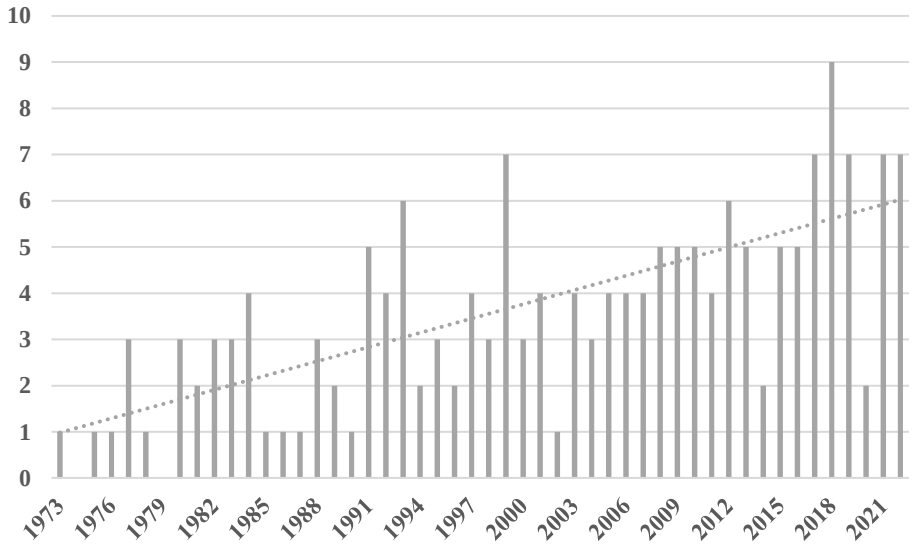
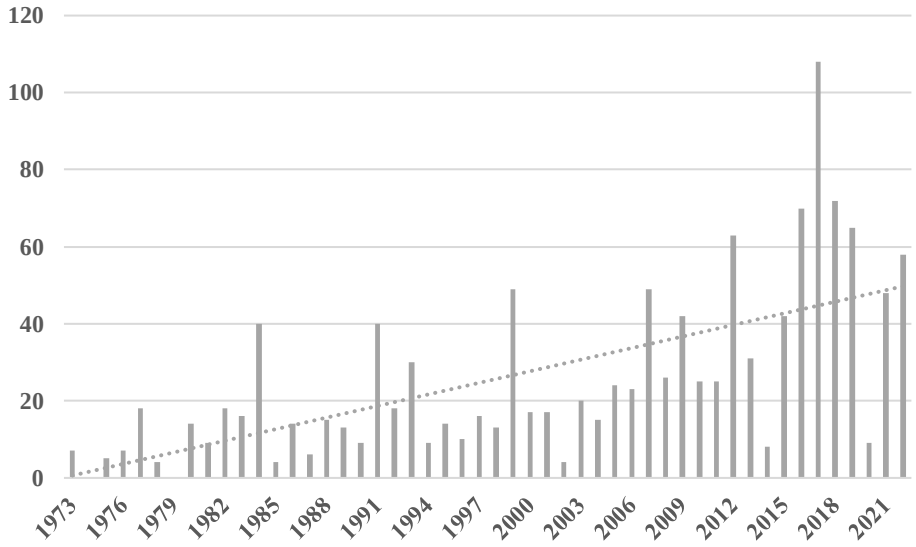


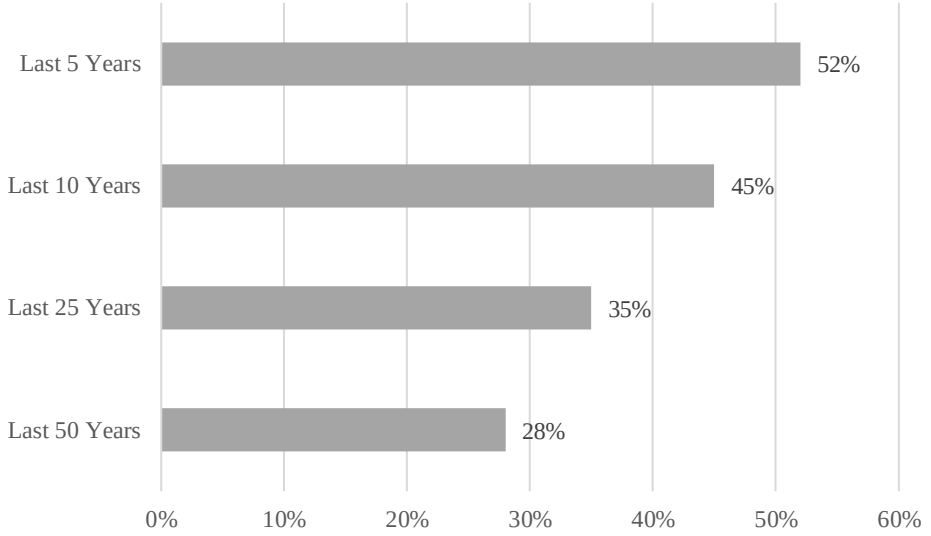
Figure 4. Annual Trends in Mass Public Shooting Fatalities, 1973-2022



II. THE USE OF ASSAULT WEAPONS IS A MAJOR FACTOR IN THE RISE OF MASS SHOOTING VIOLENCE

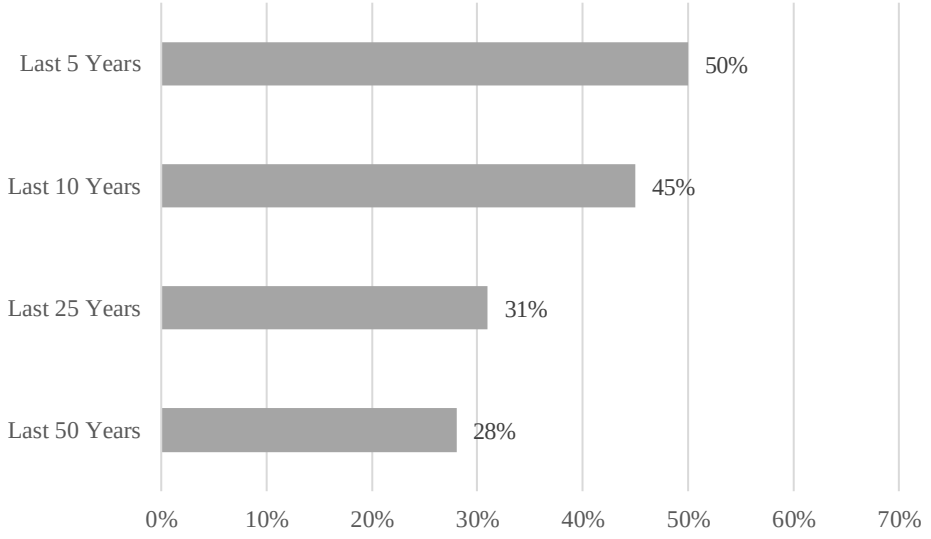
14. In addition to showing that the frequency and lethality of mass shootings are on the rise nationally, the data also point to another striking pattern: the use of assault weapons in the commission of mass shootings has grown in vast proportions. In both high-fatality mass shootings and mass public shootings, assault weapons have been used with increased frequency. As shown in Figures 5 and 6, the pattern is particularly marked of late, with at least half of high-fatality mass shootings as well as mass public shootings in the last five years involving assault weapons. A similar, albeit more pronounced, pattern is found when examining fatalities in the last five years, with approximately 6-in-10 high-fatality mass shooting deaths as well as mass public shooting deaths resulting from incidents involving assault weapons, as shown in Figures 7 and 8. These trends clearly demonstrate that, among mass shooters, there is a growing preference for using assault weapons to perpetrate their attacks.

Figure 5. Share of High-Fatality Mass Shootings Involving Assault Weapons



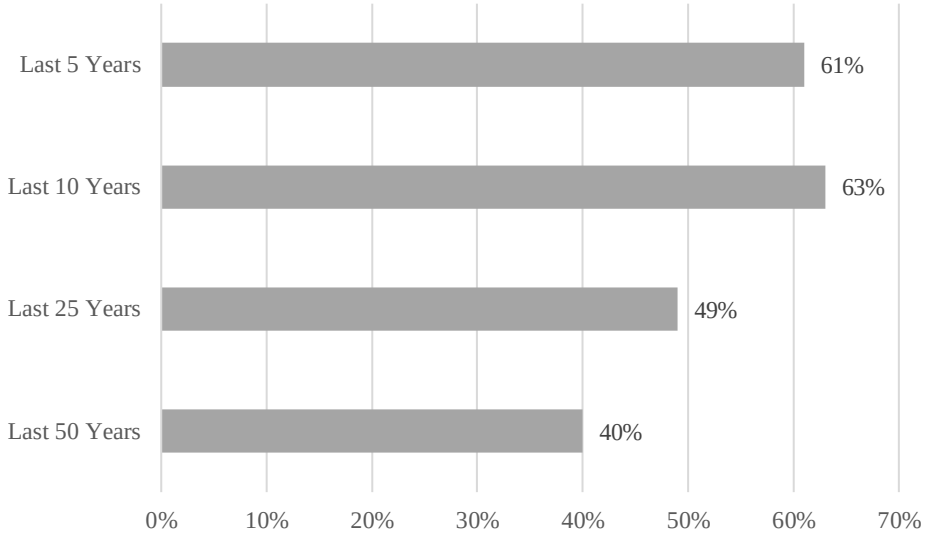
Note: The calculations in Fig. 5 exclude two high-fatality mass shootings (3/15/2020, Moncure, NC, 6 deaths; and 9/7/2020, Aguanga, CA, 7 deaths) in which the firearms used are unknown.

Figure 6. Share of Mass Public Shootings Involving Assault Weapons



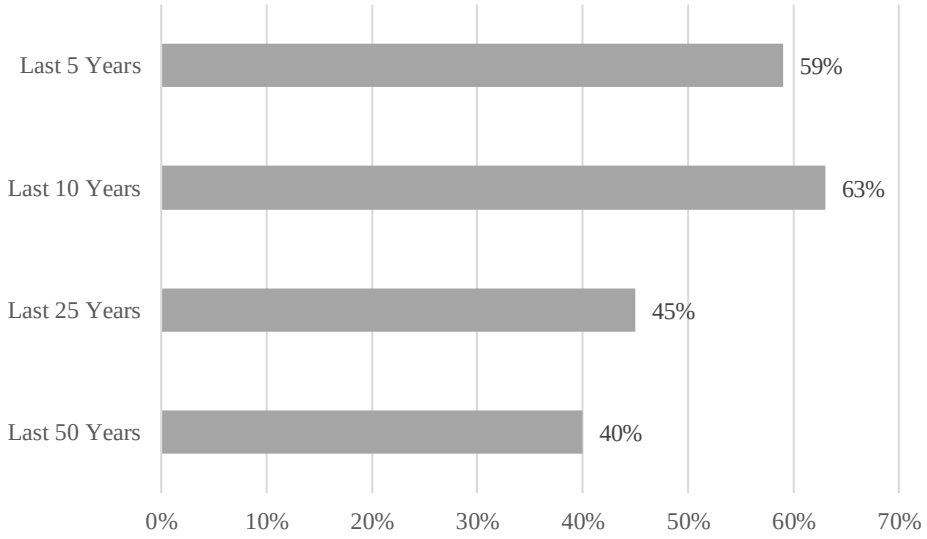
Note: The calculations in Fig. 6 exclude one mass public shooting (2/6/17, Yazoo City, MS, 4 deaths) in which the firearms used are unknown.

Figure 7. Share of High-Fatality Mass Shooting Deaths Resulting from Incidents Involving Assault Weapons



Note: The calculations in Fig. 7 exclude two high-fatality mass shootings (3/15/2020, Moncure, NC, 6 deaths; and 9/7/2020, Aguanga, CA, 7 deaths) in which the firearms used are unknown.

Figure 8. Share of Mass Public Shooting Deaths Resulting from Incidents Involving Assault Weapons



Note: The calculations in Fig. 8 exclude one mass public shooting (2/6/17, Yazoo City, MS, 4 deaths) in which the firearms used are unknown.

15. The growing use of assault weapons to carry out mass shootings is an obvious theme reflected in the data. The *disproportionate* resort to assault weapons by perpetrators of mass shootings is another clear theme. According to National Sport Shooting Foundation (NSSF) and federal government data, "modern sporting rifles"—which is a firearm industry term for AR-15-platform and AK-47-platform rifles—make up approximately 5% of all firearms in circulation in American society, according to the most recent publicly-available data (24.4 million out of an estimated 461.9 million firearms).[6] If assault weapons were used in proportion to the percentage of modern sporting rifles in circulation, approximately 5% of all mass shootings would involve assault weapons. However, as seen in Figures 5-6 above, civilian ownership rates and mass-shooter use rates are not similar. Indeed, the difference is approximately ten-fold, with the rate at which assault weapons are now used to commit mass murder far outpacing the rate at which modern sporting rifles circulate amongst civilians in the United States.

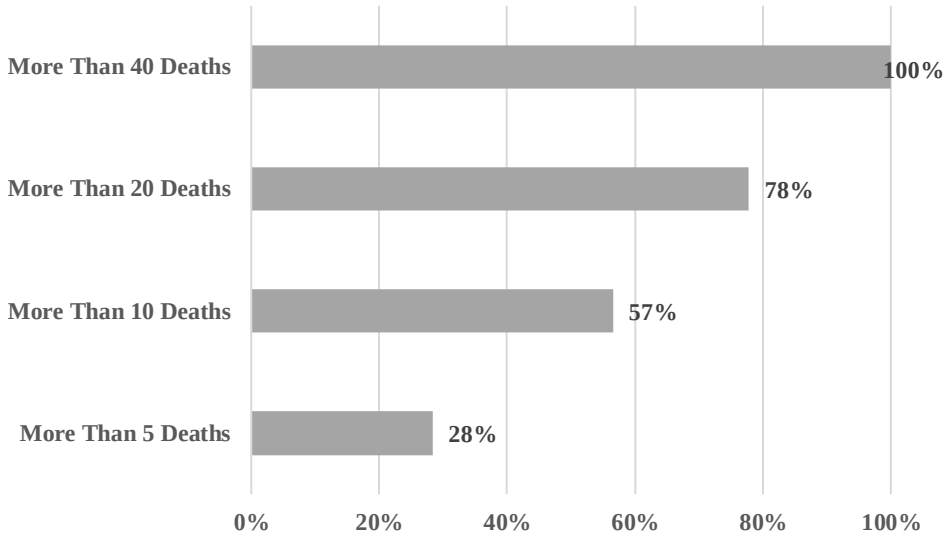
[6] The 5.6% ownership rate for modern sporting rifles was calculated using NSSF and Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF) data. The NSSF estimates that there are approximately 24.4 million modern sporting rifles in civilian hands as of the end of 2020 (when the most recent data is available). NSSF, "Commonly Owned: NSSF Announces over 24 Million MSRs in Circulation," July 20, 2022, *available at* https://www.nssf.org/articles/commonly-owned-nssf-announces-over-24-million-msrs-in-circulation (last accessed January 3, 2023). In a 2020 report that captured data through the end of 2018, the NSSF estimated that there were 433.9 million total firearms in civilian circulation. NSSF, Industry Intelligence Reports: Firearm Production in the United States with Firearm Import and Export Data, 2020, at 18, *available at* https://www.nssf.org/wp-content/uploads/2020/11/IIR-2020-Firearms-Production-v14.pdf (last accessed January 3, 2023). According to ATF data, in 2019 and 2020, an additional 28.0 million firearms entered the civilian stock nationwide. ATF, National Firearms Commerce and Trafficking Assessment: Firearms in Commerce, 2022, at 181, 188, 193, *available at* https://www.atf.gov/firearms/docs/report/national-firearms-commerce-and-trafficking-assessment-firearms-commerce-volume/download (last accessed January 3, 2023). Assuming the figures in the NSSF's 2020 report are accurate, this brings the estimated number of firearms in civilian circulation through the end of 2020 to approximately 461.9 million. The ownership rate is calculated as follows: 24.4 million modern sporting rifles divided by 461.9 million total firearms equals 5.3%, which rounds down to 5%. Because it appears that the ATF data that NSSF relies upon to form its own estimates also include firearms in the possession of domestic law enforcement agencies, NSSF estimates of modern sporting rifles owned by civilians are likely over-estimates. *Ibid.*, at 12; NSSF, Industry Intelligence Reports, 2020, at 2-3.

16. Another pattern that stands out when examining the relationship between assault weapons use and mass shooting violence reflects the disproportionately greater lethality associated with the use of assault weapons. For instance, returning to the list of the 7 deadliest individual acts of intentional criminal violence in the United States since the coordinated terrorist attack of September 11, 2001, besides all seven of the incidents being mass shootings, another prominent trait is that 6 of the 7 incidents (86%) involved assault weapons, as shown in Table 2. When mass shooting fatalities are examined exponentially, the relationship between assault weapons use and higher death tolls is striking. In the past 50 years, assault weapons have been used in 28% of all high-fatality mass shootings and mass public shootings. However, as the fatality thresholds of such incidents increase, so too does the share of incidents involving assault weapons. For instance, assault weapons were used in 80% of all mass public shootings resulting in more than 24 deaths and 100% of all high-fatality mass shootings resulting in more than 40 deaths (Figures 9-10). As the data show, there is an association between assault weapons use and mass shooting lethality.

Table 2. The Use of Assault Weapons in the Deadliest Acts of Intentional Criminal Violence in the U.S. since 9/11

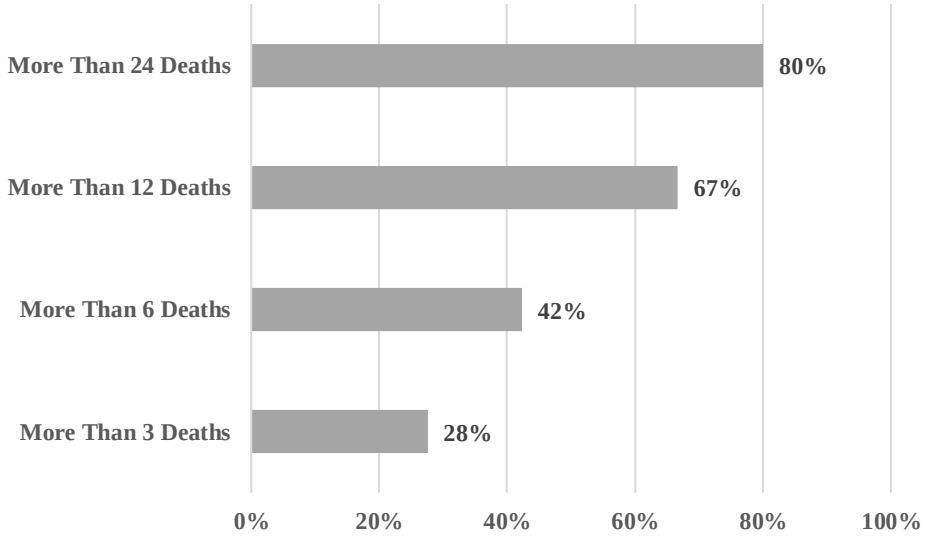
Deaths	Date	Location	Involved Assault Weapon(s)
60	October 1, 2017	Las Vegas, NV	✓ (AR-15)
49	June 12, 2016	Orlando, FL	✓ (AR-15)
32	April 16, 2007	Blacksburg, VA	
27	December 14, 2012	Newtown, CT	✓ (AR-15)
25	November 5, 2017	Sutherland Springs, TX	✓ (AR-15)
23	August 3, 2019	El Paso, TX	✓ (AK-47)
21	May 24, 2022	Uvalde, TX	✓ (AR-15)

Figure 9. Percentage of High-Fatality Mass Shootings Involving Assault Weapons by Fatality Threshold, 1973-2022



Note: The calculations in Fig. 9 exclude two high-fatality mass shootings (3/15/2020, Moncure, NC, 6 deaths; and 9/7/2020, Aguanga, CA, 7 deaths) in which the firearms used are unknown.

Figure 10. Percentage of Mass Public Shootings Involving Assault Weapons by Fatality Threshold, 1973-2022



Note: The calculations in Fig. 10 exclude one mass public shooting (2/6/17, Yazoo City, MS, 4 deaths) in which the firearms used are unknown.

17. Of the 134 high-fatality mass shootings in that last 50 years in which the type of firearm used is known, 38 involved assault weapons, resulting in 491 deaths. The average death toll for these 38 incidents is 12.9 fatalities per shooting. By contrast, the average death toll for the 96 incidents in which it is known assault weapons were not used (which resulted in 749 fatalities) is 7.8 fatalities per shooting (Table 3). Of the 174 mass public shootings in that last 50 years in which the type of firearm used is known, 48 involved assault weapons, resulting in 496 deaths. The average death toll for these 48 incidents is 10.3 fatalities per shooting. By contrast, the average death toll for the 126 incidents in which it is known assault weapons were not used (which resulted in 759 fatalities) is 6.0 fatalities per shooting (Table 4). In other words, in the last 50 years, the use of assault weapons in high-fatality mass shootings and mass public shootings has resulted, respectively, in 65% and 72% increases in average fatalities per incident (Tables 3 and 4). In the last 10 years, the differences in average fatality rates per incident are even more pronounced—more than double: 8.0 versus 16.7 deaths per high-fatality mass shooting and 6.2 versus 12.8 deaths per mass public shooting. These amount, respectively, to 109% and 106% increases in the average death tolls, associated with the use of assault weapons (Tables 3 and 4).

18. This review of the data supports an obvious takeaway: assault weapons are dangerous force multipliers when used to perpetrate mass shootings.

Table 3. The Average Death Tolls Associated with the Use of Assault Weapons in High-Fatality Mass Shootings in the U.S., 1973-2022

	Average Death Toll for Incidents That Did Not Involve the Use of Assault Weapons	Average Death Toll for Incidents That Did Involve the Use of Assault Weapons	Percent Increase in Average Death Toll Associated with the Use of Assault Weapons
Last 50 Years	7.8 Deaths	12.9 Deaths	65%
Last 10 Years	8.0 Deaths	16.7 Deaths	109%

Note: The calculations in Table 3 exclude two high-fatality mass shootings (3/15/2020, Moncure, NC, 6 deaths; and 9/7/2020, Aguanga, CA, 7 deaths) in which the types of firearms used are unknown.

Table 4. The Average Death Tolls Associated with the Use of Assault Weapons in Mass Public Shootings in the U.S., 1973-2022

	Average Death Toll for Incidents That Did Not Involve the Use of Assault Weapons	Average Death Toll for Incidents That Did Involve the Use of Assault Weapons	Percent Increase in Average Death Toll Associated with the Use of Assault Weapons
Last 50 Years	6.0 Deaths	10.3 Deaths	72%
Last 10 Years	6.2 Deaths	12.8 Deaths	106%

Note: The calculations in Table 4 exclude one mass public shooting (2/6/17, Yazoo City, MS, 4 deaths) in which the types of firearms used are unknown.

III. DOUBLE-DIGIT-FATALITY MASS SHOOTINGS ARE A POST-WORLD WAR II PHENOMENON IN AMERICAN HISTORY AND THEY OFTEN INVOLVE ASSAULT WEAPONS

19. I have also examined the historical occurrence and distribution of mass shootings resulting in 10 or more victims killed since 1776 (Table 5 and Figure 11). A lengthy search uncovered several informative findings.[7] In terms of the origins of this form of extreme gun violence, there is no known occurrence of a mass shooting resulting in double-digit fatalities at any point in time during the 173-year period between the nation's founding in 1776 and 1948. The first known mass shooting resulting in 10 or more deaths occurs in 1949. In other words, for 70 percent of its 247-year existence as a nation, the United States did not experience a mass shooting resulting in double-digit fatalities, making them a relatively modern phenomena in American history.[8]

20. After the first such incident in 1949, 17 years pass until a similar mass shooting occurs in 1966. The third such mass shooting then occurs 9 years later, in 1975. And the fourth such incident occurs 7 years after, in 1982. Basically, the first few mass shootings resulting in 10 or more deaths did not occur until the post-World War II era. Furthermore, these first few double-digit-fatality incidents occurred with relative infrequency, although the temporal gap between these first four incidents shrank with each event (Table 5 and Figure 12).[9]

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[7] I searched for firearm-related "murders," using variations of the term, setting a minimum fatality threshold of 10 in the Newspaper Archive online newspaper repository, *available at* www.newspaperarchive.com (last accessed October 2, 2022). The Newspaper Archive contains local and major metropolitan newspapers dating back to 1607. Consistent with other analyses on mass murder, incidents of large-scale, inter-group violence such as mob violence, rioting, combat or battle skirmishes, and attacks initiated by authorities acting in their official capacity were excluded.

[8] Using the Constitution's effective date of 1789 as the starting point would lead to the conclusion that, for 68 percent of its 234-year existence as a nation, the United States did not experience a mass shooting resulting in double-digit fatalities.

[9] Figures 11-12 are reproduced in larger form as **Exhibit D** of this Report.

Table 5. Mass Shootings Resulting in Double-Digit Fatalities in American History, 1776-2022

	Date	Location	Deaths	Involved Assault Weapon(s)	Involved Large-Capacity Magazine(s)
1	9/6/1949	Camden, NE	13	N	N
2	8/1/1966	Austin, TX	14	N	Y
3	3/30/1975	Hamilton, OH	11	N	N
4	9/25/1982	Wilkes-Barre, PA	13	Y	Y
5	2/18/1983	Seattle, WA	13	N	N
6	4/15/1984	Brooklyn, NY	10	N	N
7	7/18/1984	San Ysidro, CA	21	Y	Y
8	8/20/1986	Edmond, OK	14	N	N
9	10/16/1991	Killeen, TX	23	N	Y
10	4/20/1999	Littleton, CO	13	Y	Y
11	4/16/2007	Blacksburg, VA	32	N	Y
12	3/10/2009	Geneva County, AL	10	Y	Y
13	4/3/2009	Binghamton, NY	13	N	Y
14	11/5/2009	Fort Hood, TX	13	N	Y
15	7/20/2012	Aurora, CO	12	Y	Y
16	12/14/2012	Newtown, CT	27	Y	Y
17	9/16/2013	Washington, DC	12	N	N
18	12/2/2015	San Bernardino, CA	14	Y	Y
19	6/12/2016	Orlando, FL	49	Y	Y
20	10/1/2017	Las Vegas, NV	60	Y	Y
21	11/5/2017	Sutherland Springs, TX	25	Y	Y
22	2/14/2018	Parkland, FL	17	Y	Y
23	5/18/2018	Santa Fe	10	N	N
24	10/27/2018	Pittsburgh, PA	11	Y	Y
25	11/7/2018	Thousand Oaks, CA	12	N	Y
26	5/31/2019	Virginia Beach, VA	12	N	Y
27	8/3/2019	El Paso, TX	23	Y	Y
28	3/22/2021	Boulder, CO	10	Y	Y
29	5/14/2022	Buffalo, NY	10	Y	Y
30	5/24/2022	Uvalde, TX	21	Y	Y

Note: Death tolls do not include perpetrators. An incident was coded as involving an assault weapon if at least one of the firearms discharged was defined as an assault weapon in (1) the 1994 federal Assault Weapons Ban; (2) the statutes of the state where the gun massacre occurred; or (3) a legal or judicial declaration issued by a state official. An incident was coded as involving a large-capacity magazine if at least one of the firearms discharged was armed with a detachable ammunition-feeding device holding more than 10 bullets.

Figure 11. Mass Shootings Resulting in Double-Digit Fatalities in American History (1776-2022)

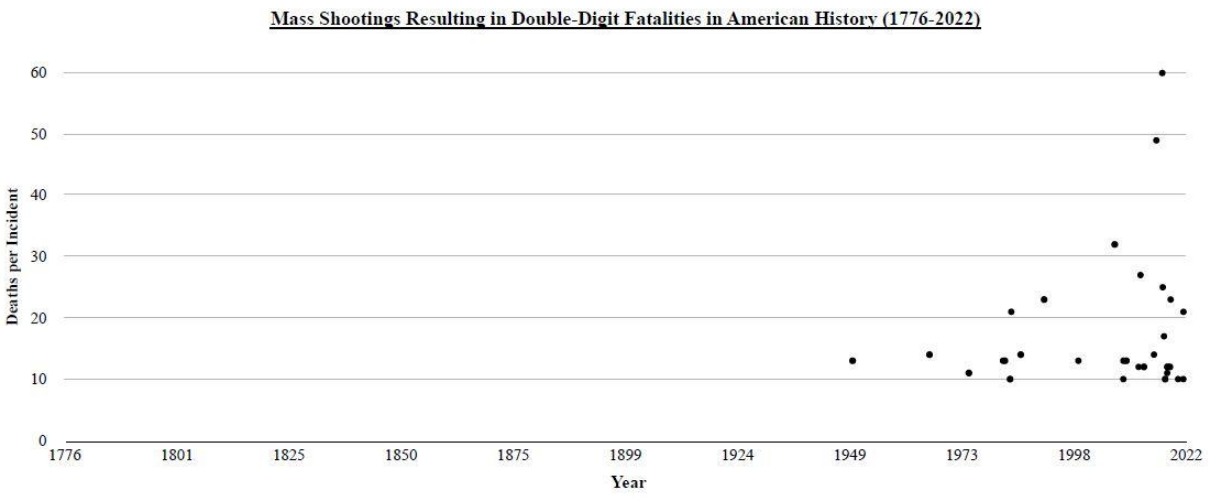
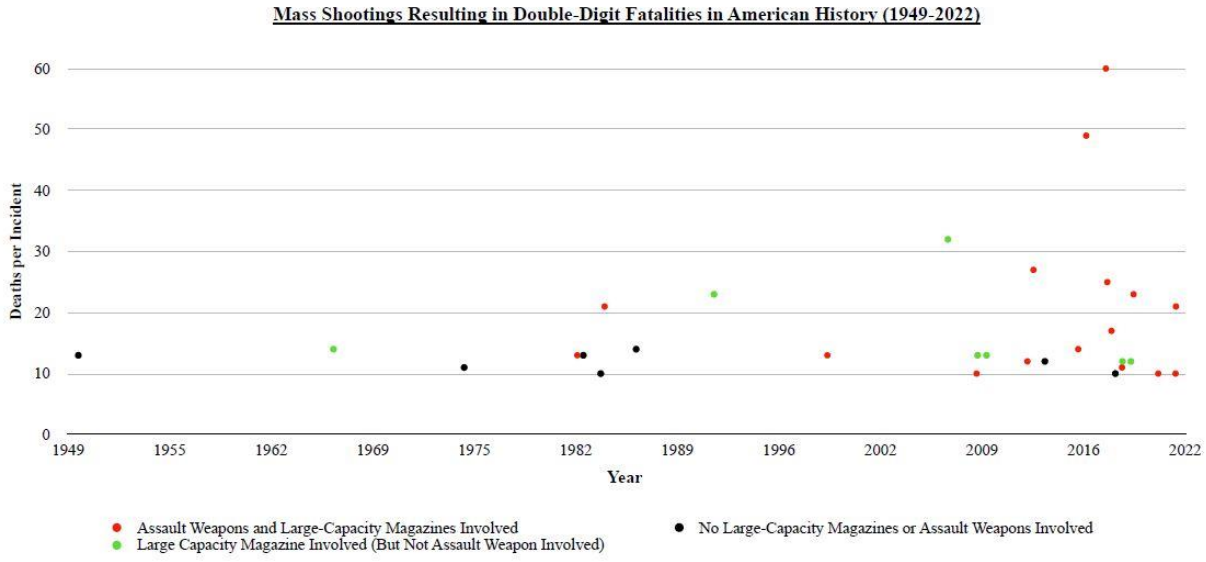


Figure 12. Mass Shootings Resulting in Double-Digit Fatalities in American History (1949-2022)



21. The distribution of double-digit-fatality mass shootings changes in the early 1980s, when five such events take place in a span of just five years. (Table 5 and Figure 12). This timeframe also reflects the first time that assault weapons are used to perpetrate mass shootings resulting in 10 or more deaths: the 1982 Wilkes-Barre, PA, massacre (involving an AR-15 rifle and resulting in 13 deaths) and the 1984 San Ysidro, CA, massacre (involving an Uzi pistol and resulting in 21 deaths). But this cluster of incidents is followed by a 20-year period in which only 2 double-digit-fatality mass shootings occur (Figure 12). This period of time from 1987-2007 correlates with two important pieces of federal firearms legislation: the 1986 Firearm Owners Protection Act and the 1994 Federal Assault Weapons Ban.

22. It is well-documented in the academic literature that, after the Assault Weapons Ban expired in 2004, mass shooting violence increased substantially.[10] Mass shootings that resulted in 10 or more deaths were no exception, following the same pattern. In the 56 years from 1949 through 2004, there were a total of 10 mass shootings resulting in double-digit fatalities. In the 18 years since 2004, there have been 20 double-digit-fatality mass shootings. In other words, the average rate of occurrence has increased over six-fold since the Federal Assault Weapons Ban expired (Table 5 and Figure 12). (The 1994 Federal Assault Weapons Ban and its impact on mass shooting violence is discussed in further detail in Section V of this Report.)

[10] *See*, for example, Louis Klarevas, Rampage Nation, *supra* note 2 (Relevant Excerpt Attached as **Exhibit E**); Louis Klarevas, et al., *The Effect of Large-Capacity Magazine Bans on High-Fatality Mass Shootings*, *supra* note 3 (Attached as **Exhibit F**); Charles DiMaggio, et al., *Changes in US Mass Shooting Deaths Associated with the 1994-2004 Federal Assault Weapons Ban: Analysis of Open-Source Data*, 86 Journal of Trauma and Acute Care Surgery 11 (2019) (Attached as **Exhibit G**); Lori Post, et al., *Impact of Firearm Surveillance on Gun Control Policy: Regression Discontinuity Analysis*, 7 JMIR Public Health and Surveillance (2021) (Attached as **Exhibit H**); and Philip J. Cook and John J. Donohue, *Regulating Assault Weapons and Large-Capacity Magazines for Ammunition*, 328 JAMA, September 27, 2022 (Attached as **Exhibit I**).

23. As with the analyses of mass shootings discussed above in Section II, death tolls in double-digit-fatality mass shootings are largely related to the use of large-capacity magazines and assault weapons—firearms technologies that, in terms of mass shootings, serve as force multipliers (Table 5 and Figure 12).

IV. ASSAULT WEAPONS ARE ALMOST NEVER USED BY PRIVATE CITIZENS IN SELF-DEFENSE DURING ACTIVE SHOOTINGS

24. An important question that, until now, has gone unanswered is: Are assault weapons used as frequently to stop mass shootings as they are to perpetrate them? As shown above in Section II, assault weapons have been used to perpetrate approximately one-third of mass shootings in the past 25 years (Figures 5-6). And in the past 5 years, the share of mass shootings that have been perpetrated with assault weapons has risen to approximately half (Figures 5-6).

25. The Federal Bureau of Investigation (FBI) has been documenting active shooter incidents since 2000.[11] According to the FBI, active shooter incidents are violent attacks that involve "one or more individuals actively engaged in killing or attempting to kill people in a populated area."[12] A simple way to conceptualize active shooter events is to think of them as attempted mass shootings. As part of its analysis of attempted mass shootings, the FBI identifies incidents that involved armed civilians using their personal firearms to intervene, regardless of whether or not the interventions were successful in stopping the attacks and/or neutralizing the perpetrator(s).

[11] All of the information in this section, including definitions and data, are publicly available from the FBI. *See* FBI, "Active Shooter Safety Resources," *available at* https://www.fbi.gov/how-we-can-help-you/safety-resources/active-shooter-safety-resources (last accessed January 2, 2023). At the time that this Report was being prepared, active shooter incident data was not yet available for the year 2022. This data will likely be released by the FBI at some point in 2023. As such, the time parameter for the analysis in this section is 2000-2021.

[12] The FBI adds, "Implicit in this definition is the shooter's use of one or more firearms. The 'active' aspect of the definition inherently implies the ongoing nature of the incidents, and thus the potential for the response to affect the outcome." *Ibid.*

26. In the 22 years between January 1, 2000, and December 31, 2021, the FBI has identified 406 active shootings occurring in the United States. Out of these 406 active shooter incidents, 15 incidents (3.7%) involved defensive gun uses (DGUs) by civilians, excluding law enforcement or armed security.[13] Of these 15 DGUs that involved an armed private citizen intervening, 12 incidents involved handguns. The remaining 3 incidents involved long guns: 1 shotgun, 1 bolt-action rifle, and 1 assault rifle. In other words, out of the 15 incidents where an armed civilian intervened, only 1 incident (6.7%) involved an assault weapon.[14] Within the broader context of all active shooter incidents, only 1 incident out of 406 in the past 22 years (0.2%) involved an armed civilian intervening with an assault weapon.[15]

27. The bottom line: assault weapons are used by civilians with a far greater frequency to perpetrate mass shootings than to stop mass shootings.

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[13] In 14 of these 15 DGU-involved active shooter incidents, there was an exchange of gunfire. For the one incident that did not involve an exchange of gunfire, the gun (a handgun) was used to detain the active shooter after the shooting had ceased. *Ibid.*

[14] The FBI also identifies an incident in which an armed individual (a local firefighter) subdued and detained a school shooter, but there is no evidence that the armed citizen drew his handgun during the incident. Moreover, local authorities have refused to comment on whether the firefighter ever drew his handgun. *See* Carla Field, "Firefighter Was Armed During Takedown of Shooting Suspect, Sheriff Says," WYFF, October 3, 2016, *available at* https://www.wyff4.com/article/firefighter-was-armed-during-takedown-of-shooting-suspect-sheriff-says/7147424 (last accessed January 3, 2023). Adding this incident to the 15 DGU-involved incidents would mean that 6.3% (as opposed to 6.7%) of the active shooter incidents, where an armed civilian intervened, involved an assault weapon.

[15] FBI, *supra* note 11. The one DGU that involved an assault weapon was the 2017 church massacre in Sutherland Springs, Texas. In that incident, an armed private citizen used an AR-15-style assault rifle to wound the perpetrator as he was attempting to flee the scene. While the perpetrator was still able to flee the scene despite being shot, minutes later, he crashed his vehicle trying to escape and then took his life with his own firearm before law enforcement could apprehend him. *See* Adam Roberts, "Man Who Shot Texas Gunman Shares His Story," KHBS/KHOG, November 7, 2017, *available at* https://www.4029tv.com/article/man-who-shot-texas-church-gunman-shares-his-story/13437943 (last accessed January 3, 2023).

V. RESTRICTIONS ON ASSAULT WEAPONS REDUCE THE INCIDENCE OF GUN MASSACRES, RESULTING IN LIVES SAVED

28. In light of the growing threat posed by mass shootings, legislatures have enacted measures aimed at reducing the occurrence and lethality of such deadly acts of firearm violence. Prominent among these measures are restrictions on assault weapons. In 1989, California became the first state to enact an assault weapons ban. The Roberti-Roos Assault Weapons Control Act (AWCA) was passed by the California legislature in 1989 in response to an attack on Cleveland Elementary School in Stockton earlier that year. The gunman in the Stockton school shooting used an AK-47 to kill five children and wound another 30 individuals, 29 of whom were children. In the process of enacting the AWCA, the legislature codified its findings and intent (at Cal. Penal Code § 30505(a)).

> The Legislature hereby finds and declares that the proliferation and use of assault weapons poses a threat to the health, safety, and security of all citizens of the state. The Legislature has restricted the assault weapons specified in [California's statutes] based upon finding that each firearm has such a high rate of fire and capacity for firepower that its function as a legitimate sports or recreational firearm is substantially outweighed by the danger that it can be used to kill and injure human beings.

29. California's statewide assault weapons ban took effect on January 1, 1990. While California was the first state to restrict assault weapons, New Jersey, Hawaii, Connecticut, and Maryland soon followed suit.[16]

30. In the years since, the state legislature revised the law to make it more comprehensive. In the deliberations over SB 880 in 2016, which was ultimately enacted to close the so-called "bullet button" loophole, the author of that bill stated:

[16] Giffords Law Center to Prevent Gun Violence, "Assault Weapons," Giffords.org, *available at* https://giffords.org/lawcenter/gun-laws/policy-areas/hardware-ammunition/assault-weapons (last accessed January 2, 2023).

> [Assault weapons] are designed only to facilitate the maximum destruction of human life. Such weapons have been used in a number of recent gun attacks, including the recent terrorist attack in San Bernardino that left 14 Californians dead and 21 injured. Too many Californians have died at the hands of these dangerous weapons.[17]

31. In considering SB 880, the Assembly Committee on Public Safety noted that the assault weapon is considered "an effective tool of *mass murder*."[18] This sentiment was echoed in the Senate Committee on Public Safety, which, in its report on SB 880, reproduced the following rationale in support of the bill.

> The rapid and controlled spray of bullets associated with assault weapons is a threat to police officers, families, and communities. As was shown by the tragedy at Sandy Hook School and more recently in San Bernardino, an assault weapon escalates the lethality and number of victims in a *mass shooting incident*.[19]

32. The legislative intent of California is not significantly different from that of the other states that have since restricted assault weapons. *The primary objective of every assault weapons ban is reducing the frequency and lethality of mass shootings*. Because, on average, the use of assault weapons results in higher death tolls in mass shootings, the rationale for imposing tight restrictions on assault weapons is to reduce the loss of life attributable to the increased kill potential of such dangerous firearms.

33. In September 1994, moved to action by several high-profile shooting rampages, the U.S. Congress enacted a ban on assault weapons that applied to all 50

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[17] Report of the Assembly Committee on Public Safety on SB 880 (Hall), June 13, 2016, *available at* https://leginfo.legislature.ca.gov/faces/billAnalysisClient.xhtml?bill_id=201520160SB880 (last accessed January 2, 2023).

[18] *Ibid.* (emphasis added)

[19] Report of the Senate Committee on Public Safety on SB 880 (Hall), April 19, 2016, *available at* https://leginfo.legislature.ca.gov/faces/billAnalysisClient.xhtml?bill_id=201520160SB880 (last accessed January 2, 2023) (emphasis added).

states plus the District of Columbia, bringing the entire country under the ban.[20] Like the state assault weapons bans that were implemented before it, the federal ban was aimed primarily at reducing mass shooting violence—an objective the ban sought to achieve by prohibiting the manufacture, importation, possession, and transfer of assault weapons not legally owned by civilians prior to the date of the law's effect (September 13, 1994).[21] Congress, however, inserted a sunset provision in the law which allowed the federal ban to expire in exactly 10 years, if it was not renewed beforehand.

34. Cognizant that the federal ban might be allowed to sunset, Massachusetts and New York enacted their own state assault weapons bans while the federal ban was still in effect. As Congress ultimately chose not to renew the law, the federal ban expired on September 13, 2004. Since the federal ban's expiration, the District of Columbia and Delaware have also enacted bans on assault weapons.[22]

35. Currently, over one-quarter of the U.S. population is subject to an assault weapons ban. The following is a list of the nine state-level jurisdictions that presently ban assault weapons and the effective dates of their bans: California (January 1, 1990); New Jersey (September 1, 1990); Hawaii (July 1, 1992, assault pistols only); Connecticut (October 1, 1993); Maryland (June 1, 1994, initially assault pistols but expanded to long guns October 1, 2013); Massachusetts (July 23, 1998); New York (November 1, 2000); the District of Columbia (March 31, 2009); and Delaware (June 20, 2022).

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[20] Pub. L. No. 103-322, tit. XI, subtit. A, 108 Stat. 1796, 1996-2010 (codified as former 18 U.S.C. § 922(v), (w)(1) (1994)).

[21] Christopher Ingraham, "The Real Reason Congress Banned Assault Weapons in 1994—and Why It Worked," *Washington Post*, February 22, 2018, *available at* https://www.washingtonpost.com/news/wonk/wp/2018/02/22/the-real-reason-congress-banned-assault-weapons-in-1994-and-why-it-worked (last accessed January 2, 2023).

[22] *Ibid*.; and Giffords, "Assault Weapons," *supra* note 16.

36. In the field of epidemiology, a common method for assessing the impact of laws and policies is to measure the rate of onset of new cases of an event, comparing the rate when and where the laws and policies were in effect against the rate when and where the laws and policies were not in effect. This measure, known as the incidence rate, allows public health experts to identify discernable differences, while accounting for variations in the population, over a set period of time. Relevant to the present case, calculating incidence rates across jurisdictions, in a manner that captures whether or not assault weapons bans were in effect during the period of observation, allows for the assessment of the effectiveness of such bans. In addition, fatality rates—the number of deaths, per population, that result from particular events across different jurisdictions—also provide insights into the impact of assault weapons bans on mass shootings.[23]

37. Since January 1, 1990, when the first state ban on assault weapons took effect, through December 31, 2022, there have been 94 high-fatality mass shootings and 145 mass public shootings in the United States (**Exhibits B and C**).[24] Calculating incidence and fatality rates for this time-period, across jurisdictions with and without bans on assault weapons, reveals that states that prohibited assault weapons experienced 46% and 16% decreases, respectively, in the high-fatality mass shooting and mass public shooting incidence rates. They also experienced 54% and 37% decreases, respectively, in the high-fatality mass shooting and mass

[23] For purposes of this Report, incidence and fatality rates are calculated using methods and principles endorsed by the Centers for Disease Control. *See* Centers for Disease Control and Prevention, *Principles of Epidemiology in Public Health Practice: An Introduction to Applied Epidemiology and Biostatistics* (2012), *available at* https://stacks.cdc.gov/view/cdc/13178 (last accessed January 3, 2023).

[24] There were no state bans on assault weapons in effect prior to January 1, 1990. Therefore, January 1, 1990, is the logical starting point for an analysis of the impact of assault weapons bans.

public shooting fatality rates, regardless of the weaponry used by the mass murderers (Tables 6-7).[25]

38. When calculations go a step further and are limited to mass shootings involving assault weapons, the difference between the two jurisdictional categories (non-ban states and ban states) is even more pronounced. In the time-period between January 1, 1990, and December 31, 2022, accounting for population, states with assault weapons bans in place experienced 59% fewer high-fatality mass shootings involving the use of assault weapons and 35% fewer mass public shootings involving the use of assault weapons. Similarly, jurisdictions with bans in effect experienced 68% fewer deaths resulting from high-fatality mass shootings perpetrated with assault weapons and 58% fewer deaths resulting from mass public shootings perpetrated with assault weapons (Tables 6-7).

39. All of the above epidemiological calculations lead to the same conclusion: when assault weapons bans are in effect, per capita, fewer mass shootings occur and fewer people die in such shootings—especially incidents involving assault weapons, where the impact is most profound. To state this finding in lay terms: bans on assault weapons appear to save lives.

[25] For purposes of coding, between September 13, 1994, and September 12, 2004, the federal assault weapons ban was in effect. During that 10-year period, all 50 states and the District of Columbia were under legal conditions that prohibited assault weapons. As such, the entire country is coded as being under an assault weapons ban during the timeframe that the federal assault weapons ban was in effect.

Table 6. Incidence and Fatality Rates for High-Fatality Mass Shootings, by Whether or Not Assault Weapons Bans Were in Effect, 1990-2022

	Annual Average Population (Millions)	Total Incidents	Annual Incidents per 100 Million Population	Total Deaths	Annual Deaths per 100 Million Population
All High-Fatality Mass Shootings					
Non-AW Ban States	159.2	64	1.22	673	12.81
AW Ban States	137.1	30	0.66	264	5.84
Percentage Decrease in Rate for AW Ban States			46%		54%
High-Fatality Mass Shootings Involving Assault Weapons					
Non-AW Ban States	159.2	23	0.44	333	6.34
AW Ban States	137.1	8	0.18	92	2.03
Percentage Decrease in Rate for AW Ban States			59%		68%

Note: Population data are from U.S. Census Bureau, "Population and Housing Unit Estimates Datasets," *available at* https://www.census.gov/programs-surveys/popest/data/data-sets.html (last accessed January 3, 2023).

Table 7. Incidence and Fatality Rates for Mass Public Shootings, by Whether or Not Assault Weapons Bans Were in Effect, 1990-2022

	Annual Average Population (Millions)	Total Incidents	Annual Incidents per 100 Million Population	Total Deaths	Annual Deaths per 100 Million Population
All Mass Public Shootings					
Non-AW Ban States	159.2	84	1.60	694	13.21
AW Ban States	137.1	61	1.35	375	8.29
Percentage Decrease in Rate for AW Ban States			16%		37%
Mass Public Shootings Involving Assault Weapons					
Non-AW Ban States	159.2	27	0.51	325	6.19
AW Ban States	137.1	15	0.33	119	2.63
Percentage Decrease in Rate for AW Ban States			35%		58%

Note: Population data are from U.S. Census Bureau, "Population and Housing Unit Estimates Datasets," *available at* https://www.census.gov/programs-surveys/popest/data/data-sets.html (last accessed January 3, 2023).

SUMMARY

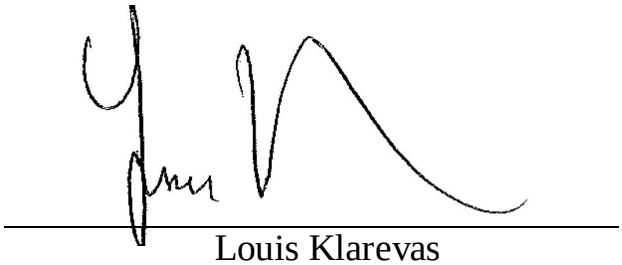
40. It is my professional opinion, based upon my extensive review and analysis of the last 50 years of data, that (1) in terms of individual acts of intentional criminal violence, mass shootings presently pose the deadliest threat to the safety of American society in the post-9/11 era, and the problem is growing nationwide; (2) mass shootings involving assault weapons, on average, have resulted in a substantially larger loss of life than similar incidents that did not involve assault weapons; (3) mass shootings resulting in double-digit fatalities are relatively modern phenomena in American history, largely related to the use of large-capacity magazines and assault weapons; (4) assault weapons are used by private citizens with a far greater frequency to perpetrate mass shootings than to stop mass shootings; and (5) jurisdictions that restrict the possession of assault weapons experience fewer mass shooting incidents and fatalities, per capita, than jurisdictions that do not restrict assault weapons. Based on these findings, it is my opinion that restrictions on assault weapons have the potential to save lives by reducing the frequency and lethality of mass shootings.

41. The main purpose of bans on assault weapons is to restrict the availability of assault weapons. The rationale is that, if there are fewer assault weapons in circulation, then potential mass shooters will either be dissuaded from attacking or they will be forced to use less-lethal firearms, resulting in fewer lives lost. The epidemiological data buttress this line of reasoning, supporting the California legislature's determination that restricting civilian access to assault weapons will enhance public safety.

42. While imposing constraints on assault weapons will not prevent all future mass shootings, the data suggest that legislative efforts to deny gunmen access to assault weapons should result in a substantial number of lives being saved.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on January 6, 2023 at Nassau County, NY.



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Expert for Cook County, Illinois, *Viramontes v. County of Cook*, United States District Court for Northern District of Illinois, Case Number 21-cv-04595, Chicago, IL, 2022-

Expert for Government of Canada, *Parker and K.K.S. Tactical Supplies Ltd. v. Attorney General of Canada*, Federal Court, Court File No.: T-569-20, 2021-

Expert for Government of Canada, *Canadian Coalition for Firearm Rights, et al. v. Attorney General of Canada*, Federal Court, Court File No.: T-577-20, 2021-

Expert for Government of Canada, *Hipwell v. Attorney General of Canada*, Federal Court, Court File No.: T-581-20, 2021-

Expert for Government of Canada, *Doherty, et al. v. Attorney General of Canada*, Federal Court, Court File No.: T-677-20, 2021-

Expert for Government of Canada, *Generoux, et al. v. Attorney General of Canada*, Federal Court, Court File No.: T-735-20, 2021-

Expert for Government of Canada, *Eichenberg, et al. v. Attorney General of Canada*, Federal Court, Court File No.: T-905-20, 2021-

Expert for State of California, *Nguyen v. Bonta*, United States District Court for Southern District of California, Case Number 20-cv-02470-WQH-MDD, San Diego, CA, 2021-

Expert for State of California, *Jones v. Bonta*, United States District Court for Southern District of California, Case Number 19-cv-01226-L-AHG, San Diego, CA, 2021-

Expert for State of California, *Miller v. Becerra*, United States District Court for Southern District of California, Case Number 19-cv-1537-BEN-JLB, San Diego, CA, 2019-

Expert for Plaintiffs, *Ward et al. v. Academy Sports + Outdoor*, District Court Bexar County, Texas, 224th Judicial District, Cause Number 2017CI23341, Bexar County, TX, 2019-

Expert for State of California, *Duncan v. Becerra*, United States District Court for Southern District of California, Case Number 17-cv-1017-BEN-JLB, San Diego, CA, 2017-

Expert for State of California, *Wiese v. Becerra*, United States District Court for Eastern District of California, Case Number 17-cv-00903-WBS-KJN, Sacramento, CA, 2017-

Expert for State of Colorado, *Rocky Mountain Gun Owners v. Hickenlooper*, District Court for County and City of Denver, Colorado, Case Number 2013CV33879, Denver, CO, 2016-2017

Consultant, National Joint Terrorism Task Force, Federal Bureau of Investigation, Washington, DC, 2015

Writer, Prometheus Books, Amherst, NY, 2012-2015

Consultant, United States Institute of Peace, Washington, DC, 2005, 2008-2009

Research Associate, United States Institute of Peace, Washington, DC, 1992-1998

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Counter-Terrorism and Homeland Security
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International Politics in a Post-Cold War Era
International Security
Machinery and Politics of American Foreign Policy
Role of the United States in World Affairs
Security Policy
Theories of International Politics
Transnational Security
Transnational Terrorism
United States Foreign Policy

Undergraduate
American Government and Politics
European-Atlantic Relations
International Political Economy
International Relations
Transnational Terrorism
United States Foreign Policy

Scholarship

"State Firearm Laws, Gun Ownership, and K-12 School Shootings: Implications for School Safety," *Journal of School Violence*, 2022 (co-authored with Paul M. Reeping, Sonali Rajan, et al.)

"The Effect of Large-Capacity Magazine Bans on High-Fatality Mass Shootings, 1990-2017," *American Journal of Public Health*, November 2019 (co-authored with Andrew Conner and David Hemenway)

"Changes in U.S. Mass Shooting Deaths Associated with the 1994-2004 Federal Assault Weapons Ban," *Journal of Trauma and Acute Care Surgery*, May 2019 (correspondence)

Firearms on College Campuses: Research Evidence and Policy Implications, report prepared by the Johns Hopkins University Center for Gun Policy and Research for the Association of American Universities, October 2016 (co-authored with Daniel W. Webster, John J. Donohue, et al.)

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Review of James Edward Miller's *The United States and the Making of Modern Greece: History and Power, 1950-1974*, *Presidential Studies Quarterly*, June 2012 (book review)

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"The Death Penalty Should Be Decided Only Under a Specific Guideline," in Christine Watkins, ed., *The Ethics of Capital Punishment* (Cengage/Gale Publishers, 2011)

Saving Lives in the 'Convoy of Joy': Lessons for Peace-Keeping from UNPROFOR, United States Institute of Peace Case Study, 2009

"Casualties, Polls and the Iraq War," *International Security*, Fall 2006 (correspondence)

"The CIA Leak Case Indicting Vice President Cheney's Chief of Staff," *Presidential Studies Quarterly*, June 2006

"Were the Eagle and the Phoenix Birds of a Feather? The United States and the 1967 Greek Coup," *Diplomatic History*, June 2006

"Greeks Bearing Consensus: An Outline for Increasing Greece's Soft Power in the West," *Mediterranean Quarterly*, Summer 2005

"W Version 2.0: Foreign Policy in the Second Bush Term," *The Fletcher Forum of World Affairs*, Summer 2005

"Can You Sue the White House? Opening the Door for Separation of Powers Immunity in *Cheney v. District Court*," *Presidential Studies Quarterly*, December 2004

"Political Realism: A Culprit for the 9/11 Attacks," *Harvard International Review*, Fall 2004

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Were the Eagle and the Phoenix Birds of a Feather? The United States and the 1967 Greek Coup, Hellenic Observatory Discussion Paper 15, London School of Economics, February 2004

"Not a Divorce," *Survival*, Winter 2003-2004 (correspondence)

"Media Impact," in Mark Rozell, ed., *The Media and American Politics: An Introduction* (Lanham, MD: Rowman & Littlefield, 2003)

"The Surrender of Alleged War Criminals to International Tribunals: Examining the Constitutionality of Extradition via Congressional-Executive Agreement," *UCLA Journal of International Law and Foreign Affairs*, Fall/Winter 2003

"The Constitutionality of Congressional-Executive Agreements: Insights from Two Recent Cases," *Presidential Studies Quarterly*, June 2003

"The 'Essential Domino' of Military Operations: American Public Opinion and the Use of Force," *International Studies Perspectives*, November 2002

"The Polls–Trends: The United States Peace Operation in Somalia," *Public Opinion Quarterly*, Winter 2001

American Public Opinion on Peace Operations: The Cases of Somalia, Rwanda, and Haiti, University of Michigan Dissertation Services, 1999

"Turkey's Right v. Might Dilemma in Cyprus: Reviewing the Implications of *Loizidou v. Turkey*," *Mediterranean Quarterly*, Spring 1999

"An Outline of a Plan Toward a Comprehensive Settlement of the Greek-Turkish Dispute," in Vangelis Calotychos, ed., *Cyprus and Its People: Nation, Identity, and Experience in an Unimaginable Community, 1955-1997*, Boulder, CO: Westview Press, 1998 (co-authored with Theodore A. Couloumbis)

"Prospects for Greek-Turkish Reconciliation in a Changing International Setting," in Tozun Bahcheli, Theodore A. Couloumbis, and Patricia Carley, eds., *Greek-Turkish Relations and U.S. Foreign Policy: Cyprus, the Aegean, and Regional Stability*, Washington, D.C.: U.S. Institute of Peace, 1997 (co-authored with Theodore A. Couloumbis) [Reproduced as "Prospects for Greek-

Turkish Reconciliation in a Changing International Setting," in Robert L. Pfaltzgraff and Dimitris Keridis, eds., *Security in Southeastern Europe and the U.S.-Greek–Relationship*, London: Brassey's, 1997 (co-authored with Theodore A. Couloumbis)]

"Structuration Theory in International Relations," *Swords & Ploughshares*, Spring 1992

Commentaries and Correspondence

"Why Our Response to School Shootings Is All Wrong," *Los Angeles Times*, May 25, 2022 (co-authored with Sonali Rajan and Charles Branas)

"COVID-19 Is a Threat to National Security. Let's Start Treating It as Such," *Just Security*, August 6, 2020 (co-authored with Colin P. Clarke)

"If the Assault Weapons Ban 'Didn't Work,' Then Why Does the Evidence Suggest It Saved Lives?" *Los Angeles Times*, March 11, 2018 (correspondence)

"London and the Mainstreaming of Vehicular Terrorism," *The Atlantic*, June 4, 2017 (co-authored with Colin P. Clarke)

"Firearms Have Killed 82 of the 86 Victims of Post-9/11 Domestic Terrorism," *The Trace*, June 30, 2015 [Reproduced as "Almost Every Fatal Terrorist Attack in America since 9/1 Has Involved Guns." *Vice*, December 4, 2015]

"International Law and the 2012 Presidential Elections," Vitoria Institute, March 24, 2012

"Al Qaeda Without Bin Laden," CBS News *Opinion*, May 2, 2011

"Fuel, But Not the Spark," *Zocalo Public Square*, February 16, 2011

"After Tucson, Emotions Run High," *New York Times*, January 12, 2011 (correspondence)

"WikiLeaks, the Web, and the Need to Rethink the Espionage Act," *The Atlantic*, November 9, 2010

"Deprogramming Jihadis," *New York Times Magazine*, November 23, 2008 (correspondence)

"Food: An Issue of National Security," *Forbes* (Forbes.com), October 25, 2008

"An Invaluable Opportunity for Greece To Increase Its Standing and Influence on the World Stage," *Kathimerini* (Greece), January 13, 2005

"How Many War Deaths Can We Take?" *Newsday*, November 7, 2003

"Down But Not Out," London School of Economics Iraq War Website, April 2003

"Four Half-Truths and a War," *American Reporter*, April 6, 2003

"The Greek Bridge between Old and New Europe," *National Herald*, February 15-16, 2003

"Debunking a Widely-Believed Greek Conspiracy Theory," *National Herald*, September 21-22, 2002

"Debunking of Elaborate Media Conspiracies an Important Trend," *Kathimerini* (Greece), September 21, 2002 [Not Related to September 21-22, 2002, *National Herald* Piece with Similar Title]

"Cold Turkey," *Washington Times*, March 16, 1998

"If This Alliance Is to Survive . . .," *Washington Post*, January 2, 1998 [Reproduced as "Make Greece and Turkey Behave," *International Herald Tribune*, January 3, 1998]

"Defuse Standoff on Cyprus," *Defense News*, January 27-February 2, 1997

"Ukraine Holds Nuclear Edge," *Defense News*, August 2-8, 1993

Commentaries Written for *New York Daily News* – https://www.nydailynews.com/authors/?author=Louis+Klarevas

"Careful How You Talk about Suicide, Mr. President," March 25, 2020 (co-authored with Sonali Rajan, Charles Branas, and Katherine Keyes)

"Only as Strong as Our Weakest Gun Laws: The Latest Mass Shooting Makes a Powerful Case for Federal Action," November 8, 2018

"What to Worry, and not Worry, About: The Thwarted Pipe-Bomb Attacks Point to Homeland Security Successes and Vulnerabilities," October 25, 2018

"After the Santa Fe Massacre, Bury the 'Good Guy with a Gun' Myth: Armed Staffers Won't Deter Shooters or Keep Kids Safe," May 22, 2018

"It's the Guns (and Ammo), Stupid: Dissuading Killers and Hardening Targets Matter Too, But Access to Weapons Matters Most," February 18, 2018

"The Texas Shooting Again Reveals Inadequate Mental-Health Help in the U.S. Military," November 7, 2017

"Why Mass Shootings Are Getting Worse: After Vegas, We Urgently Must Fix Our Laws," October 2, 2017

"N.Y. Can Lead the Nation in Fighting Child Sex Trafficking," April 21, 2009 (co-authored with Ana Burdsall-Morse)

"Crack Down on Handguns – They're a Tool of Terror, Too," October 25, 2007

Commentaries Written for *The Huffington Post* – www.huffingtonpost.com/louis-klarevas

"Improving the Justice System Following the Deaths of Michael Brown and Eric Garner," December 4, 2014

"American Greengemony: How the U.S. Can Help Ukraine and the E.U. Break Free from Russia's Energy Stranglehold," March 6, 2014

"Guns Don't Kill People, Dogs Kill People," October 17, 2013

"Romney the Liberal Internationalist?" October 23, 2012

"Romney's Unrealistic Foreign Policy Vision: National Security Funded by Money Growing Trees," October 10, 2012

"Do the Wrong Thing: Why Penn State Failed as an Institution," November 14, 2011

"Holding Egypt's Military to Its Pledge of Democratic Reform," February 11, 2011

"The Coming Twivolutions? Social Media in the Recent Uprisings in Tunisia and Egypt," January 31, 2011

"Scholarship Slavery: Does St. John's 'Dean of Mean' Represent a New Face of Human Trafficking?" October 6, 2010

"Misunderstanding Terrorism, Misrepresenting Islam," September 21, 2010

"Bombing on the Analysis of the Times Square Bomb Plot," May 5, 2010

"Do the Hutaree Militia Members Pose a Terrorist Threat?" May 4, 2010

"Addressing Mexico's Gun Violence One Extradition at a Time," March 29, 2010

"Terrorism in Texas: Why the Austin Plane Crash Is an Act of Terror," February 19, 2010

"Securing American Primacy by Tackling Climate Change: Toward a National Strategy of Greengemony," December 15, 2009

"Traffickers Without Borders: A 'Journey' into the Life of a Child Victimized by Sex Trafficking," November 17, 2009

"Beyond a Lingering Doubt: It's Time for a New Standard on Capital Punishment," November 9, 2009

"It's the Guns Stupid: Why Handguns Remain One of the Biggest Threats to Homeland Security," November 7, 2009

"Obama Wins the 2009 Nobel Promise Prize," October 9, 2009

Commentaries for *Foreign Policy* – www.foreignpolicy.com

"The White House's Benghazi Problem," September 20, 2012

"Greeks Don't Want a Grexit," June 14, 2012

"The Earthquake in Greece," May 7, 2012

"The Idiot Jihadist Next Door," December 1, 2011

"Locked Up Abroad," October 4, 2011

Commentaries for *The New Republic* – www.tnr.com/users/louis-klarevas

"What the U.N. Can Do To Stop Getting Attacked by Terrorists," September 2, 2011

"Is It Completely Nuts That the British Police Don't Carry Guns? Maybe Not," August 13, 2011

"How Obama Could Have Stayed the Execution of Humberto Leal Garcia," July 13, 2011

"After Osama bin Laden: Will His Death Hasten Al Qaeda's Demise?" May 2, 2011

"Libya's Stranger Soldiers: How To Go After Qaddafi's Mercenaries," February 28, 2011

"Closing the Gap: How To Reform U.S. Gun Laws To Prevent Another Tucson," January 13, 2011

"Easy Target," June 13, 2010

"Death Be Not Proud," October 27, 2003 (correspondence)

Legal Analyses Written for *Writ* – writ.news.findlaw.com/contributors.html#klarevas

"Human Trafficking and the Child Protection Compact Act of 2009," *Writ* (FindLaw.com), July 15, 2009 (co-authored with Christine Buckley)

"Can the Justice Department Prosecute Reporters Who Publish Leaked Classified Information? Interpreting the Espionage Act," *Writ* (FindLaw.com), June 9, 2006

"Will the Precedent Set by the Indictment in a Pentagon Leak Case Spell Trouble for Those Who Leaked Valerie Plame's Identity to the Press?" *Writ* (FindLaw.com), August 15, 2005

"Jailing Judith Miller: Why the Media Shouldn't Be So Quick to Defend Her, and Why a Number of These Defenses Are Troubling," *Writ* (FindLaw.com), July 8, 2005

"The Supreme Court Dismisses the Controversial Consular Rights Case: A Blessing in Disguise for International Law Advocates?" *Writ* (FindLaw.com), June 6, 2005 (co-authored with Howard S. Schiffman)

"The Decision Dismissing the Lawsuit against Vice President Dick Cheney," *Writ* (FindLaw.com), May 17, 2005

"The Supreme Court Considers the Rights of Foreign Citizens Arrested in the United States," *Writ* (FindLaw.com), March 21, 2005 (co-authored with Howard S. Schiffman)

Presentations and Addresses

In addition to the presentations listed below, I have made close to one hundred media appearances, book events, and educational presentations (beyond lectures for my own classes)

"Mass Shootings: What We Know, What We Don't Know, and Why It All Matters," keynote presentation to be delivered at the Columbia University Center for Injury Science and Prevention Annual Symposium, virtual meeting, May 2020

"K-12 School Environmental Responses to Gun Violence: Gaps in the Evidence," paper presented at Society for Advancement of Violence and Injury Research Annual Meeting, virtual meeting, April 2020 (co-authored with Sonali Rajan, Joseph Erardi, Justin Heinze, and Charles Branas)

"Active School Shootings," Post-Performance Talkback following Presentation of *17 Minutes*, Barrow Theater, New York, January 29, 2020 (co-delivered with Sonali Rajan)

"Addressing Mass Shootings in Public Health: Lessons from Security Studies," Teachers College, Columbia University, November 25, 2019

"Rampage Nation: Securing America from Mass Shootings," Swarthmore College, October 24, 2019

"Rampage Nation: Securing America from Mass Shootings," University of Pennsylvania, February 9, 2018

"Treating Mass Shootings for What They Really Are: Threats to American Security," Framingham State University, October 26, 2017

"Book Talk: Rampage Nation," Teachers College, Columbia University, October 17, 2017

Participant, Roundtable on Assault Weapons and Large-Capacity Magazines, Annual Conference on Second Amendment Litigation and Jurisprudence, Law Center to Prevent Gun Violence, October 16, 2017

"Protecting the Homeland: Tracking Patterns and Trends in Domestic Terrorism," address delivered to the annual meeting of the National Joint Terrorism Task Force, June 2015

"Sovereign Accountability: Creating a Better World by Going after Bad Political Leaders," address delivered to the Daniel H. Inouye Asia-Pacific Center for Security Studies, November 2013

"Game Theory and Political Theater," address delivered at the School of Drama, State Theater of Northern Greece, May 2012

"Holding Heads of State Accountable for Gross Human Rights Abuses and Acts of Aggression," presentation delivered at the Michael and Kitty Dukakis Center for Public and Humanitarian Service, American College of Thessaloniki, May 2012

Chairperson, Cultural Enrichment Seminar, Fulbright Foundation – Southern Europe, April 2012

Participant, Roundtable on "Did the Intertubes Topple Hosni?" Zócalo Public Square, February 2011

Chairperson, Panel on Democracy and Terrorism, annual meeting of the International Security Studies Section of the International Studies Association, October 2010

"Trends in Terrorism Within the American Homeland Since 9/11," paper to be presented at the annual meeting of the International Security Studies Section of the International Studies Association, October 2010

Panelist, "In and Of the World," Panel on Global Affairs in the 21st Century, Center for Global Affairs, New York University, March 2010

Moderator, "Primacy, Perils, and Players: What Does the Future Hold for American Security?" Panel of Faculty Symposium on Global Challenges Facing the Obama Administration, Center for Global Affairs, New York University, March 2009

"Europe's Broken Border: The Problem of Illegal Immigration, Smuggling and Trafficking via Greece and the Implications for Western Security," presentation delivered at the Center for Global Affairs, New York University, February 2009

"The Dangers of Democratization: Implications for Southeast Europe," address delivered at the University of Athens, Athens, Greece, May 2008

Participant, "U.S. National Intelligence: The Iran National Intelligence Estimate," Council on Foreign Relations, New York, April 2008

Moderator, First Friday Lunch Series, "Intelligence in the Post-9/11 World: An Off-the-Record Conversation with Dr. Joseph Helman (U.S. Senior National Intelligence Service)," Center for Global Affairs, New York University, March 2008

Participant, "U.S. National Intelligence: Progress and Challenges," Council on Foreign Relations, New York, March 2008

Moderator, First Friday Lunch Series, "Public Diplomacy: The Steel Backbone of America's Soft Power: An Off-the-Record Conversation with Dr. Judith Baroody (U.S. Department of State)," Center for Global Affairs, New York University, October 2007

"The Problems and Challenges of Democratization: Implications for Latin America," presentation delivered at the Argentinean Center for the Study of Strategic and International Relations Third Conference on the International Relations of South America (IBERAM III), Buenos Aires, Argentina, September 2007

"The Importance of Higher Education to the Hellenic-American Community," keynote address to the annual Pan-Icarian Youth Convention, New York, May 2007

Moderator, First Friday Lunch Series, Panel Spotlighting Graduate Theses and Capstone Projects, Center for Global Affairs, New York University, April 2007

Convener, U.S. Department of State Foreign Officials Delegation Working Group on the Kurds and Turkey, March 2007

"Soft Power and International Law in a Globalizing Latin America," round-table presentation delivered at the Argentinean Center for the Study of Strategic and International Relations Twelfth Conference of Students and Graduates of International Relations in the Southern Cone (CONOSUR XII), Buenos Aires, Argentina, November 2006

Moderator, First Friday Lunch Series, "From Berkeley to Baghdad to the Beltway: An Off-the-Record Conversation with Dr. Catherine Dale (U.S. Department of Defense)," Center for Global Affairs, New York University, November 2006

Chairperson, Roundtable on Presidential Privilege and Power Reconsidered in a Post-9/11 Era, American Political Science Association Annual Meeting, September 2006

"Constitutional Controversies," round-table presentation delivered at City University of New York-College of Staten Island, September 2005

"The Future of the Cyprus Conflict," address to be delivered at City University of New York College of Staten Island, April 2005

"The 2004 Election and the Future of American Foreign Policy," address delivered at City University of New York College of Staten Island, December 2004

"One Culprit for the 9/11 Attacks: Political Realism," address delivered at City University of New York-College of Staten Island, September 2004

"Were the Eagle and the Phoenix Birds of a Feather? The United States and the 1967 Greek Coup," address delivered at London School of Economics, November 2003

"Beware of Europeans Bearing Gifts? Cypriot Accession to the EU and the Prospects for Peace," address delivered at Conference on Mediterranean Stability, Security, and Cooperation, Austrian Defense Ministry, Vienna, Austria, October 2003

Co-Chair, Panel on Ideational and Strategic Aspects of Greek International Relations, London School of Economics Symposium on Modern Greece, London, June 2003

"Greece between Old and New Europe," address delivered at London School of Economics, June 2003

Co-Chair, Panel on International Regimes and Genocide, International Association of Genocide Scholars Annual Meeting, Galway, Ireland, June 2003

"American Cooperation with International Tribunals," paper presented at the International Association of Genocide Scholars Annual Meeting, Galway, Ireland, June 2003

"Is the Unipolar Moment Fading?" address delivered at London School of Economics, May 2003

"Cyprus, Turkey, and the European Union," address delivered at London School of Economics, February 2003

"Bridging the Greek-Turkish Divide," address delivered at Northwestern University, May 1998

"The CNN Effect: Fact or Fiction?" address delivered at Catholic University, April 1998

"The Current Political Situation in Cyprus," address delivered at AMIDEAST, July 1997

"Making the Peace Happen in Cyprus," presentation delivered at the U.S. Institute of Peace in July 1997

"The CNN Effect: The Impact of the Media during Diplomatic Crises and Complex Emergencies," a series of presentations delivered in Cyprus (including at Ledra Palace), May 1997

"Are Policy-Makers Misreading the Public? American Public Opinion on the United Nations," paper presented at the International Studies Association Annual Meeting, Toronto, Canada, March 1997 (with Shoon Murray)

"The Political and Diplomatic Consequences of Greece's Recent National Elections," presentation delivered at the National Foreign Affairs Training Center, Arlington, VA, September 1996

"Prospects for Greek-Turkish Reconciliation," presentation delivered at the U.S. Institute of Peace Conference on Greek-Turkish Relations, Washington, D.C., June, 1996 (with Theodore A. Couloumbis)

"Greek-Turkish Reconciliation," paper presented at the Karamanlis Foundation and Fletcher School of Diplomacy Joint Conference on The Greek-U.S. Relationship and the Future of Southeastern Europe, Washington, D.C., May, 1996 (with Theodore A. Couloumbis)

"The Path toward Peace in the Eastern Mediterranean and the Balkans in the Post-Cold War Era," paper presented at the International Studies Association Annual Meeting, San Diego, CA, March, 1996 (with Theodore A. Couloumbis)

"Peace Operations: The View from the Public," paper presented at the International Studies Association Annual Meeting, San Diego, CA, March, 1996

Chairperson, Roundtable on Peace Operations, International Security Section of the International Studies Association Annual Meeting, Rosslyn, VA, October, 1995

"Chaos and Complexity in International Politics: Epistemological Implications," paper presented at the International Studies Association Annual Meeting, Washington, D.C., March, 1994

"At What Cost? American Mass Public Opinion and the Use of Force Abroad," paper presented at the International Studies Association Annual Meeting, Washington, D.C., March, 1994 (with Daniel B. O'Connor)

"American Mass Public Opinion and the Use of Force Abroad," presentation delivered at the United States Institute of Peace, Washington, D.C., February, 1994 (with Daniel B. O'Connor)

"For a Good Cause: American Mass Public Opinion and the Use of Force Abroad," paper presented at the Annual Meeting of the Foreign Policy Analysis/Midwest Section of the International Studies Association, Chicago, IL, October, 1993 (with Daniel B. O'Connor)

"American International Narcotics Control Policy: A Critical Evaluation," presentation delivered at the American University Drug Policy Forum, Washington, D.C., November, 1991

"American National Security in the Post-Cold War Era: Social Defense, the War on Drugs, and the Department of Justice," paper presented at the Association of Professional Schools of International Affairs Conference, Denver, CO, February, 1991

Referee for Grant Organizations, Peer-Reviewed Journals, and Book Publishers

National Science Foundation, Division of Social and Economic Sciences

American Journal of Public Health

American Political Science Review

British Medical Journal (BMJ)

Comparative Political Studies

Injury Epidemiology

Journal of Public and International Affairs

Millennium

Political Behavior

Presidential Studies Quarterly

Victims & Offenders

Violence and Victims

Brill Publishers

Johns Hopkins University Press

Routledge

Service to University, Profession, and Community

Member, Regional Gun Violence Research Consortium, Nelson A. Rockefeller Institute of Government, State University of New York, 2022-

Founding Member, Scientific Union for the Reduction of Gun Violence (SURGE), Columbia University, 2019-

Contributing Lecturer, Johns Hopkins University, Massive Open Online Course on Evidence-Based Gun Violence Research, Funded by David and Lucile Packard Foundation, 2019

Member, Group of Gun Violence Experts, *New York Times* Upshot Survey, 2017

Member, Guns on Campus Assessment Group, Johns Hopkins University and Association of American Universities, 2016

Member, Fulbright Selection Committee, Fulbright Foundation, Athens, Greece, 2012

Faculty Advisor, Global Affairs Graduate Society, New York University, 2009-2011

Founder and Coordinator, Graduate Transnational Security Studies, Center for Global Affairs, New York University, 2009-2011

Organizer, Annual Faculty Symposium, Center for Global Affairs, New York University, 2009

Member, Faculty Search Committees, Center for Global Affairs, New York University, 2007-2009

Member, Graduate Program Director Search Committee, Center for Global Affairs, New York University, 2008-2009

Developer, Transnational Security Studies, Center for Global Affairs, New York University, 2007-2009

Participant, Council on Foreign Relations Special Series on National Intelligence, New York, 2008

Member, Graduate Certificate Curriculum Committee, Center for Global Affairs, New York University, 2008

Member, Faculty Affairs Committee, New York University, 2006-2008

Member, Curriculum Review Committee, Center for Global Affairs, New York University, 2006-2008

Member, Overseas Study Committee, Center for Global Affairs, New York University, 2006-2007

Participant, New York Academic Delegation to Israel, Sponsored by American-Israel Friendship League, 2006

Member, Science, Letters, and Society Curriculum Committee, City University of New York-College of Staten Island, 2006

Member, Graduate Studies Committee, City University of New York-College of Staten Island, 2005-2006

Member, Summer Research Grant Selection Committee, City University of New York-College of Staten Island, 2005

Director, College of Staten Island Association, 2004-2005

Member of Investment Committee, College of Staten Island Association, 2004-2005

Member of Insurance Committee, College of Staten Island Association, 2004-2005

Member, International Studies Advisory Committee, City University of New York-College of Staten Island, 2004-2006

Faculty Advisor, Pi Sigma Alpha National Political Science Honor Society, City University of New York-College of Staten Island, 2004-2006

Participant, World on Wednesday Seminar Series, City University of New York-College of Staten Island, 2004-2005

Participant, American Democracy Project, City University of New York-College of Staten Island, 2004

Participant, Philosophy Forum, City University of New York-College of Staten Island, 2004

Commencement Liaison, City University of New York-College of Staten Island, 2004

Member of Scholarship Committee, Foundation of Pan-Icarian Brotherhood, 2003-2005, 2009

Scholarship Chairman, Foundation of Pan-Icarian Brotherhood, 2001-2003

Faculty Advisor to the Kosmos Hellenic Society, George Washington University, 2001-2002

Member of University of Pennsylvania's Alumni Application Screening Committee, 2000-2002

Participant in U.S. Department of State's International Speakers Program, 1997

Participant in Yale University's United Nations Project, 1996-1997

Member of Editorial Advisory Board, *Journal of Public and International Affairs*, Woodrow Wilson School of Public and International Affairs, Princeton University, 1991-1993

Voting Graduate Student Member, School of International Service Rank and Tenure Committee, American University, 1990-1992

Member of School of International Service Graduate Student Council, American University, 1990-1992

Teaching Assistant for the Several Courses (World Politics, Beyond Sovereignty, Between Peace and War, Soviet-American Security Relations, and Organizational Theory) at School of International Service Graduate Student Council, American University, 1989-1992

Representative for American University at the Annual Meeting of the Association of Professional Schools of International Affairs, Denver, Colorado, 1991

Affiliations, Associations, and Organizations (Past and Present)

Academy of Political Science (APS)

American Political Science Association (APSA)

Anderson Society of American University

Carnegie Council Global Ethics Network

Columbia University Scientific Union for the Reduction of Gun Violence (SURGE)

Firearm Safety among Children and Teens (FACTS)

International Political Science Association (IPSA)

International Studies Association (ISA)

New York Screenwriters Collective

Pan-Icarian Brotherhood

Pi Sigma Alpha

Regional Gun Violence Research Consortium

Society for Advancement of Violence and Injury Research (SAVIR)

United States Department of State Alumni Network

United States Institute of Peace Alumni Association

University of Pennsylvania Alumni Association

Grants, Honors, and Awards

Co-Investigator, A Nationwide Case-Control Study of Firearm Violence Prevention Tactics and Policies in K-12 School, National Institutes of Health, 2021-2024 (Charles Branas and Sonali Rajan MPIs)

Senior Fulbright Fellowship, 2012

Professional Staff Congress Research Grantee, City University of New York, 2004-2005

Research Assistance Award (Two Times), City University of New York-College of Staten Island, 2004

Summer Research Fellowship, City University of New York-College of Staten Island, 2004

European Institute Associate Fellowship, London School of Economics, 2003-2004

Hellenic Observatory Defense Analysis Research Fellowship, London School of Economics, 2002-2003

United States Institute of Peace Certificate of Meritorious Service, 1996

National Science Foundation Dissertation Research Grant, 1995 (declined)

Alexander George Award for Best Graduate Student Paper, Runner-Up, Foreign Policy Analysis Section, International Studies Association, 1994

Dean's Scholar Fellowship, School of International Service, American University, 1989-1992

Graduate Research and Teaching Assistantship, School of International Service, American University, 1989-1992

American Hellenic Educational Progressive Association (AHEPA) College Scholarship, 1986

Political Science Student of the Year, Wilkes-Barre Area School District, 1986

EXHIBIT B

Exhibit B
High-Fatality Mass Shootings in the United States, 1973-2022

	Date	City	State	Deaths	Involved Assault Weapon(s)
1	1/7/1973	New Orleans	LA	7	N
2	4/22/1973	Los Angeles	CA	7	N
3	6/9/1973	Boston	MA	6	N
4	6/21/1973	Palos Hills	IL	7	N
5	11/4/1973	Cleveland	OH	7	N
6	2/18/1974	Fayette	MS	7	N
7	10/19/1974	New Britain	CT	6	N
8	11/13/1974	Amityville	NY	6	N
9	3/30/1975	Hamilton	OH	11	N
10	10/19/1975	Sutherland	NE	6	N
11	3/12/1976	Trevose	PA	6	N
12	7/12/1976	Fullerton	CA	7	N
13	2/14/1977	New Rochelle	NY	6	N
14	7/23/1977	Klamath Falls	OR	6	Y
15	8/26/1977	Hackettstown	NJ	6	N
16	7/16/1978	Oklahoma City	OK	6	N
17	1/3/1981	Delmar	IA	6	N
18	1/7/1981	Richmond	VA	6	N
19	5/2/1981	Clinton	MD	6	N
20	8/21/1981	Indianapolis	IN	6	N
21	2/17/1982	Farwell	MI	7	N
22	8/9/1982	Grand Prairie	TX	6	N
23	8/20/1982	Miami	FL	8	N
24	9/7/1982	Craig	AK	8	N
25	9/25/1982	Wilkes-Barre	PA	13	Y
26	2/18/1983	Seattle	WA	13	N
27	3/3/1983	McCarthy	AK	6	Y
28	10/11/1983	College Station and Hempstead	TX	6	N
29	4/15/1984	Brooklyn	NY	10	N
30	5/19/1984	Manley Hot Springs	AK	8	N
31	6/29/1984	Dallas	TX	6	N
32	7/18/1984	San Ysidro	CA	21	Y
33	10/18/1984	Evansville	IN	6	N
34	8/20/1986	Edmond	OK	14	N
35	12/8/1986	Oakland	CA	6	Y
36	2/5/1987	Flint	MI	6	N

	Date	City	State	Deaths	Involved Assault Weapon(s)
37	4/23/1987	Palm Bay	FL	6	Y
38	7/12/1987	Tacoma	WA	7	N
39	9/25/1987	Elkland	MO	7	N
40	12/30/1987	Algona	IA	6	N
41	2/16/1988	Sunnyvale	CA	7	N
42	9/14/1989	Louisville	KY	8	Y
43	6/18/1990	Jacksonville	FL	9	N
44	1/26/1991	Chimayo	NM	7	N
45	8/9/1991	Waddell	AZ	9	N
46	10/16/1991	Killeen	TX	23	N
47	11/7/1992	Morro Bay and Paso Robles	CA	6	N
48	1/8/1993	Palatine	IL	7	N
49	5/16/1993	Fresno	CA	7	Y
50	7/1/1993	San Francisco	CA	8	Y
51	12/7/1993	Garden City	NY	6	N
52	4/20/1999	Littleton	CO	13	Y
53	7/12/1999	Atlanta	GA	6	N
54	7/29/1999	Atlanta	GA	9	N
55	9/15/1999	Fort Worth	TX	7	N
56	11/2/1999	Honolulu	HI	7	N
57	12/26/2000	Wakefield	MA	7	Y
58	12/28/2000	Philadelphia	PA	7	N
59	8/26/2002	Rutledge	AL	6	N
60	1/15/2003	Edinburg	TX	6	Y
61	7/8/2003	Meridian	MS	6	N
62	8/27/2003	Chicago	IL	6	N
63	3/12/2004	Fresno	CA	9	N
64	11/21/2004	Birchwood	WI	6	Y
65	3/12/2005	Brookfield	WI	7	N
66	3/21/2005	Red Lake	MN	9	N
67	1/30/2006	Goleta	CA	7	N
68	3/25/2006	Seattle	WA	6	N
69	6/1/2006	Indianapolis	IN	7	Y
70	12/16/2006	Kansas City	KS	6	N
71	4/16/2007	Blacksburg	VA	32	N
72	10/7/2007	Crandon	WI	6	Y
73	12/5/2007	Omaha	NE	8	Y
74	12/24/2007	Carnation	WA	6	N
75	2/7/2008	Kirkwood	MO	6	N

	Date	City	State	Deaths	Involved Assault Weapon(s)
76	9/2/2008	Alger	WA	6	N
77	12/24/2008	Covina	CA	8	N
78	1/27/2009	Los Angeles	CA	6	N
79	3/10/2009	Kinston, Samson, and Geneva	AL	10	Y
80	3/29/2009	Carthage	NC	8	N
81	4/3/2009	Binghamton	NY	13	N
82	11/5/2009	Fort Hood	TX	13	N
83	1/19/2010	Appomattox	VA	8	Y
84	8/3/2010	Manchester	CT	8	N
85	1/8/2011	Tucson	AZ	6	N
86	7/7/2011	Grand Rapids	MI	7	N
87	8/7/2011	Copley Township	OH	7	N
88	10/12/2011	Seal Beach	CA	8	N
89	12/25/2011	Grapevine	TX	6	N
90	4/2/2012	Oakland	CA	7	N
91	7/20/2012	Aurora	CO	12	Y
92	8/5/2012	Oak Creek	WI	6	N
93	9/27/2012	Minneapolis	MN	6	N
94	12/14/2012	Newtown	CT	27	Y
95	7/26//2013	Hialeah	FL	6	N
96	9/16/2013	Washington	DC	12	N
97	7/9/2014	Spring	TX	6	N
98	9/18/2014	Bell	FL	7	N
99	2/26/2015	Tyrone	MO	7	N
100	5/17/2015	Waco	TX	9	N
101	6/17/2015	Charleston	SC	9	N
102	8/8/2015	Houston	TX	8	N
103	10/1/2015	Roseburg	OR	9	N
104	12/2/2015	San Bernardino	CA	14	Y
105	2/21/2016	Kalamazoo	MI	6	N
106	4/22/2016	Piketon	OH	8	N
107	6/12/2016	Orlando	FL	49	Y
108	5/27/2017	Brookhaven	MS	8	Y
109	9/10/2017	Plano	TX	8	Y
110	10/1/2017	Las Vegas	NV	60	Y
111	11/5/2017	Sutherland Springs	TX	25	Y
112	2/14/2018	Parkland	FL	17	Y
113	5/18/2018	Santa Fe	TX	10	N
114	10/27/2018	Pittsburgh	PA	11	Y

	Date	City	State	Deaths	Involved Assault Weapon(s)
115	11/7/2018	Thousand Oaks	CA	12	N
116	5/31/2019	Virginia Beach	VA	12	N
117	8/3/2019	El Paso	TX	23	Y
118	8/4/2019	Dayton	OH	9	Y
119	8/31/2019	Midland and Odessa	TX	7	Y
120	3/15/2020	Moncure	NC	6	U
121	6/4/2020	Valhermoso Springs	AL	7	Y
122	9/7/2020	Aguanga	CA	7	U
123	2/2/2021	Muskogee	OK	6	N
124	3/16/2021	Acworth and Atlanta	GA	8	N
125	3/22/2021	Boulder	CO	10	Y
126	4/7/2021	Rock Hill	SC	6	Y
127	4/15/2021	Indianapolis	IN	8	Y
128	5/9/2021	Colorado Springs	CO	6	N
129	5/26/2021	San Jose	CA	9	N
130	1/23/2022	Milwaukee	WI	6	N
131	4/3/2022	Sacramento	CA	6	N
132	5/14/2022	Buffalo	NY	10	Y
133	5/24/2022	Uvalde	TX	21	Y
134	7/4/2022	Highland Park	IL	7	Y
135	10/27/2022	Broken Arrow	OK	7	N
136	11/22/2022	Chesapeake	VA	6	N

Note: High-fatality mass shootings are shootings resulting in 6 or more fatalities, not including the perpetrator(s), regardless of location or motive. For purposes of this Exhibit, a high-fatality mass shooting was coded as involving an assault weapon if at least one of the firearms discharged was defined as an assault weapon in (1) the 1994 federal Assault Weapons Ban; (2) the statutes of the state where the shooting occurred; or (3) a legal or judicial declaration issued by a state official. Incidents in gray shade are those incidents that occurred at a time when and in a state where legal prohibitions on assault weapons were in effect statewide or nationwide.

Sources: Louis Klarevas, *Rampage Nation: Securing America from Mass Shootings* (2016); Louis Klarevas, et al., *The Effect of Large-Capacity Magazine Bans on High-Fatality Mass Shootings*, 109 American Journal of Public Health 1754 (2019), *available at* https://ajph.aphapublications.org/doi/full/10.2105/AJPH.2019.305311 (last accessed December 27, 2022); and "Gun Violence Archive," *available at* https://www.gunviolencearchive.org (last accessed January 3, 2023). The Gun Violence Archive was only consulted for identifying high-fatality mass shootings that occurred since January 1, 2018.

EXHIBIT C

Exhibit C
Mass Public Shootings in the United States, 1973-2022

	Date	City	State	Deaths	Involved Assault Weapon(s)
1	1/7/1973	New Orleans	LA	7	N
2	3/2/1975	Smith River	CA	5	N
3	7/12/1976	Fullerton	CA	7	N
4	2/14/1977	New Rochelle	NY	6	N
5	7/23/1977	Klamath Falls	OR	6	Y
6	8/26/1977	Hackettstown	NJ	6	N
7	6/17/1978	Warwick	RI	4	N
8	2/3/1980	El Paso	TX	5	N
9	6/22/1980	Daingerfield	TX	5	N
10	7/21/1980	Coraopolis	PA	4	N
11	5/7/1981	Salem	OR	4	N
12	10/16/1981	Allen	KY	5	N
13	5/3/1982	Anchorage	AK	4	N
14	8/9/1982	Grand Prairie	TX	6	N
15	8/20/1982	Miami	FL	8	N
16	2/3/1983	New York	NY	4	N
17	3/3/1983	McCarthy	AK	6	Y
18	10/11/1983	College Station and Hempstead	TX	6	N
19	5/17/1984	Manley Hot Springs	AK	8	N
20	6/29/1984	Dallas	TX	6	N
21	7/18/1984	San Ysidro	CA	21	Y
22	7/24/1984	Hot Springs	AR	5	N
23	3/16/1985	Connellsville	PA	4	N
24	8/20/1986	Edmond	OK	14	N
25	4/23/1987	Palm Bay	FL	6	Y
26	2/16/1988	Sunnyvale	CA	7	N
27	7/17/1988	Winston-Salem	NC	4	N
28	9/22/1988	Chicago	IL	4	N
29	1/17/1989	Stockton	CA	5	Y
30	9/14/1989	Louisville	KY	8	Y
31	6/18/1990	Jacksonville	FL	9	N
32	10/10/1991	Ridgewood	NJ	4	Y
33	10/16/1991	Killeen	TX	23	N
34	11/1/1991	Iowa City	IA	5	N
35	11/9/1991	Harrodsburg	KY	4	N
36	11/14/1991	Royal Oak	MI	4	N

	Date	City	State	Deaths	Involved Assault Weapon(s)
37	3/15/1992	Phoenix	AZ	4	N
38	5/1/1992	Olivehurst	CA	4	N
39	10/15/1992	Watkins Glen	NY	4	N
40	11/8/1992	Morro Bay and Paso Robles	CA	6	N
41	7/1/1993	San Francisco	CA	8	Y
42	8/6/1993	Fayetteville	NC	4	N
43	10/14/1993	El Cajon	CA	4	N
44	12/2/1993	Oxnard	CA	4	N
45	12/7/1993	Garden City	NY	6	N
46	12/14/1993	Aurora	CO	4	N
47	6/20/1994	Fairchild Air Force Base	WA	4	Y
48	12/31/1994	Raeford	NC	5	N
49	4/3/1995	Corpus Christi	TX	5	N
50	7/19/1995	Los Angeles	CA	4	N
51	12/19/1995	Bronx	NY	5	N
52	2/9/1996	Fort Lauderdale	FL	5	N
53	4/24/1996	Jackson	MS	5	Y
54	8/19/1997	Colebrook	NH	4	Y
55	9/15/1997	Aiken	SC	4	N
56	12/3/1997	Bartow	FL	4	N
57	12/18/1997	Orange	CA	4	Y
58	3/6/1998	Rocky Hill	CT	4	N
59	3/24/1998	Jonesboro	AR	5	N
60	5/20/1998	Springfield	OR	4	N
61	3/10/1999	Gonzalez	LA	4	N
62	4/20/1999	Littleton	CO	13	Y
63	6/3/1999	Las Vegas	NV	4	N
64	7/29/1999	Atlanta	GA	9	N
65	9/15/1999	Fort Worth	TX	7	N
66	11/2/1999	Honolulu	HI	7	N
67	12/30/1999	Tampa	FL	5	N
68	3/20/2000	Irving	TX	5	N
69	4/28/2000	Pittsburgh	PA	5	N
70	12/26/2000	Wakefield	MA	7	Y
71	1/9/2001	Houston	TX	4	N
72	2/5/2001	Lisle	IL	4	Y
73	7/3/2001	Rifle	CO	4	N
74	9/8/2001	Sacramento	CA	5	Y
75	3/22/2002	South Bend	IN	4	N

	Date	City	State	Deaths	Involved Assault Weapon(s)
76	2/25/2003	Huntsville	AL	4	N
77	7/8/2003	Meridian	MS	6	N
78	8/27/2003	Chicago	IL	6	N
79	10/24/2003	Oldtown	ID	4	N
80	7/2/2004	Kansas City	KS	5	N
81	11/21/2004	Birchwood	WI	6	Y
82	12/8/2004	Columbus	OH	4	N
83	3/11/2005	Atlanta	GA	4	N
84	3/12/2005	Brookfield	WI	7	N
85	3/21/2005	Red Lake	MN	9	N
86	8/28/2005	Honey Grove	TX	4	N
87	1/30/2006	Goleta	CA	7	N
88	3/25/2006	Seattle	WA	6	N
89	5/21/2006	Baton Rouge	LA	5	N
90	10/2/2006	Paradise	PA	5	N
91	2/12/2007	Salt Lake City	UT	5	N
92	4/16/2007	Blacksburg	VA	32	N
93	12/5/2007	Omaha	NE	8	Y
94	12/9/2007	Arvada	CO	4	Y
95	2/7/2008	Kirkwood	MO	6	N
96	2/14/2008	DeKalb	IL	5	N
97	3/18/2008	Santa Maria	CA	4	N
98	6/25/2008	Henderson	KY	5	N
99	9/2/2008	Alger	WA	6	N
100	3/29/2009	Carthage	NC	8	N
101	4/3/2009	Binghamton	NY	13	N
102	11/1/2009	Mount Airy	NC	4	Y
103	11/5/2009	Killeen	TX	13	N
104	11/29/2009	Tacoma	WA	4	N
105	4/3/2010	North Hollywood	CA	4	N
106	6/6/2010	Hialeah	FL	4	N
107	8/3/2010	Manchester	CT	8	N
108	8/14/2010	Buffalo	NY	4	N
109	9/11/2010	Jackson	KY	5	N
110	1/8/2011	Tucson	AZ	6	N
111	8/7/2011	Copley Township	OH	7	N
112	9/6/2011	Carson City	NV	4	Y
113	10/12/2011	Seal Beach	CA	8	N
114	4/2/2012	Oakland	CA	7	N

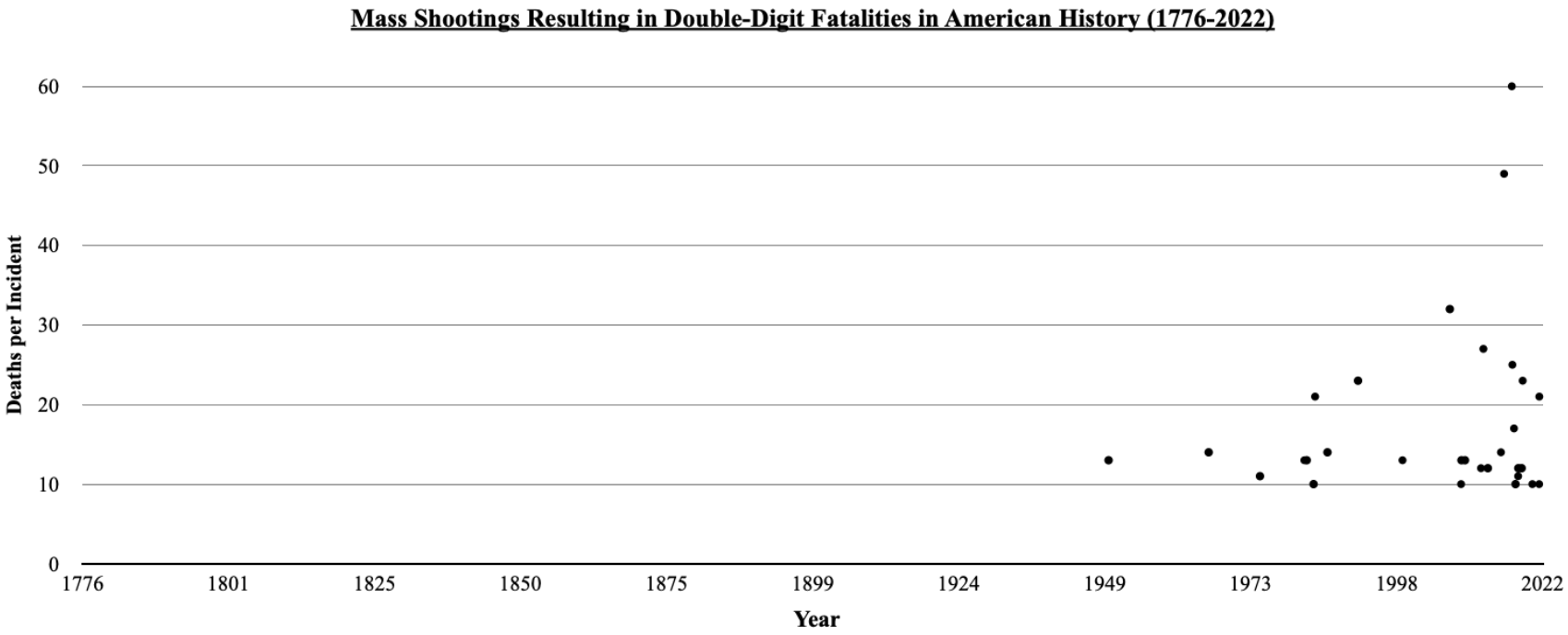
	Date	City	State	Deaths	Involved Assault Weapon(s)
115	5/30/2012	Seattle	WA	5	N
116	7/20/2012	Aurora	CO	12	Y
117	8/5/2012	Oak Creek	WI	6	N
118	9/27/2012	Minneapolis	MN	6	N
119	12/14/2012	Newtown	CT	27	Y
120	3/13/2013	Herkimer	NY	4	N
121	4/21/2013	Federal Way	WA	4	N
122	6/7/2013	Santa Monica	CA	5	Y
123	7/26/2013	Hialeah	FL	6	N
124	9/16/2013	Washington	DC	12	N
125	2/20/2014	Alturas	CA	4	N
126	10/24/2014	Marysville	WA	4	N
127	6/17/2015	Charleston	SC	9	N
128	7/16/2015	Chattanooga	TN	5	Y
129	10/1/2015	Roseburg	OR	9	N
130	11/14/2015	Palestine	TX	5	N
131	12/2/2015	San Bernardino	CA	14	Y
132	2/20/2016	Kalamazoo	MI	6	N
133	3/9/2016	Wilkinsburg	PA	5	Y
134	6/12/2016	Orlando	FL	49	Y
135	7/7/2016	Dallas	TX	5	Y
136	9/23/2016	Burlington	WA	5	N
137	1/6/2017	Fort Lauderdale	FL	5	N
138	2/6/2017	Yazoo City	MS	4	U
139	3/22/2017	Rothschild	WI	4	N
140	6/5/2017	Orlando	FL	5	N
141	10/1/2017	Las Vegas	NV	60	Y
142	11/5/2017	Sutherland Springs	TX	25	Y
143	11/14/2017	Corning and Rancho Tehama	CA	5	Y
144	1/28/2018	Melcroft	PA	4	Y
145	2/14/2018	Parkland	FL	17	Y
146	2/26/2018	Detroit	MI	4	N
147	4/22/2018	Antioch	TN	4	Y
148	5/18/2018	Santa Fe	TX	10	N
149	6/28/2018	Annapolis	MD	5	N
150	9/12/2018	Bakersfield	CA	5	N
151	10/27/2018	Pittsburgh	PA	11	Y
152	11/7/2018	Thousand Oaks	CA	12	N
153	1/23/2019	Sebring	FL	5	N

	Date	City	State	Deaths	Involved Assault Weapon(s)
154	2/15/2019	Aurora	IL	5	N
155	5/31/2019	Virginia Beach	VA	12	N
156	8/3/2019	El Paso	TX	23	Y
157	8/4/2019	Dayton	OH	9	Y
158	8/31/2019	Midland and Odessa	TX	7	Y
159	12/10/2019	Jersey City	NJ	4	Y
160	2/26/2020	Milwaukee	WI	5	N
161	3/15/2020	Springfield	MO	4	Y
162	1/9/2021	Chicago and Evanston	IL	5	N
163	3/16/2021	Atlanta	GA	8	N
164	3/22/2021	Boulder	CO	10	Y
165	3/31/2021	Orange	CA	4	N
166	4/15/2021	Indianapolis	IN	8	Y
167	5/26/2021	San Jose	CA	9	N
168	11/30/2021	Oxford	MI	4	N
169	5/14/2022	Buffalo	NY	10	Y
170	5/24/2022	Uvalde	TX	21	Y
171	6/1/2022	Tulsa	OK	4	Y
172	7/4/2022	Highland Park	IL	7	Y
173	10/13/2022	Raleigh	NC	5	N
174	11/19/2022	Colorado Springs	CO	5	Y
175	11/22/2022	Chesapeake	VA	6	N

Notes: Mass public shootings are shootings resulting in 4 or more fatalities, not including the perpetrator(s), so long as the act of violence occurred largely in a public setting and was not undertaken in pursuit of an underlying criminal objective. For purposes of this Exhibit, a high-fatality mass shooting was coded as involving an assault weapon if at least one of the firearms discharged was defined as an assault weapon in (1) the 1994 federal Assault Weapons Ban; (2) the statutes of the state where the shooting occurred; or (3) a legal or judicial declaration issued by a state official. Incidents in gray shade are those incidents that occurred at a time when and in a state where legal prohibitions on assault weapons were in effect statewide or nationwide.

Source: The Violence Project. The source for the comprehensive data set is: The Violence Project, "Mass Shooter Database," 2023, *available at* https://www.theviolenceproject.org/mass-shooter-database (last accessed January 3, 2023).

EXHIBIT D


Mass Shootings Resulting in Double-Digit Fatalities in American History (1776-2022)
Deaths per Incident
60
50
40
30
20
10
0
1776
1801
1825
1850
1875
1899
1924
1949
1973
1998
2022
Year

Mass Shootings Resulting in Double-Digit Fatalities in American History (1949-2022)

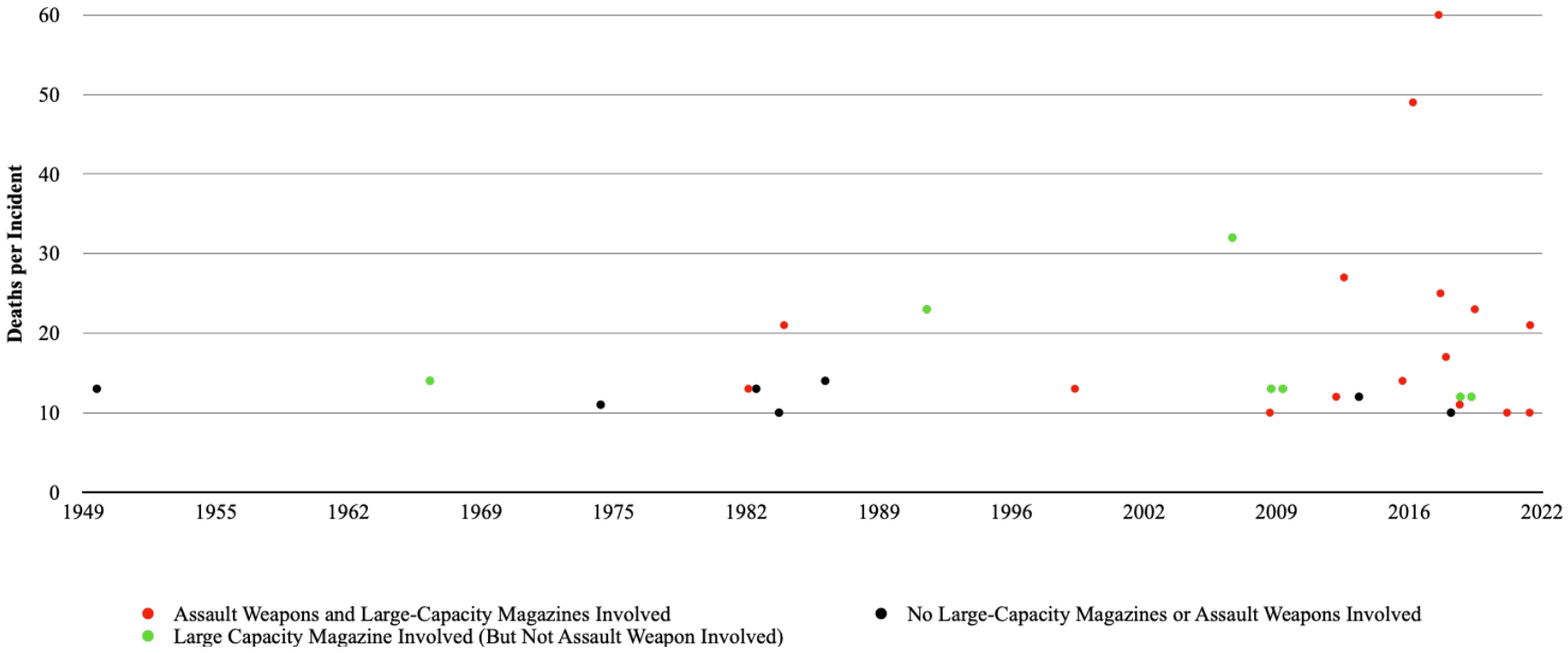


EXHIBIT E

LOUIS KLAREVAS

RAMPAGE NATION

SECURING AMERICA FROM MASS SHOOTINGS

Prometheus Books
59 John Glenn Drive
Amherst, New York 14228

in a class all by itself. No other advanced, Western democracy experiences the magnitude of gun violence that presently afflicts American society.[28] This is particularly true when it comes to mass shootings.[29]

☆ ☆ ☆

The United States does little to regulate firearms, especially at the federal level.[30] While it goes to great lengths to restrict access to WMDs and IEDs, the same can't be said for its efforts to keep firearms out of the hands of high-risk individuals. Indeed, the American experience with gun control nationwide is so limited that it can actually be chronicled in a few bullet points:

- The National Firearms Act of 1934: Heavily regulated machine guns, short-barrel rifles and shotguns, and silencers.
- The Federal Firearms Act of 1938: Established a federal licensing system to regulate manufacturers, importers, and dealers of firearms.
- The Omnibus Crime Control and Safe Streets Act of 1968: Prohibited anyone under twenty-one years of age from purchasing a handgun.
- The Gun Control Act of 1968: Required that all interstate firearms transfers or sales be made through a federally licensed firearms dealer and prohibited certain categories of people—felons (indicted or convicted), fugitives, drug abusers, mentally ill persons (as determined by adjudication), illegal aliens, dishonorably discharged servicemen, US-citizenship renouncers, and domestic abusers—from possessing firearms.[31]
- The Firearm Owners Protection Act of 1986: Barred the purchase or transfer of automatic weapons without government approval.
- The Undetectable Firearms Act of 1988: Required that all firearms have at least 3.7 oz. of metal that can be detected by a metal detector.
- The Gun-Free School Zones Act of 1990: Criminalized possession or discharge of a firearm in a school zone.
- The Brady Handgun Violence Prevention Act of 1993: Required

that anyone attempting to purchase a firearm from a federally licensed dealer pass a background check.[32]

- The Federal Assault Weapons Ban of 1994: Banned the sale and possession of semiautomatic assault weapons and extended-capacity magazines not grandfathered prior to the enactment of the law.[33]

Of all of these measures, the National Firearms Act of 1934 and the Assault Weapons Ban of 1994 (AWB) were the only ones instituted primarily in an effort to reduce the carnage of mass shootings. The former was passed in response to a series of bloody gangland executions, including the infamous 1929 St. Valentine's Day massacre in Chicago.[34] While there are still machine guns in circulation, the National Firearm Act, in conjunction with the Firearm Owners Protection Act of 1986, sharply cut the availability of machine guns, which likely explains the complete elimination of massacres perpetrated with such automatic-fire weapons.

Like the National Firearms Act, the AWB was introduced following several high-profile mass shootings in the early 1990s: the Luby's restaurant, 101 California Street office complex, and Long Island Railroad train car massacres.[35] Signed into law by President Bill Clinton, the AWB went into effect on September 13, 1994. At the insistence of the gun-rights lobby, however, the bill contained a ten-year sunset provision. As Congress never renewed the ban, it automatically expired on September 13, 2004.

The decade the law was in effect nonetheless resulted in a unique experiment, allowing us to discern what impact, if any, the ban had on gun violence in general and mass shootings in particular. As to the former, the academic consensus seems to be that the AWB had a minimal impact on reducing violent crime.[36] This hardly comes as a surprise. After all, most crimes don't involve assault weapons. The real test should be: Did it succeed in its intended purpose of reducing rampage violence? The answer is a resounding yes.

Let's take a closer look.

The best way to assess the impact of something is to conduct what, in social science, we commonly refer to as a time-series analysis. Basically, that's a fancy name for a before-and-after test. Figures 7.1

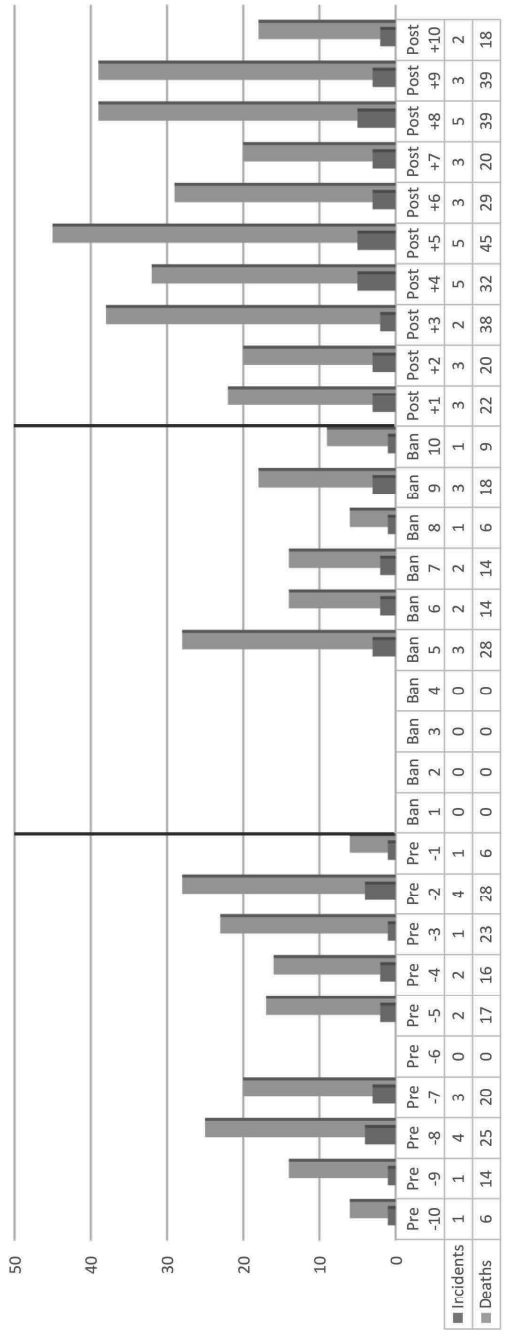


Fig. 7.1. Gun Massacres Before, During, and After the Assault Weapons Ban of 1994.
Note: The lines in the graph demarcate the start and end points of the Assault Weapons Ban, which was in effect from September 13, 1994, through September 12, 2004. The data are drawn from Table 3.2.

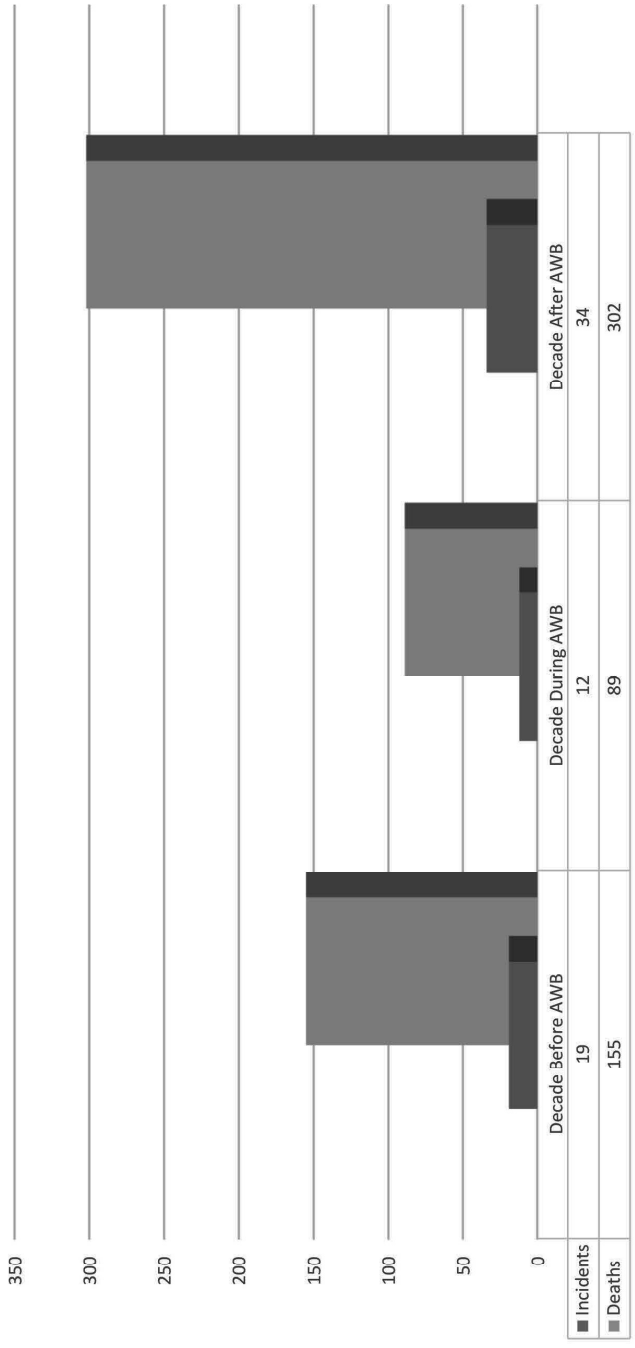


Fig. 7.2. Gun Massacres by Decade Before, During, and After the Assault Weapons Ban of 1994.
Note: The Assault Weapons Ban was in effect from September 13, 1994, through September 12, 2004.
The data are drawn from Table 3.2.

and 7.2 provide a look at the before-and-after pictures. In the decade prior to the enactment of the AWB, the United States experienced nineteen gun massacres that resulted in 155 cumulative deaths, for an average death toll of 8.2 fatalities per incident. During the ten-year period that the AWB was in effect, the numbers declined substantially, with only twelve gun massacres, resulting in eighty-nine deaths, for an average of 7.4 fatalities per incident.[37] What's particularly astounding about this time period is that during the first four and a half years of the ban, there wasn't a single gun massacre in the United States. Not one. This is unprecedented in modern American history.[38] Since 1966, the longest streaks without a gun massacre prior to era of the AWB were two instances of consecutive years (1969–1970 and 1979–1980).[39] Then, all of a sudden, from September 1994 to April 1999, the country experienced a long calm. As further evidence of the AWB's effectiveness, once it expired, rampages returned with a vengeance. In the ten years after the ban, the number of gun massacres nearly tripled to thirty-four incidents, sending the total number of deaths skyrocketing to 302, for an average of 8.9 fatalities per incident.[40] These numbers paint a clear picture: America's experiment, while short-lived, was also extremely successful.[41]

ZEROING OUT GUN MASSACRES

The biggest takeaway from America's experience with a ban on assault weapons and extended-capacity magazines is that gun-control legislation can save lives. But is there a way to get to zero? Is there a way to eliminate gun massacres once and for all? For that, we have to look overseas for insights.

One of the biggest obstacles to successful gun control is the ability to transport firearms across open, contiguous borders. In the United States, it's a problem that allows guns to flow freely from states with lax laws into states with strict laws. A common complaint frequently leveled by elected officials in places like California, Illinois, Maryland, New York, and Massachusetts is that people just need to drive across a state line and they can readily obtain firearms that they can then easily—if perhaps illegally—bring back into their jurisdictions.[42] That

EXHIBIT F

The Effect of Large-Capacity Magazine Bans on High-Fatality Mass Shootings, 1990–2017

Louis Klarevas, PhD, Andrew Conner, BS, David Hemenway, PhD

Objectives. To evaluate the effect of large-capacity magazine (LCM) bans on the frequency and lethality of high-fatality mass shootings in the United States.

Methods. We analyzed state panel data of high-fatality mass shootings from 1990 to 2017. We first assessed the relationship between LCM bans overall, and then federal and state bans separately, on (1) the occurrence of high-fatality mass shootings (logit regression) and (2) the deaths resulting from such incidents (negative binomial analysis). We controlled for 10 independent variables, used state fixed effects with a continuous variable for year, and accounted for clustering.

Results. Between 1990 and 2017, there were 69 high-fatality mass shootings. Attacks involving LCMs resulted in a 62% higher mean average death toll. The incidence of high-fatality mass shootings in non–LCM ban states was more than double the rate in LCM ban states; the annual number of deaths was more than 3 times higher. In multivariate analyses, states without an LCM ban experienced significantly more high-fatality mass shootings and a higher death rate from such incidents.

Conclusions. LCM bans appear to reduce both the incidence of, and number of people killed in, high-fatality mass shootings. (*Am J Public Health.* 2019;109:1754–1761. doi: 10.2105/AJPH.2019.305311)

The recent spate of gun massacres in the United States has re-energized the debate over how to prevent such tragedies.[1] A common response to high-profile acts of gun violence is the promotion of tighter gun legislation, and there is some evidence that laws imposing tighter restrictions on access to firearms have been associated with lower levels of mass shootings.[2] One proposal that has received renewed interest involves restricting the possession of large-capacity magazines (LCMs).[3–5] This raises an important question: what has been the impact of LCM bans on high-fatality mass shootings?

In an attempt to arrest an uptick in mass shooting violence in the early 1990s, Congress in 1994 enacted the federal assault weapons ban, which, among other things, restricted ownership of certain ammunition-feeding devices.[6,7] The law, which contained a sunset provision, was allowed to expire a decade later. Pursuant to that ban (18 USC §921(a) [1994]; repealed), it was illegal to possess LCMs—defined as any ammunition-feeding device holding more than 10 bullets—unless the magazines were manufactured before the enactment of the ban. LCM restrictions are arguably the most important component of assault weapons bans because they also apply to semiautomatic firearms without military-style features.[8,9]

Beginning with New Jersey in 1990, some states implemented their own regulations on LCMs. Today, 9 states and the District of Columbia restrict the possession of LCMs. The bans vary along many dimensions, including maximum bullet capacity of permissible magazines, grandfathering of existing LCMs, and applicable firearms. Moreover, overlaps sometimes exist between assault weapons bans and LCM bans, but not in all states. For example, California instituted a ban on assault weapons in 1989, but LCMs remained unregulated in the state until 1994, when the federal ban went into effect. In 2000, California's own statewide ban on LCMs took effect as a safeguard in the event the federal ban expired, which happened in 2004.[10,11]

LCMs provide a distinct advantage to active shooters intent on murdering numerous people: they increase the number of rounds that can be fired at potential victims before having to pause to reload or switch weapons. Evidence shows that victims struck by multiple rounds are more likely to die, with 2 studies finding that, when compared with the fatality rates of gunshot wound victims who were hit by only a single bullet, the fatality rates of those victims hit by more than 1 bullet were more than 60% higher.[12,13] Being able to strike human targets with more than 1 bullet increases shooters' chances of killing their victims. Analyses of gunshot wound victims at level I trauma centers have suggested that this multiple-impact capability is often attributable to the use of LCMs.[14,15]

In addition, LCMs provide active shooters with extended cover.[16] During an attack, perpetrators are either firing their guns or not firing their guns. While gunmen are firing, it is extremely difficult for those in the line of fire to take successful defensive maneuvers. But if gunmen run out of bullets, there are lulls in the shootings, as the perpetrators are forced to pause their attacks to reload or change weapons. These pauses provide opportunities for people to intervene and disrupt a shooting. Alternatively, they provide individuals in

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harm's way with a chance to flee or hide. Legislative endeavors that restrict access to LCMs are implemented with the express objective of reducing an active shooter's multiple-impact capability and extended cover.[10]

Although mass shootings have received extensive study, there has been little scholarly analysis of LCM bans.[17–24] The studies undertaken that have broached the subject of ammunition capacity have primarily concentrated on the effect of LCM bans on violent crimes other than mass shootings or on the impact of the assault weapons bans on mass shootings.[25–27]

Evidence suggests that firearms equipped with LCMs are involved in a disproportionate share of mass shootings.[10,20,28] Proponents of LCM bans believe that without LCMs, fewer people will be killed in a mass shooting, other things equal. In turn, fewer shootings will cross the threshold required to be classified as what we call a "high-fatality mass shooting" (≥ 6 victims shot to death). If LCM bans are effective, we should expect to find that high-fatality mass shootings occur at a lower incidence rate when LCM bans are in place, and fewer people are killed in such attacks. But have LCM bans actually saved lives in practice? To our knowledge, the impact of LCM bans has never been systematically assessed. This study fills that void.

METHODS

Mass shootings have been defined in a variety of ways, with some analyses setting the casualty threshold as low as 2 people wounded or killed and others requiring a minimum of 7 gunshot victims.[18,22,29] We focused on high-fatality mass shootings—the deadliest and most disturbing of such incidents—which are defined as intentional crimes of gun violence with 6 or more victims shot to death, not including the perpetrators.[20,30,31] After an exhaustive search, we identified 69 such incidents in the United States between 1990 and 2017. We then discerned whether each high-fatality mass shooting involved a LCM—unless otherwise stated, defined consistent with the 1994 federal ban as a detachable ammunition-feeding device capable of holding more than 10 bullets. (See Table 1 for a list of incidents and for additional details on the search and identification strategy we employed.)

The first state to enact an LCM ban was New Jersey in 1990. Since then, another 8 states and the District of Columbia have enacted LCM bans (Table A, available as a supplement to the online version of this article at http://www.ajph.org).[10] With no LCM bans in effect before 1990, a priori we chose that year to begin our analysis to avoid inflating the impact of the bans. Our data set extends 28 years, from 1990 through 2017. As a secondary analysis, we used a 13-year data set, beginning in 2005, the first full year after the federal assault weapons ban expired.

Our primary outcome measures were the incidence of high-fatality mass shootings and the number of victims killed. We distinguished between high-fatality mass shootings occurring with and without a ban in effect. Because the federal ban was in effect nationwide from September 13, 1994, through September 12, 2004, we coded every state as being under an LCM ban during that 10-year timeframe.

Our interest was in the effect of LCM bans. We ran regression analyses to determine if any relationship between LCM bans and high-fatality mass shootings can be explained by other factors. In our state–year panel multivariate analyses, the outcome variables were (1) whether an LCM-involved high-fatality mass shooting occurred, (2) whether any high-fatality mass shooting occurred, (3) the number of fatalities in an LCM-involved high-fatality mass shooting, and (4) the number of fatalities in any high-fatality mass shooting. Our analyses first combined and then separated federal and state LCM bans.

Consistent with the suggestions and practices of the literature on firearm homicides and mass shootings, our explanatory variables are population density; proportion of population aged 19 to 24 years, aged 25 to 34 years, that is Black, and with a college degree; real per-capita median income; unemployment rate; and per-capita prison population.[2,26,27,32] We also added a variable for percentage of households with a firearm. All regression models controlled for total state population. When the dependent variable reflected occurrences of incidents (ordered choice data), we used logit regression; we ran probit regression as a sensitivity analysis. We had multiple observations for individual states. To control for this, we utilized cluster-robust standard errors to account for the clustering of observations. When the dependent variable reflected deaths (count data), we used negative binomial regression; Gius used a Poisson regression, and we used that approach as a sensitivity analysis.[26] We included state fixed effects. We used a continuous variable for year because the rate of high-fatality mass shootings has increased over time. For purposes of sensitivity analysis, we also replaced the linear yearly trend with a quadratic function. We performed multivariate statistical analyses by using Stata/IC version 15.1 (StataCorp LP, College Station, TX).

Population data came from the US Census Bureau, unemployment data came from the Bureau of Labor Statistics, and imprisonment data came from the Bureau of Justice Statistics. The percentage of households with a firearm was a validated proxy (the percentage of suicides that are firearm suicides) derived from Centers for Disease Control and Prevention National Vital Statistics Data.[33]

RESULTS

Between 1990 and 2017, there were 69 high-fatality mass shootings (≥ 6 victims shot to death) in the United States. Of these, 44 (64%) involved LCMs, 16 did not (23%), and for 9 (13%) we could not determine whether LCMs were used (Table 1). The mean number of victims killed in the 44 LCM-involved high-fatality mass shootings was 11.8; including the unknowns resulted in that average falling to 11.0 (not shown). The mean number of victims killed in high-fatality mass shootings in which the perpetrator did not use an LCM was 7.3 (Table B, available as a supplement to the online version of this article at http://www.ajph.org); including the unknowns resulted in that average falling to 7.1 (not shown). When we excluded unknown cases, the data indicated that utilizing LCMs in high-fatality mass shootings resulted in a 62% increase in the mean death toll.

Data sets of mass shooting fatalities by their nature involve truncated data, with the mode generally being the baseline number of fatalities required to be included in the data set (6 fatalities in the current study). Our data

TABLE 1—High-Fatality Mass Shootings in the United States, 1990–2017

Incident	Date	City	State	LCM	Deaths, No.	State LCM Ban	Federal Assault Weapons Ban
1	Jun 18, 1990	Jacksonville	FL	Y	9	N	N
2	Jan 26, 1991	Chimayo	NM	N	7	N	N
3	Aug 9, 1991	Waddell	AZ	N	9	N	N
4	Oct 16, 1991	Killeen	TX	Y	23	N	N
5	Nov 7, 1992	Morro Bay and Paso Robles	CA	N	6	N	N
6	Jan 8, 1993	Palatine	IL	N	7	N	N
7	May 16, 1993	Fresno	CA	Y	7	N	N
8	Jul 1, 1993	San Francisco	CA	Y	8	N	N
9	Dec 7, 1993	Garden City	NY	Y	6	N	N
10	Apr 20, 1999	Littleton	CO	Y	13	Y	Y
11	Jul 12, 1999	Atlanta	GA	U	6	Y	Y
12	Jul 29, 1999	Atlanta	GA	Y	9	Y	Y
13	Sep 15, 1999	Fort Worth	TX	Y	7	Y	Y
14	Nov 2, 1999	Honolulu	HI	Y	7	Y	Y
15	Dec 26, 2000	Wakefield	MA	Y	7	Y	Y
16	Dec 28, 2000	Philadelphia	PA	Y	7	Y	Y
17	Aug 26, 2002	Rutledge	AL	N	6	Y	Y
18	Jan 15, 2003	Edinburg	TX	U	6	Y	Y
19	Jul 8, 2003	Meridian	MS	N	6	Y	Y
20	Aug 27, 2003	Chicago	IL	N	6	Y	Y
21	Mar 12, 2004	Fresno	CA	N	9	Y	Y
22	Nov 21, 2004	Birchwood	WI	Y	6	N	N
23	Mar 12, 2005	Brookfield	WI	Y	7	N	N
24	Mar 21, 2005	Red Lake	MN	Y	9	N	N
25	Jan 30, 2006	Goleta	CA	Y	7	Y	N
26	Mar 25, 2006	Seattle	WA	Y	6	N	N
27	Jun 1, 2006	Indianapolis	IN	Y	7	N	N
28	Dec 16, 2006	Kansas City	KS	N	6	N	N
29	Apr 16, 2007	Blacksburg	VA	Y	32	N	N
30	Oct 7, 2007	Crandon	WI	Y	6	N	N
31	Dec 5, 2007	Omaha	NE	Y	8	N	N
32	Dec 24, 2007	Carnation	WA	U	6	N	N
33	Feb 7, 2008	Kirkwood	MO	Y	6	N	N
34	Sep 2, 2008	Alger	WA	U	6	N	N
35	Dec 24, 2008	Covina	CA	Y	8	Y	N
36	Jan 27, 2009	Los Angeles	CA	N	6	Y	N
37	Mar 10, 2009	Kinston, Samson, and Geneva	AL	Y	10	N	N
38	Mar 29, 2009	Carthage	NC	N	8	N	N
39	Apr 3, 2009	Binghamton	NY	Y	13	Y	N
40	Nov 5, 2009	Fort Hood	TX	Y	13	N	N
41	Jan 19, 2010	Appomattox	VA	Y	8	N	N

Continued

TABLE 1—*Continued*

Incident	Date	City	State	LCM	Deaths, No.	State LCM Ban	Federal Assault Weapons Ban
42	Aug 3, 2010	Manchester	CT	Y	8	N	N
43	Jan 8, 2011	Tucson	AZ	Y	6	N	N
44	Jul 7, 2011	Grand Rapids	MI	Y	7	N	N
45	Aug 7, 2011	Copley Township	OH	N	7	N	N
46	Oct 12, 2011	Seal Beach	CA	N	8	Y	N
47	Dec 25, 2011	Grapevine	TX	N	6	N	N
48	Apr 2, 2012	Oakland	CA	N	7	Y	N
49	Jul 20, 2012	Aurora	CO	Y	12	N	N
50	Aug 5, 2012	Oak Creek	WI	Y	6	N	N
51	Sep 27, 2012	Minneapolis	MN	Y	6	N	N
52	Dec 14, 2012	Newtown	CT	Y	27	N	N
53	Jul 26, 2013	Hialeah	FL	Y	6	N	N
54	Sep 16, 2013	Washington	DC	N	12	Y	N
55	Jul 9, 2014	Spring	TX	Y	6	N	N
56	Sep 18, 2014	Bell	FL	U	7	N	N
57	Feb 26, 2015	Tyrone	MO	U	7	N	N
58	May 17, 2015	Waco	TX	Y	9	N	N
59	Jun 17, 2015	Charleston	SC	Y	9	N	N
60	Aug 8, 2015	Houston	TX	U	8	N	N
61	Oct 1, 2015	Roseburg	OR	Y	9	N	N
62	Dec 2, 2015	San Bernardino	CA	Y	14	Y	N
63	Feb 21, 2016	Kalamazoo	MI	Y	6	N	N
64	Apr 22, 2016	Piketon	OH	U	8	N	N
65	Jun 12, 2016	Orlando	FL	Y	49	N	N
66	May 27, 2017	Brookhaven	MS	U	8	N	N
67	Sep 10, 2017	Plano	TX	Y	8	N	N
68	Oct 1, 2017	Las Vegas	NV	Y	58	N	N
69	Nov 5, 2017	Sutherland Springs	TX	Y	25	N	N

Note. LCM = large-capacity magazine; N = no; U = unknown; Y = yes. From September 13, 1994, until and including September 12, 2004, each and every state, including the District of Columbia, was subject to a ban on LCMs pursuant to the federal assault weapons ban. To collect the data in Table 1, we searched the following news media resources for every shooting that resulted in 6 or more fatalities: America's Historical Newspapers, EBSCO, Factiva, Gannett Newsstand, Google News Archive, Lexis-Nexis, Newspaper Archive, Newspaper Source Plus, Newspapers.com, Newswires, ProQuest Historical Newspapers, and ProQuest Newsstand. We also reviewed mass shooting data sets maintained by *Mother Jones*, the *New York Times*, and *USA Today*. In addition to news media sources, we reviewed reports on mass shootings produced by think tank, policy advocacy, and governmental organizations, including the US Federal Bureau of Investigation Supplementary Homicide Reports, the crowdsourced Mass Shooting Tracker, and the open-source databases maintained by the Gun Violence Archive and the Stanford University Geospatial Center. Finally, when it was relevant, we also reviewed court records as well as police, forensic, and autopsy reports. As a general rule, when government sources were available, they were preferred over other sources. Furthermore, when media sources conflicted on the number of casualties or the weaponry involved, the later sources were privileged (as later reporting is often more accurate).

set of high-fatality mass shootings was no exception. As such, the median average number of fatalities for each subset of incidents—those involving and those not involving LCMs—was necessarily lower than the mean average. Nevertheless, like the mean average, the median average was higher when LCMs were employed—a median average of 8 fatalities per incident compared with 7 fatalities per incident for attacks not involving LCMs.

For the 60 incidents in which it was known if an LCM was used, in 44 the perpetrator used an LCM. Of the 44 incidents in which the perpetrators used LCMs, 77% (34/44) were in nonban states. In the 16 incidents in which the perpetrators did not use LCMs, 50% (8/16) were in nonban states (Table B, available as a supplement to the online version of this article at http://www.ajph.org). Stated differently, in nonban states, 81% (34/42) of high-fatality mass shooting perpetrators used LCMs; in LCM-ban states, only 55% (10/18) used LCMs.

The rate of high-fatality mass shootings increased considerably after September 2004 (when the federal assault weapons ban expired). In the 10 years the federal ban was in effect, there were 12 high-fatality mass shootings and 89 deaths (an average of 1.2 incidents and 8.9 deaths per year). Since then, through 2017, there have been 48 high-fatality mass shootings and 527 deaths (an average of 3.6 incidents and 39.6 deaths per year in these 13.3 years).

Of the 69 high-fatality mass shootings from 1990 to 2017, 49 occurred in states without an LCM ban in effect at the time and 20 in states with a ban in effect at the time. The annual incidence rate for high-fatality mass shootings in states without an LCM ban was 11.7 per billion population; the annual incidence rate for high-fatality mass shootings in states with an LCM ban was 5.1 per billion population. In that 28-year period, the rate of high-fatality mass shootings per capita was 2.3 times higher in states without an LCM ban (Table 2).

Non–LCM ban states had not only more incidents but also more deaths per incident (10.9 vs 8.2). The average annual number of high-fatality mass shooting deaths per billion population in the non–LCM ban states was 127.4. In the LCM ban states, it was 41.6 (Table 2).

For the time period beginning with the first full calendar year following the expiration of the federal assault weapons ban (January 1, 2005–December 31, 2017), there were 47 high-fatality mass shootings in the United States. Of these, 39 occurred in states where an LCM ban was not in effect, and 8 occurred in LCM ban locations. The annual incidence rate for high-fatality mass shootings in states without an LCM ban was 13.2 per billion population; for states with an LCM ban, it was 7.4 per billion population (Table 2). During this period, non–LCM ban states had not only more incidents but also more deaths per incident (11.4 vs 9.4). In terms of high-fatality mass shooting deaths per billion population, the annual number of deaths in the non-LCM ban states was 150.6; in the LCM ban states it was 69.2 (Table 2).

When we limited the analysis solely to high-fatality mass shootings that definitely involved LCMs, the differences between ban and nonban states became larger. For example, for the entire period of 1990 to 2017, of the 44 high-fatality mass shootings that involved LCMs, the annual incidence rate for LCM-involved high-fatality mass shootings in nonban states was 8.1 per billion population; in LCM-ban states it was 2.5 per billion population. The annual rate of high-fatality mass shooting deaths in the non–LCM ban states was 102.1 per billion population; in the LCM ban states it was 23.3. In terms of LCM-involved high-fatality mass shootings, we also found comparable wide differences in incidence and fatality rates between ban and nonban states for the post–federal assault weapons ban period (2005–2017; Table 2).

We found largely similar results in the multivariate analyses (1990–2017). States that did not ban LCMs were significantly more likely to experience LCM-involved high-fatality mass shootings as well as more likely to experience any high-fatality mass shootings (regardless of whether an LCM was involved). States that did not ban LCMs also experienced significantly more deaths from high-fatality mass shootings, operationalized as the absolute number of fatalities (Table 3).

When the LCM bans were separated into federal and state bans, both remained significantly related to the incidence of LCM-involved high-fatality mass shooting events and to the number of LCM-involved high-fatality mass shooting deaths. The associations between federal and state bans and

TABLE 2—High-Fatality Mass Shootings (≥6 Victims Shot to Death) by Whether LCM Bans Were in Effect: United States, 1990–2017

	Average Annual Population, No. (Millions)	Total Incidents, No.	Annual Incidents per Billion Population, No.	Total Deaths, No.	Annual Deaths per Billion Population, No.	Deaths per Incident, No.
All high-fatality mass shootings, 1990–2017 (28 y)						
Non–LCM ban states	149.7	49	11.7	534	127.4	10.9
LCM ban states	140.7	20	5.1	164	41.6	8.2
All high-fatality mass shootings, 2005–2017 (13 y)						
Non–LCM ban states	227.8	39	13.2	446	150.6	11.4
LCM ban states	83.4	8	7.4	75	69.2	9.4
LCM-involved high-fatality mass shootings, 1990–2017 (28 y)						
Non–LCM ban states	149.7	34	8.1	428	102.1	12.6
LCM ban states	140.7	10	2.5	92	23.3	9.2
LCM-involved high-fatality mass shootings, 2005–2017 (13 y)						
Non–LCM ban states	227.8	28	9.5	369	124.6	13.2
LCM ban states	83.4	4	3.7	42	38.7	10.5
Non-LCM high-fatality mass shootings, 1990–2017 (28 y)						
Non–LCM ban states	149.7	8	1.9	56	13.4	7.0
LCM ban states	140.7	8	2.0	60	15.2	7.5

Note. LCM = large-capacity magazine.

TABLE 3—Multivariate Results of the Relationship Between LCM Bans and High-Fatality Mass Shootings (≥ 6 Victims Shot to Death), 1990–2017 Combined Federal and State Large Capacity Magazine Bans: United States

	LCM-Involved High-Fatality Mass Shootings, b (95% CI)		All High-Fatality Mass Shootings, b (95% CI)	
	Incidents[a]	No. Deaths[b]	Incidents[a]	No. Deaths[b]
All LCM bans (federal and state)	−2.217 (−3.493, −0.940)	−5.912 (−9.261, −2.563)	−1.283 (−2.147, −0.420)	−3.660 (−5.695, −1.624)
Population density	−0.011 (−0.052, 0.031)	0.013 (−0.068, 0.095)	0.001 (−0.003, 0.006)	0.011 (−0.005, 0.026)
% aged 19–24 y	−0.480 (−1.689, 0.730)	−2.496 (−5.893, 0.901)	0.283 (−0.599, 1.164)	−0.585 (−2.666, 1.495)
% aged 25–34 y	−0.801 (−1.512, −0.089)	−2.390 (−4.391, −0.388)	−0.337 (−0.871, 0.197)	−1.114 (−2.463, 0.235)
% Black	−0.227 (−1.062, 0.607)	−0.654 (−2.831, 1.522)	−0.163 (−0.703, 0.377)	−0.261 (−1.391, 0.870)
% with a bachelor's degree or higher	−0.009 (−0.492, 0.474)	−0.469 (−1.590, 0.652)	0.143 (−0.214, 0.501)	0.183 (−0.715, 1.081)
Percentage of households with a firearm (proxy)	−0.047 (−0.195, 0.101)	−0.147 (−0.546, 0.251)	−0.020 (−0.131, 0.091)	−0.084 (−0.368, 0.200)
Median household income	0.000 (0.000, 0.000)	0.000 (0.000, 0.000)	0.000 (0.000, 0.000)	0.000 (0.000, 0.000)
Unemployment rate	−0.072 (−0.293, 0.149)	−0.476 (−1.081, 0.129)	0.041 (−0.135, 0.216)	−0.182 (−0.628, 0.263)
Imprisonment rate (per 100 000 population)	−0.006 (−0.012, 0.001)	−0.007 (−0.017, 0.004)	−0.001 (−0.006, 0.003)	−0.003 (−0.012, 0.007)
Total population	0.000 (0.000, 0.000)	0.000 (0.000, 0.000)	0.000 (0.000, 0.000)	0.000 (0.000, 0.000)
Pseudo R^2	0.31	0.16	0.26	0.11

Note. CI = confidence interval; LCM = large-capacity magazine. There were a total of 1428 observations in state-years (51 jurisdictions—all 50 states plus Washington, DC—over a 28-year period). Mean variance inflation factor = 3.49.

[a]Logit regression.

[b]Negative binomial regression.

the overall incidence of all high-fatality mass shootings as well as the total number of victims in these events remained strongly negative but was only sometimes statistically significant (Table 4).

In terms of sensitivity analyses, using probit instead of logit gave us similar results (not shown). When the outcome variable was the number of high-fatality mass shooting deaths, we obtained largely similar results concerning the association between LCM bans and the outcome variables, regardless of whether we used Poisson or negative binominal regression (not shown). Moreover, replacing the linear yearly trend with a quadratic function did not change the major results of the analyses (not shown). Variance inflation factors for all the independent variables never exceeded 10.0, with the variance inflation factor for LCM ban variables always being less than 2.0, indicating that there were no significant multicollinearity issues (Tables 3 and 4).

DISCUSSION

In the United States, LCMs are disproportionately used in high-fatality mass shootings (incidents in which ≥ 6 victims are shot to death). In at least 64% of the incidents since 1990, perpetrators used LCMs. (For 23%, we determined that they did not involve LCMs, and a determination could not be made for the remaining 13%.) Previous research has shown that LCM firearms are used in a high share of mass murders (typically defined as ≥ 4 homicides) and murders of police.[9]

We could not find reliable estimates of LCM firearms in the US gun stock. However, it is likely much lower than 64%, given that commonly owned firearms such as revolvers, bolt-action rifles, and shotguns are not typically designed to be LCM-capable. During the decade the federal assault weapons ban was in effect, no firearms were legally manufactured with LCMs for sale in the United States. In the postban era, semiautomatic firearms, especially pistols, are often sold with factory-issue LCMs, but firearms that are not semiautomatic are not sold with such magazines.

Why do we find LCMs so prominent among high-fatality mass shootings? We suspect there are 2 main reasons. The first is that perpetrators probably deliberately select LCMs because they facilitate the ability to fire many rounds without having to stop to reload. The second reason is that the ability of shooters to kill many victims—especially the 6 victims required to be included in our data set—may be reduced if LCMs are not available. In other words, the first explanation is that shooters perceive LCMs to be more effective at killing many people; the second explanation is that LCMs are indeed more effective at killing many people.

High-fatality mass shootings are not common, even in the United States. Between 1990 and 2017, there has been an average of 2.5 incidents per year, with an average of 25 people killed annually in such attacks. However, the number of incidents and the number of people killed per incident have been increasing since the end of the federal assault weapons ban.

In our study, we found that bans on LCMs were associated with both lower incidence of high-fatality mass shootings and lower fatality tolls per incident. The difference in incidence and overall number of fatalities between states, with and without bans, was even greater for LCM-involved high-fatality mass shootings.

The multivariate results are largely consistent with these bivariate associations. When we controlled for 10 independent variables often associated with overall crime rates, as well as state and year effects, states with LCM bans had lower rates of high-fatality mass shootings and fewer high-fatality mass shooting deaths. When we investigated federal and state bans separately in the multiple

TABLE 4—Multivariate Results of the Relationship Between Large Caliber Magazine Bans and High-Fatality Mass Shootings (≥ 6 Victims Shot to Death), 1990–2017 Separate Federal and State Large Caliber Magazine Bans: United States

	LCM-Involved High-Fatality Mass Shootings, b (95% CI)		All High-Fatality Mass Shootings, b (95% CI)	
	Incidents[a]	No. Deaths[b]	Incidents[a]	No. Deaths[b]
Federal LCM ban	−1.434 (−2.622, −0.245)	−3.571 (−7.103, −0.038)	−0.895 (−1.806, 0.016)	−2.570 (−4.902, −0.238)
State LCM bans	−2.603 (−4.895, −0.311)	−8.048 (−15.172, −0.925)	−1.277 (−2.977, 0.422)	−3.082 (−7.227, 1.064)
Population density	−0.012 (−0.055, 0.030)	−0.001 (−0.085, 0.083)	0.001 (−0.003, 0.006)	0.009 (−0.007, 0.024)
% aged 19–24 y	−0.311 (−1.499, 0.878)	−2.589 (−6.057, 0.879)	0.342 (−0.551, 1.236)	−0.531 (−2.759, 1.698)
% aged 25–34 y	−0.812 (−1.532, −0.093)	−2.660 (−4.848, −0.471)	−0.323 (−0.864, 0.217)	−0.848 (−2.236, 0.539)
% Black	−0.229 (−1.101, 0.643)	−0.770 (−3.232, 1.693)	−0.150 (−0.698, 0.398)	−0.154 (−1.321, 1.013)
% with a bachelor's degree or higher	−0.031 (−0.447, 0.509)	−0.479 (−1.577, 0.618)	0.156 (−0.199, 0.511)	0.269 (−0.567, 1.106)
Percentage of households with a firearm (proxy)	−0.055 (−0.210, 0.101)	−0.227 (−0.651, 0.196)	−0.019 (−0.133, 0.094)	−0.107 (−0.399, 0.186)
Median household income	0.000 (0.000, 0.000)	0.000 (0.000, 0.000)	0.000 (0.000, 0.000)	0.000 (0.000, 0.000)
Unemployment rate	−0.061 (−0.284, 0.162)	−0.420 (−1.041, 0.201)	0.046 (−0.132, 0.224)	−0.157 (−0.619, 0.305)
Imprisonment rate (per 100 000 population)	−0.006 (−0.013, 0.000)	−0.012 (−0.026, 0.002)	−0.002 (−0.007, 0.003)	−0.003 (−0.014, 0.007)
Total population	0.000 (0.000, 0.000)	0.000 (0.000, 0.000)	0.000 (0.000, 0.000)	0.000 (0.000, 0.000)
Pseudo R^2	0.30	0.15	0.26	0.11

Note. CI = confidence interval; LCM = large-capacity magazine. There were a total of 1428 observations in state-years (51 jurisdictions—all 50 states plus Washington, DC—over a 28-year period). Mean variance inflation factor = 3.45.

[a]Logit regression.

[b]Negative binomial regression.

regressions, both were significantly associated with the incidence of LCM-involved high-fatality mass shootings as well as the number of victims in LCM-involved attacks. The relationship between these bans, considered separately, and all high-fatality mass shooting incidence and deaths is often not statistically significant, although this may be attributable to lack of statistical power (number of observations) to find a statistically significant effect.

Our analysis provides answers to 4 important questions:

1. How often are LCMs used in high-fatality mass shootings? At minimum, 64% of high-fatality mass shootings perpetrated between 1990 and 2017 involved LCMs.
2. Are more people killed when LCMs are used? Yes, and the difference in our data set is substantial and statistically significant (11.8 vs 7.3). We should add that our results likely underestimate the difference because we have a truncated sample (we only examined incidents with at least 6 victim fatalities), compounded by the fact that the number of homicide incidents fell as the number of victims increased.
3. Do states with LCM bans experience high-fatality mass shootings involving LCMs at a lower rate and a lower fatality count than those states with no such bans in effect? Yes. In fact, the effect is more pronounced for high-fatality mass shootings involving LCMs than for those not involving LCMs.
4. Do states with LCM bans experience high-fatality mass shootings (regardless of whether they involve LCMs) at a lower rate and a lower fatality count than states with no such bans in effect? Yes.

Limitations

Our study had various limitations. First, although we carefully searched for every high-fatality mass shooting, it is possible that we might have missed some. Nevertheless, we suspect that this is unlikely, because it would mean that others who compiled lists have also missed the same ones, for we checked our list against multiple sources.

Second, our definition of a high-fatality mass shooting is a shooting that results in 6 or more fatal victims. A different threshold criterion (e.g., 6 or more people shot; 5 or more victims killed), might lead to somewhat different results. We expect that as the number of victims in a shooting increases, the likelihood that the perpetrator used an LCM also increases. Indeed, of the 13 high-fatality mass shootings with 10 or more fatalities in our data set, 12 (92%) involved an LCM.

Third, although many high-fatality mass shootings tend to be highly publicized, in 13% of the incidents we reviewed, we could not determine whether an LCM was used. As a sensitivity analysis, we assessed the assumptions that all of the unknown cases first did, and then did not, involve LCMs. Neither assumption appreciably changed our main results (not shown).

Fourth, as a general rule, clustering standard errors is most appropriate when there is a large number of treated units. Although during the decade of the federal assault weapons bans all 50 states plus the District of Columbia regulated LCMs, during the remaining time periods under examination, only 8 jurisdictions regulated LCMs. As a result, there is the possibility that the standard errors were underestimated in our analyses.[34]

Fifth, there were only 69 events that met our criterion for a "high-fatality mass shooting." Although 69 is a horrific number of incidents, for statistical purposes, it is a relatively small number and limits the power to detect significant associations. For example, we did not have the statistical power (and thus did not even try) to determine whether

different aspects of the various LCM laws might have differential effects on the incidence of high-fatality mass shootings. Moreover, because of suboptimal statistical power, there is also the possibility that the magnitude of the effects detected was overestimated.[35]

Public Health Implications

LCMs increase the ability to fire large numbers of bullets without having to pause to reload. Any measure that can force a pause in an active shooting—creating opportunities for those in the line of fire to flee, take cover, or physically confront a gunman—offers a possibility of reducing the number of victims in such an attack. To put it in different terms, if the only firearms available were 18th-century muskets, it is doubtful that mass shootings would be the social problem they are today.

The impact of individual state firearm laws is reduced by the fact that guns often move across state lines—occasionally purchased in locales with more permissive laws and taken to states with more restrictive laws. This is partly why efforts aimed at reducing the frequency and lethality of mass shootings must necessarily be multifaceted and multidisciplinary. Legal restrictions on firearms are merely a part of this broader, public health approach. That being said, the theory behind reducing the availability of LCMs to reduce the number of victims in mass shootings makes sense, and our empirical results, consistent with much of the limited literature on mass shootings, suggest that LCM bans have been effective in saving lives. AJPH

CONTRIBUTORS

L. Klarevas and D. Hemenway designed the study, collected the data, and contributed equally to all parts of the study. A. Conner ran the statistical analyses and helped construct the tables that report the results of the multivariate analyses. All authors approved the final article as submitted.

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CONFLICTS OF INTEREST

L. Klarevas has, in the past 2 years, served as an expert to the states of Colorado and California in civil litigation that involved the constitutionality of state restrictions on large-capacity magazines. The authors have no additional conflicts of interest to report.

HUMAN PARTICIPANT PROTECTION

No protocol approval was needed because no human participants were involved in this study.

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EXHIBIT G

Changes in US mass shooting deaths associated with the 1994–2004 federal assault weapons ban: Analysis of open-source data

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BACKGROUND: A federal assault weapons ban has been proposed as a way to reduce mass shootings in the United States. The Federal Assault Weapons Ban of 1994 made the manufacture and civilian use of a defined set of automatic and semiautomatic weapons and large capacity magazines illegal. The ban expired in 2004. The period from 1994 to 2004 serves as a single-arm pre-post observational study to assess the effectiveness of this policy intervention.

METHODS: Mass shooting data for 1981 to 2017 were obtained from three well-documented, referenced, and open-source sets of data, based on media reports. We calculated the yearly rates of mass shooting fatalities as a proportion of total firearm homicide deaths and per US population. We compared the 1994 to 2004 federal ban period to non-ban periods, using simple linear regression models for rates and a Poison model for counts with a year variable to control for trend. The relative effects of the ban period were estimated with odds ratios.

RESULTS: Assault rifles accounted for 430 or 85.8% of the total 501 mass-shooting fatalities reported (95% confidence interval, 82.8–88.9) in 44 mass-shooting incidents. Mass shootings in the United States accounted for an increasing proportion of all firearm-related homicides (coefficient for year, 0.7; $p = 0.0003$), with increment in year alone capturing over a third of the overall variance in the data (adjusted $R^2 = 0.3$). In a linear regression model controlling for yearly trend, the federal ban period was associated with a statistically significant 9 fewer mass shooting related deaths per 10,000 firearm homicides ($p = 0.03$). Mass-shooting fatalities were 70% less likely to occur during the federal ban period (relative rate, 0.30; 95% confidence interval, 0.22–0.39).

CONCLUSION: Mass-shooting related homicides in the United States were reduced during the years of the federal assault weapons ban of 1994 to 2004. (*J Trauma Acute Care Surg.* 2019;86: 11–19. Copyright © 2018 American Association for the Surgery of Trauma.)

LEVEL OF EVIDENCE: Observational, level II/IV.

KEY WORDS: Firearms; mass-shootings; assault weapons; epidemiology.

Increases in firearm-related injuries, particularly mass-shooting related fatalities, in the United States have contributed to a polarizing and sometimes contentious debate over gun ownership and limiting weapons characterized as assault weapons.[1,2] Despite the increasing sense that there is an epidemic of indiscriminate firearm violence in our schools and public spaces, there is a paucity of public health evidence on the topic. Among a number of recommendations, a federal Assault Weapons Ban (AWB) has been proposed as a way to prevent and control mass shootings in the United States. In this article, we assess evidence for the effectiveness of such a ban in preventing or controlling mass-shooting homicides in the United States.

While mass shootings occur in other industrialized nations, the United States is particularly prone to these crimes. In a recent 30-year period, the United States had double the number of mass-shooting incidents than the next 24 industrialized nations combined.[3] Any public perception of recent increases in the number of these events is borne out by analysis of available data.[4] By one measure, there have been more deaths due to mass shootings in the United States in the past 18 years than in the entire 20th century.[5] While there is some debate about the role of mental illness in mass shootings,[6–8] many high-profile recent mass shootings (Aurora, CO; Roseburg, OR; San Bernadino, CA; Newtown, CT; Orlando; Las Vegas; Sutherland Springs, TX) have been characterized by the use of semiautomatic assault rifles,[9] leading some to advocate for restrictions on the manufacture and sale of these weapons.

While survey results indicate that researchers in criminology, law and public health rank an assault weapons ban as one of the most effective measures to prevent mass shootings, and that 67% of the US general population support such a ban,[10] the existing evidence on banning assault weapons is scant and sometimes contradictory. Most evidence is related to the Federal AWB of 1994, which made illegal the manufacture and use by civilians of a defined set of automatic and semiautomatic weapons and large capacity magazines. Formally known as "The Public Safety and Recreational Firearms Use Protection Act", the AWB was part of the broader "Violent Crime Control and Law Enforcement Act of 1994. The ban lasted 10 years, expiring in 2004 when the US Congress declined to renew it.

In a study soon following the implementation of the 1994 ban, researchers reported a 55% decrease in the recovery of assault weapons by the Baltimore City Police in the first 6 months of 1995, indicating a statistically significant 29 fewer such firearms in the population.[11] In a 2009 study based on ICD9 external cause of injury codes for patients younger than 18 years in the United States, 11 states with assault and large-capacity magazine bans, as well as other firearm laws, were compared with 33 states without such restrictions. The incidence of firearm injuries per 1,000 total traumatic injuries was significantly lower in states with restrictive laws, 2.2 compared with 5.9.[12] In contrast, a comprehensive 2001 evaluation of the AWB itself concluded that there was "no evidence of reductions in multiple-victim gun homicides or multiple-gunshot wound victimizations". The authors cautioned their results should be "interpreted cautiously" because of the short period since the ban's inception, and that future assessments were warranted.[13] More recent studies, while not primarily addressing the US Federal AWB have found results generally consistent with its effectiveness in preventing mass-shooting fatalities.[14,15]

We believe sufficient time has passed and enough data have accumulated to treat the period from 1994 to 2004 as a naturalistic pre-post observational comparison period for the association of the AWB with changes in mass-shootings in the United States. Because there is no authoritative source or registry, or even a widely agreed upon definition for these incidents, we obtained data from three open source references and restricted our analyses to only those incidents confirmed by all three sources. We assess evidence for the potential effectiveness of such a ban in preventing and controlling mass-shooting homicides in the United States. We hypothesized that the implementation of the Federal AWB contributed to a reduction in mass shooting deaths as measured by the number and rate of mass shooting fatalities before, during, and after the federal AWB.

METHODS

Mass incident shooting data were obtained from three independent, well-documented and referenced online sources: Mother Jones Magazine, the Los Angeles Times and Stanford

University.[16–18] These sources have each been the basis for a number of previous studies.[19–26] Data from the three online open-source references were combined. Analyses were restricted to incidents reported by all three sources. Entries were further restricted to those for which four or more fatalities (not including the shooter) were reported, which meets the strictest definition of mass shootings as defined by the Federal Bureau of Investigation.[27,28] Yearly homicide data were obtained from the US Centers for Disease Control and Prevention Web-based Injury Statistics Query and Reporting System (WISQARS) an online database of fatal and nonfatal injury.[29] Because 2017 data were not yet available in the WISQARS system, data for firearm-related homicide data for that year were obtained from a separate online source.[30]

A variable was created to indicate the 1994 to 2004 period as the federal ban period. We attempted to identify incidents involving assault weapons. An assault weapon has been defined as semiautomatic rifle that incorporates military-style features such as pistol grips, folding stocks, and high-capacity detachable magazines.[31] In this study, assault weapons were identified using the text search terms "AK," "AR," "MCX," "assault," "assault," or "semiautomatic" in a text field for weapon details. These terms were based on descriptions of the federal assault ban legislative language.[32] The total number of mass shooting fatalities and injuries were aggregated by year and merged with the yearly firearm homicide data.

The rate of mass shooting fatalities per 10,000 firearm homicide deaths was calculated. For the years covered by the data sources, we calculated (1) the total and yearly number of mass-shooting incidents that met the strictest criteria and were confirmed by all three sources, (2) the number of all weapon (assault and nonassault weapons) mass-shooting fatalities, and (3) the case-fatality ratio of all-weapon mass-shooting fatalities per 100 total mass-shooting fatalities and injuries. The yearly case-fatality ratio was plotted with overlying Loess line for trend and standard error limits. We also plotted the yearly rate of mass shooting fatalities per 10,000 firearm-related homicides with an overlying simple linear model with year as the predictor for (1) the total period, and (2) for preban, ban, and postban periods.

We evaluated assumptions of normality and linearity of the data using graphical methods such as density plots and Q-Q normal plots as well as summary statistics. We tested the hypothesis that the federal ban period was associated with a decrease in the number and rate of mass-shooting fatalities in the United States with a multiple linear regression model, with total homicide-based mass-shooting fatality rate as the outcome variable, a dichotomous indicator variable for the federal ban period as the predictor variable, and year as a control variable for trend over time. We calculated the relative risk of mass shooting fatalities during the federal ban period compared to nonban periods by using the "epitab" function of the R "epitools" package. This estimate is based on the ratio of the fatality rate during the ban period divided by the fatality rate during the nonban period. All results are presented with two-sided p values with a significance level of 0.05 and/or 95% confidence intervals (CI). We conducted subgroup analysis with data restricted to incidents in which an assault-type weapon was explicitly noted.

We conducted analyses to test the sensitivity of our results to the choice of denominator with linear regression models controlling for trend with yearly rates based on (1) CDC WISQARS homicide data ending in 2016, (2) extrapolated CDC WISQARS homicide data for 2017, and (3) population denominator-based rates. We tested the robustness of our underlying modeling assumptions with an alternate mixed-effects generalized linear model of yearly mass shooting fatality counts with an observation-level random effect to account for overdispersion.

The study was determined to be exempt as nonidentifiable data. The study data and analytic code are available for download at http://www.injuryepi.org/styled-2/.

RESULTS

The three data sources listed incidents ranging in number from 51 (LA Times) to 335 (Stanford) and in dates from 1966 (Stanford) to 2018 (LA Times). There were a total of 51 reported cases of mass shootings between 1981 and 2017 confirmed by all three sources. Forty-four of these incidents met the strictest criteria for mass shootings (4 or more killed), totaling 501 all-weapon fatalities. In total 1,460 persons were injured or killed over the 37-year period, for a total case-fatality ratio of 34.3% (95% CI, 31.9–36.8). The overall rate of mass shooting fatalities per 10,000 firearm-related homicides was 10.2 (95% CI, 9.4–11.2). There was an increase in the all-weapon yearly number of mass-shooting fatalities in the United States during the study period, (Fig. 1) and evidence of a decrease in case fatality in the post-2010 period (Fig. 2). Incidents in which weapons were characterized as assault rifles accounted for 430 or 85.8% of mass-shooting fatalities (95% CI, 82.8–88.9). Weapons characterized as assault rifles accounted for *all* mass-shooting fatalities in 15 (62.5%) of the 24 (95% CI, 42.6–78.9) years for which a mass-shooting incident was reported, accounting for a total of 230 fatalities in those years.

Between 1981 and 2017, mass shootings in the United States accounted for an increasing proportion of all firearm-related homicides, with increment in year accounting for nearly 32% of the overall variance in the data. During the years in which the AWB was in effect, this slope decreased, with an increase in the slope of yearly mass-shooting homicides in the postban period

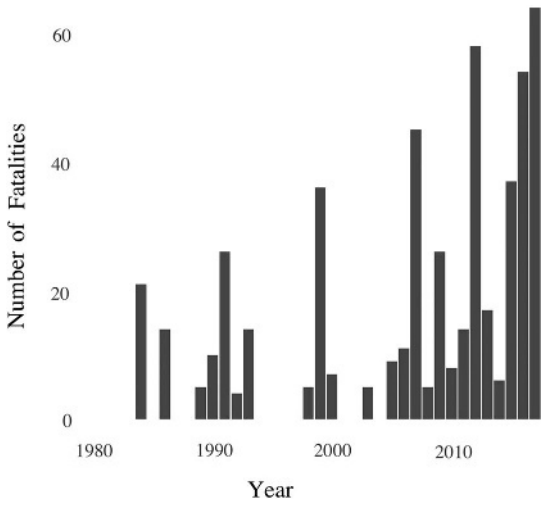

Figure 1. Mass shooting deaths. United States 1981–2017.

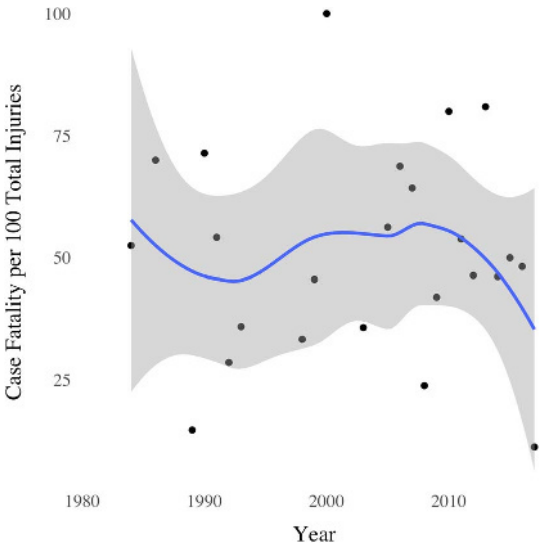

Figure 2. Case fatality per 100 total mass-shooting injuries with loess smoothing line for trend and standard error bounds. United States 1981–2017.

(Fig. 3). A similar pattern was evident in data restricted to those incidents characterized as involving assault weapons (Fig. 4).

In a linear regression model controlling for yearly trend, the federal ban period was associated with a statistically significant 9 fewer mass shooting–related deaths per 10,000 firearm homicides per year (Table 1). The model indicated that year and federal ban period alone accounted for nearly 40% of all the variation in the data (adjusted R^2 = 0.37). A subanalysis

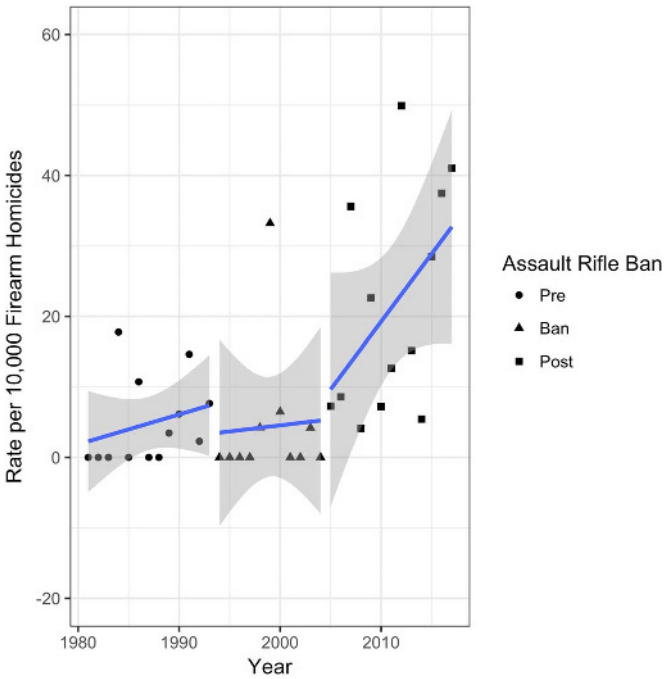

Figure 3. Mass shooting deaths per 10,000 firearm-related homicides with linear trends for preban, ban, and postban periods. United States 1981–2017.

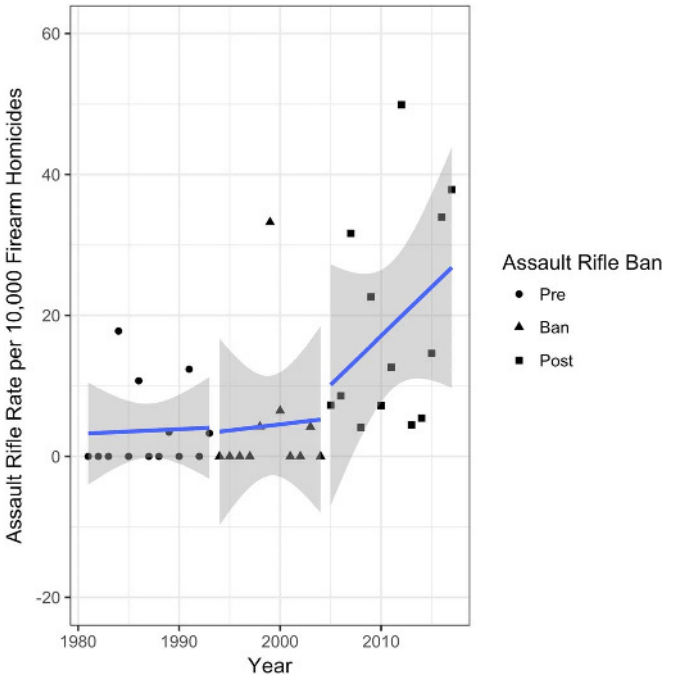

Figure 4. Mass-shooting shooting deaths per 10,000 firearm-related homicides restricted to incidents involving assault weapons with linear trends for preban, ban, and postban periods. United States 1981–2017.

restricted to just those incidents characterized by the use of an assault weapon indicated that seven preventable deaths during the ban period were due to assault weapons alone (Table 2).

The risk of mass shooting fatalities during the federal van period was 53 per 140,515 total firearm homicides compared with 448 per 348,528 during the nonban periods, for a risk ratio of 0.30 (95% CI, 0.22–0.39). The calculated risk ratio for the association of the federal ban period with mass-shooting fatalities as a proportion of all firearm-related homicides was 0.29 (95% CI, 0.22–0.29), indicating that mass shooting fatalities were 70% less likely to occur during the federal ban period.

The results of our sensitivity analyses were consistent with our main analyses for total mass shooting fatalities. In a linear regression analysis controlling for yearly trend and restricted to the period ending in 2016 using just CDC WISQARS homicide data as the denominator, the effect of ban period was associated with a statistically significant eight fewer mass shooting related deaths per 10,000 firearm homicides per year (coefficient for ban period, 8.0; p = 0.05). In a similar model using extrapolated CDC WISQARS homicide data for 2017 instead of Online Gun Violence Archive data as the denominator, the effect of ban

TABLE 1. Linear Regression Effect of 1994–2004 Federal Assault Weapon Ban on Mass-Shooting Deaths per 10,000 Firearm Homicides, United States, 1981–2017

Variable	Estimate	Std. Error	t	p
(Intercept)	−1409.4	333.0	−4.2	0.0002
Year	0.7	0.2	4.3	0.0001
Ban Period	−8.6	3.9	−2.2	0.03

TABLE 2. Linear Regression Effect of 1994–2004 Federal Assault Weapon Ban on Mass-Shooting Deaths Characterized by Use of Assault Weapon per 10,000 Firearm Homicides, United States, 1981–2017

Variable	Estimate	Std. Error	*t*	*p*
(Intercept)	−1219.7	333.9	−3.7	0.0009
Year	0.6	0.2	3.7	0.0008
Ban	−6.7	3.9	−1.7	0.09

period was associated with a statistically significant 9 fewer mass shooting related deaths per 10,000 firearm homicides per year (coefficient for ban period, 8.6; $p = 0.03$). A model based on the total yearly US population as the denominator, the effect of ban period was associated with a statistically significant 0.4 fewer mass shooting related deaths per 10,000,000 population (coefficient for ban period, 0.4; $p = 0.02$).

The results of a mixed-effects generalized linear Poisson model of yearly mass shooting fatality counts with an observation-level random effect to account for overdispersion were very similar whether the offset variable was the number of total firearm deaths or the population size. In either case, the assault weapons ban period was associated with an approximately 85% reduction in mass shooting fatalities (Table 3).

DISCUSSION

Recently, 75% of members of the American College of Surgeons Committee on Trauma endorsed restrictions to "civilian access to assault rifles (magazine fed, semiautomatic, i.e., AR-15),"[33] and 76% of the Board of Governors were in favor of a limit to "… civilian access to ammunition designed for military or law enforcement use (that is, armor piercing, large magazine capacity)."[34] In 2015, the American College of Surgeons joined seven of the largest most prestigious professional health organizations in the United States and the American Bar Association to call for "restricting the manufacture and sale of military-style assault weapons and large-capacity magazines for civilian use."[35] This analysis adds evidence to support these recommendations.

No observational epidemiologic study can answer the question whether the 1994 US federal assault ban was causally related to preventing mass-shooting homicides. However, this study adds to the evidence by narrowly focusing our question on the potential effect of a national assault weapon ban on mass shootings as measured through the lens of case fatality. While the data are amenable to a number of additional analyses, such as stratification by location (e.g. school vs. nonschool) or by characterization of large-capacity magazines versus non large-capacity magazine, we chose to focus only on year of occurrence and total number of fatalities. In this way, we relied on the least subjective aspects of the published reports. We believe our results support the conclusion that the ban period was associated with fewer overall mass-shooting homicides. These results are also consistent with a similar study of the effect of a 1996 ban on assault type weapons in Australia after which mass-shooting fatalities dropped to zero.[36]

While the absolute effects of our regression analyses appears modest (7 to 9 fewer deaths per 10,000 firearm-homicides), it must be interpreted in the context of the overall number of such fatalities, which ranges from none to 60 in any given year in our data. However, if our linear regression estimate of 9 fewer mass shooting–related deaths per 10,000 homicides is correct, an assault weapons ban would have prevented 314 of the 448 or 70% of the mass shooting deaths during the nonban periods under study. Notably, this estimate is roughly consistent with our odds ratio estimate and Poisson model results.

Our results add to the documentation that mass shooting–related homicides are indeed increasing, most rapidly in the postban period, and that these incidents are frequently associated with weapons characterized as assault rifles by the language of the 1994 AWB. We did not find an increase in the case fatality ratio of mass-shooting deaths to mass-shooting injuries. This might at first seem counterintuitive and paradoxical. The destructive effect of these weapons is unequivocal. They are engineered to cause maximum tissue damage rapidly to the greatest number of targets. However, it may be that the use of these kinds of weapons results in indiscriminate injury with additional rounds more likely to injure more people increasing the denominator in a case-fatality ratio. By contrast, the use of nonassault weapons may result in more precise targeting of victims. It is also possible that improvements in trauma care are driving down case fatality.[37] Also, it is worth noting that in absolute terms, there were many more fatalities outside the ban period and that survivable injury comes with its own physical, emotional, and economic costs, which have been estimated at US $32,237 per hospital admission.[38]

Despite US federal funding restrictions on firearm-related research dating to 1996,[39,40] there is a small but growing number of analyses of mass shooting violence in the United States. Many articles have focused on the mental health aspects of these incidents,[41–43] or on social effects like increased firearm acquisition following mass shootings.[44,45] However, fewer studies have taken a strictly public health or clinical approach. Among these, an autopsy-based study of the incidence and severity of mass-shooting casualties concluded the wound patterns differed sufficiently from combat injuries to require new management strategies, indicating there is much to be learned from a systematic epidemiological perspective.[46] Recently, there have been calls to remove such funding restrictions from both academics and elected officials from across the political spectrum.[47,48]

Our choice of data and analytic approach may reasonably be debated. We chose to base our analyses on the yearly rate of mass shooting fatalities per 10,000 overall firearm homicides. This is not a population-based risk estimate, but is in fact a risk as commonly used in the epidemiologic literature which is essentially a probability statement, that is, the number of events

TABLE 3. Exponentiated Coefficients Generalized Linear Poisson Model

	Homicide Offset		Population Offset	
Variable	Estimate	95% CI	Estimate	95% CI
Year	0.6	0.2	3.7	0.0008
Ban	−6.7	3.9	−1.7	0.09

Effect of 1994–2004 federal assault weapon ban on mass-shooting death counts. United States, 1981–20017.

that occurred over the number of times that event could occur. It is the risk of a homicide occurring as a result of a mass shooting. It may be considered a strong assumption to build mass shooting death rates based on the overall firearm homicide rate. The demographics of most homicide victims may differ appreciably from those of mass shooting victims. We selected this approach from among a number of imperfect potential denominators, believing that basing the rates on the number of firearm-homicides partly controls for secular trends in overall homicides and firearm availability. Our sensitivity analyses indicate that our results were robust to most any choice of denominator. We chose linear regression as our primary model because it was straightforward, accessible to most readers, accounted for linear trends in the data, and returned results in the metric in which we were most interested, that is, changes in the rate of fatalities. Our comparative Poisson model results were essentially consistent with the primary model.

These analyses are subject to a number of additional limitations and caveats, primary among which is that there is no authoritative source of data on mass shooting, and any one source may be biased and incomplete. It was for this reason that we chose to combine three independent sources of data, each with its own strengths and weaknesses, and base our analyses only on those numbers that were verified by all three sources. We further restricted our analyses to only the number of fatalities and the year in which the incident occurred, and to the strictest definition of mass shootings as defined by the Federal Bureau of Investigation.[27,28] Even with this approach, the data remain imprecise and subject to differing definitions. We attempted to compensate for this by framing our questions as precisely as possible, following the advice of the scientist and statistician John Tukey to pursue, "… an approximate answer to the right question ...(rather) than the exact answer to the wrong question..."

In this study, we failed to falsify the hypothesis that the AWB was associated with a decrease in mass shooting fatalities in the United States. However, it is important to note that our model did not include important and potentially confounding factors like state-level and local differences in assault weapon laws following the sun downing of the federal AWB. Additional analyses including such variables and using approaches like propensity score matching and regression discontinuity[49] with data further aggregated to state and local levels are necessary to test the strength and consistency of our results.

Federally referenced denominator data were not available for the last year of the study. We chose to use data from the Online Gun Violence Archive to account for firearm homicide in 2017. This resource is a nonpartisan not-for-profit group founded and maintained by a retired computer systems analyst and gun advocate.[50] The alternative would have been to extrapolate from the CDC data, but the 15,593 firearm-related homicides reported by the Online Gun Violence Archive in 2017 was more consistent with the 14,415 reported by CDC in 2016 compared with the 11,599 predicted by an extrapolation and returned more conservative estimates of the increased rate of recent mass shootings. We note there were many years in which the number of mass-shooting fatalities is listed as zero. There were, in fact, fatalities and incidents in those years that could meet a definition of mass shooting, but they were not reported by all three sources, or did not meet the strict criteria we set for this analysis.

An assault weapon ban is not a panacea, nor do our analyses indicate that an assault weapon ban will result in fewer overall firearm-related homicides. It is important to recognize that suicides make up the majority of firearm-related deaths in the United States, accounting for 60.7% of 36,252 deaths from firearms in 2015.[51] However, while this is a critically important issue in its own right, suicides differ fundamentally from mass-shootings, and are unlikely to be affected by an assault weapons ban. Also, compared with the 501 mass-shooting fatalities we counted, there were 489,043 firearm-related homicides in the United States. Public health efforts should be directed at reducing all gun violence and must be multipronged, including targeted initiatives to address mental illness and reducing access to weapons in those with a propensity for violence. However, taken in the context of the increase in mass shootings in the United States, these results support the conclusion that the federal AWB of 1994 to 2004 was effective in reducing mass shooting–related homicides in the United States, and we believe our results support a re-institution of the 1994 federal assault weapons ban as a way to prevent and control mass shooting fatalities in the United States.

DISCLOSURE

The authors have no conflicts of interest to declare.
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DISCUSSION

Ernest E. "Gene" Moore, MD (Denver, Colorado): Thank you, Dr. Rotondo and Dr. Reilly. Can I please have the discussion video. [sounds of a gun shooting]. Well, that is the AR15 rifle. Literally, 30 potential lethal shots delivered within 10 seconds. Is this safe to have in our society?

I congratulate Dr. DiMaggio and his colleagues from NYU for their superb presentation on a very timely issue. The AAST has had a long-term interest in reducing gun violence in the United States, and has recently published our 14-point approach. Access to assault rifles is one of them. At a reductionist level, mass shootings are the net result of (1) a deranged person intending to kill random individuals in a populated area, and (2) the use of an assault rifle. Since we seem to be unable to identify

the active shooter preemptively, we are left with the alternative solution of eliminating the weapon.

The presentation today provides evidence that a federal assault weapon ban can reduce mass shootings. According to our recent national trauma surgeon surveys, three-fourths of us in the audience, including me, would like to believe the analysis; but I think we need to consider some of the potential limitations.

Many of these issues relate to the fact that research support for gun violence control in the United States remains frustratingly suppressed and fundamentally inadequate. The general lack of information, low quality of data, and need to merge data sets from diverse sources – medical, coroner, police, legal, and behavioral – compounded by scarce funding and public controversy, undermine research to inform policy and enlighten the public. The fact that you had to compare three open-access databases to be certain that the reported mass shootings occurred underscores this deficiency.

Furthermore, there is no definition of a mass shooting, although you employed perhaps the most acceptable at the moment – the FBI's definition. Could you explain for us the rationale for this definition?

You present an analysis of 44 events with four or more deaths, including the shooter, from 1981 to 2017 – a 36-year period; whereas, others suggest a much higher incidence, such as Klaveras, who reported 69 shootings of six or more over the past 27 years.

Identifying all known mass shootings per year during a study period would be useful to appreciate the overall trends, as your data somewhat understates the magnitude of mass shootings in the United States.

You employed the Gun Violence Archive to estimate homicides in 2017. Why did you not use this source for mass shootings? The Archive has reported an alarming 261 mass shootings – defined as six or more shot – thus far in 2018. Nonetheless, in the sample you studied, assault rifles accounted for greater than 85 percent of the fatalities, and this is the key issue.

You have evaluated the impact of the federal assault rifle ban by analyzing the rate of mass shootings per 10,000 firearm homicide deaths per year to adjust for confounders. This would assume that the factors influencing mass shootings are the same as those for homicides, which seems very unlikely. You have idicated that you analyzed mass-shooting fatalities per population per year; perhaps you could elaborate more about this analysis.

Another confounder as acknowledged in the presentation is the impact of individual state limitations on magazine capacity. The first state to enforce these limitations was New Jersey in 1990, and now at least eight states and Washington, D.C., have these restrictions in effect. How can we distinguish the effects of this policy? And could this be a potential bridge to ultimately reestablish a national assault rifle ban?

You have also calculated the case fatality of all weapons in mass shootings per 100 total shootings, finding a decrease since 2010. While you conjecture this may be due to indiscriminate injury from assault rifles or possibly attributed to better trauma care, I am uncertain how this is relevant to the issue of banning assault rifles. The Las Vegas shooting is a cogent example of how these data may be misleading.

Finally, there is the issue of so-called falsification that could be addressed by examining other causes of trauma mortality during this time period.

In sum, this study adds to overwhelming evidence that assault rifles are an essential component in the dramatic escalation of mass shootings in the United States. While the scientific data to support a federal ban on civilian assault rifles is imperfect due to inadequate research support, I submit collectively the existing information argues strongly for enactment of this measure, and compliment the authors for their timely contribution.

Sheldon H. Teperman, MD (Bronx, New York): Dr. DiMaggio, your home institution, Bellevue, plays a seminal role in the trauma center safety of our nation.

In fact, right now, your trauma medical director is not present with us, but he is at home on guard for the U.N. General Assembly. But in New York, we don't see long-gun injuries. New York has the Safe Act, and there is an assault weapons ban. So why is it so important to America's trauma center – Bellevue – that we see a national ban on assault rifles?

Charles E. Lucas, MD (Detroit, Michigan): Thank you for your nice presentation. How many of these incidents occurred in an inner-city environment, where most of the victims that we treat have received multiple wounds which were purposely inflicted in order to compete competitively for the distribution of heroin and other drugs? Also, how many of the assailants were African-American?

Martin A. Croce, MD (Memphis, Tennessee): Thank you. I want to commend the authors for an excellent study, and really, not so much to ask any questions but I rise to put out a plea to the membership that this issue is a public health problem.

This is not a right versus left problem, this is not a Second Amendment problem. This is a public health problem.

And to quote Wayne Meredith at one of the recent Board meetings, "Our primary goal is to reduce the number of bullet holes in people." So I implore the Membership to correct this dearth of research that is going on about gun violence in order to promote a public health approach, so that we can reduce the number of bullet holes in people.

Deborah A. Kuhls, MD (Las Vegas, Nevada): And to carry on that thought, I would urge the authors to incorporate the public health data from the CDC when it is available, because part of the methodological issues for this paper is that one data set was used for a certain period of time.

But for the last year, the CDC data was not used because it was not available, so I would urge you to not only do that analysis, but I would also urge the Journal of Trauma to consider an update to that article when that is available. Thank you.

Charles DiMaggio, MPH, PhD (New York, New York): Thank you very much for all these comments and questions.

Dr. Moore, so with regard to your observation about the reductionist approach to looking at this particular issue, that puts me in the mind very much of the traditional epidemiologic triad of agent, host, and environment, and if you break one link in that connection, you can break the transmission. In this case, we could call assault weapons one link, whether it's agent or host, we can decide.

With regards to the rationale for the definition, I think it's reflective of the lack of research in this area.

A case definition is an essential and critical first step in any epidemiologic investigation, and you can see that we are barely there. I think the FBI definition makes sense, I think it's the oldest one, I think it's informed by expert consensus.

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And I think all the other definitions are based in some form on that, which is why we chose it. And I would urge that if we are going to be doing this research going forward, probably it would be best if we all had the consensus that that be the definition.

Why did we not use the Gun Violence Archive to estimate some of these results, and why are our numbers so much smaller than some of the other numbers? I have to agree, our numbers are very much an under-count.

We restricted our analysis to these three databases. And so the limiting factor was the one database. And I can tell you it was the LA Times – they had the fewest number. And if it wasn't in the LA Times, then the other databases didn't contribute to this data set.

We felt that the important aspect of this particular study was to demonstrate the relative effects, merits or associations with the assault weapon ban as opposed to documenting the absolute numbers.

So the Gun Archive, for example, defines mass shootings as four or more deaths or injuries. That really raises the number of deaths that can be included. We didn't include it, but I think going forward we absolutely should.

With regard to the analysis using population denominators, we agree, actually, that gun homicides are an imperfect denominator. We also felt that population was an imperfect denominator. And again, as we keep on circling around, it has to do with the data in this case.

We did feel that gun homicides captured something about gun availability and criminality in the United States, although homicides themselves differ very much from these mass shooting fatalities.

We do note that our population-based results essentially mirrored the gun homicide results, indicating that, at least for the relative effects and benefits of the assault weapons ban, the results are robust and invariant to the choice of denominator in this case.

Can we distinguish local effects, and could this possibly be a bridge to reestablishing an assault rifle ban? The short answer is yes and yes. We can distinguish local effects.

We took a very broad approach on this particular study as a first pass on the data. But, there are data sources (and even within the data sources we used) where you can tease out local, municipal and state policies.

Also, we can link our data to other sources that have those variables. There are statistical methods available that will not only account for those variables, but also allow us to measure or estimate in some way the contribution of local or regional variation in these policies to the overall effectiveness.

The issue of the case fatality rate is very interesting and challenging. I want to note that there was a paper in JAMA on September 11th – just a couple of weeks ago – looking at mass shooter fatalities, that came essentially to the same conclusion – that there has been this recent decrease.

In our paper, in this write-up, we look at three potential explanations, and one of them is, first of all, it's just a matter of denominator. These are indiscriminate weapons.

You have someone shooting at a large group of people, and there are going to be more injuries and more casualties, and it just inflates the denominator in this case.

The second thing is, the obverse of that, is single-fire weapons, guns, are very personal weapons. They're usually characterized by someone who knows who they want to kill. And finally, we feel that perhaps there may be some improvement by the folks in this room in treating these.

I'm going to close at this point, given the time constraints.

EXHIBIT H

Original Paper

Impact of Firearm Surveillance on Gun Control Policy: Regression Discontinuity Analysis

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Abstract

Background: Public mass shootings are a significant public health problem that require ongoing systematic surveillance to test and inform policies that combat gun injuries. Although there is widespread agreement that something needs to be done to stop public mass shootings, opinions on exactly which policies that entails vary, such as the prohibition of assault weapons and large-capacity magazines.

Objective: The aim of this study was to determine if the Federal Assault Weapons Ban (FAWB) (1994-2004) reduced the number of public mass shootings while it was in place.

Methods: We extracted public mass shooting surveillance data from the Violence Project that matched our inclusion criteria of 4 or more fatalities in a public space during a single event. We performed regression discontinuity analysis, taking advantage of the imposition of the FAWB, which included a prohibition on large-capacity magazines in addition to assault weapons. We estimated a regression model of the 5-year moving average number of public mass shootings per year for the period of 1966 to 2019 controlling for population growth and homicides in general, introduced regression discontinuities in the intercept and a time trend for years coincident with the federal legislation (ie, 1994-2004), and also allowed for a differential effect of the homicide rate during this period. We introduced a second set of trend and intercept discontinuities for post-FAWB years to capture the effects of termination of the policy. We used the regression results to predict what would have happened from 1995 to 2019 had there been no FAWB and also to project what would have happened from 2005 onward had it remained in place.

Results: The FAWB resulted in a significant decrease in public mass shootings, number of gun deaths, and number of gun injuries. We estimate that the FAWB prevented 11 public mass shootings during the decade the ban was in place. A continuation of the FAWB would have prevented 30 public mass shootings that killed 339 people and injured an additional 1139 people.

Conclusions: This study demonstrates the utility of public health surveillance on gun violence. Surveillance informs policy on whether a ban on assault weapons and large-capacity magazines reduces public mass shootings. As society searches for effective policies to prevent the next mass shooting, we must consider the overwhelming evidence that bans on assault weapons and/or large-capacity magazines work.

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KEYWORDS

firearm surveillance; assault weapons ban; large-capacity magazines; guns control policy; mass shootings; regression lines of discontinuity

Introduction

Background

Approximately 44,000 people are killed and an additional 100,000 people are injured by a gun each year in the United States [1,2]. Mass shooting fatalities, as a particular type of gun injury event, account for <1% of all gun deaths [3] and have largely been ignored until recently [4,5]; yet, mass shooting events occur multiple times per year [6]. This information is based on insights from firearm surveillance performed by a variety of researchers, and state and federal agencies on incidence, prevalence, risk factors, injuries, deaths, and precipitating events, similar to the surveillance of infectious diseases such as COVID-19 [7-21]. Teutch and Thacker [22] defined public health surveillance as

> *the ongoing systematic collection, analysis, and interpretation of health data, essential to the planning, implementation, and evaluation of public health practice, closely integrated to the dissemination of these data to those who need to know and linked to prevention and control.*

Not only do surveillance systems generate hypotheses to test but they also provide the data to test them.

The Federal Assault Weapons Ban (FAWB, also known as the Public Safety and Recreational Firearms Use Protection Act) included a ban on the manufacture for civilian use or sale of certain semiautomatic firearms defined as assault weapons as well as certain large-capacity magazines (LCMs). The Act was in effect for 10 years from 1994 until it sunsetted in 2004. Semiautomatic weapons (rapid fire) and assault weapons (second grip plus other features) are distinct; however, the two are often incorrectly conflated as similar [23-26]. Semiautomatic weapons are defined as weapons that automatically load another cartridge into a chamber, preparing the weapon for firing, but requiring the shooter to manually release and press the trigger for each round [23-26]. By contrast, automatic weapons are similarly self-loading, but allow for a shooter to hold the trigger for continuous fire [27]. Furthermore, the FAWB also prohibited certain ammunition magazines that were defined as "large-capacity" cartridges [28] containing more than 10 bullets [29]. These LCMs can feed ammunition to semiautomatic weapons that do not meet the criteria of being considered assault weapons. Furthermore, LCMs are considered one of the most important features of the FAWB as research has found a relationship between bans on LCMs and casualty counts at the state level [30-34]. The 10-year federal ban was signed into law by President Clinton on September 13, 1994 [28].

Firearm surveillance data have been used to test potential policy responses to prevent mass shootings, including the FAWB [32,34-39], Extreme Risk Protection Orders (also known as red flag laws) [40-45], and federal and state LCM bans [31,32,46]. In particular, it seems likely that the FAWB and LCM bans have potential to affect mass shootings because they regulate weapons and ammunition formats that are designed to enable rapid discharge, which is a key feature in mass shooting incidents [24,47]. Other types of gun deaths may not be responsive to the FAWB or LCM bans. As an example, Extreme Risk Protection Orders or "Red Flag" orders [43,48], which temporarily prohibit at-risk individuals from owning or purchasing firearms, may be effective for preventing firearm suicides or domestic violence homicides [49] but less effective for public mass shooters [50,51]. The prohibition of LCMs may have no impact on firearm suicide because suicide decedents only require one bullet to kill themselves [52].

Several studies during and after the FAWB attempted to determine if gun policy that restricts the production and sale of assault weapons and LCMs decreased gun deaths [53,54]. These initial studies make meaningful contributions to the literature because they describe what constitutes assault weapons, magazine capacity, ballistics, and loopholes in the FAWB legislation [3,53-57]. However, these studies have found little to no evidence that these policies have had any overall effect on firearm homicides, gun lethality, or overall crime [58-61]. Since deaths from public mass shootings comprise less than 1% of all homicides based on our definition, testing whether or not the FAWB/LCM ban has an impact on homicide would wash out the effect. Since the FAWB/LCM ban may be effective at specific types of gun deaths, sampling must be limited to specific types of shooters over overall gun deaths or tests for lethality [62,63]. Finally, the variation in research findings is related to differences in research design, sampling frame, and case definition of a public mass shooting [3,53-56,64,65].

Our study differs from other studies that evaluated the efficacy of the FAWB because we used economic methods and a different outcome variable. Specifically, we focused on whether the FAWB resulted in fewer public mass shooting "events," whereas other studies evaluated the number of gun injuries and deaths that occurred during the course of a mass shooting.

Objective

The aim of this study was to test whether curbing *access to certain types of guns and magazines* will decrease mass shooting *events*. We sought to empirically answer if there was a relationship between the FAWB and a reduction in mass shooting events.

Methods

Data Source

We created a firearm surveillance system based on the National Institute of Justice–funded Violence Project dataset, which culled mass shooting events from 1966 to 2019 [6]. Consistent with earlier studies, we rely on the original Federal Bureau of Investigation (FBI) definition of a massacre, specifically where 4 or more people are killed within a single timeframe. We differentiate our mass shootings from others in that our inclusion criteria require the shootings to have occurred in a public setting.

We adapted this definition to only include massacres that involved gun deaths of 4 or more victims to isolate a particular type of mass shooter [66]. Many firearm surveillance systems that include mass shootings use a lower threshold of persons shot and many do not include deaths. An FBI report on active shooters in mass shooting events identified planning and preparation behaviors that are central to prevention [67]. This more narrow definition isolates premeditation, whereas broader definitions may include shooters that are more reactive [68]. Our case definition does not include family annihilators or felony killers because *familicides are defined by the victim-offender relationship, public massacres are defined by location, and felony killings are distinguished by motive* [69]. This differentiation is consistent with other mass shooting studies [70-72].

We examined the annual number of public mass shootings occurring between 1966 and 2019 that resulted in 4 or more fatalities. The hypothesis was that the FAWB reduced the number of public mass shootings per year during the period of the ban. We used regression discontinuity analysis to test the hypothesis. Regression discontinuity analysis is a standard economist tool used in policy analysis taking advantage of quasi-experimental designs [65,73].

Analyses

Regression discontinuity analysis allows for discontinuities or shifts in both the intercept and the slope of the trend line at both the onset and sunset of the FAWB. That is, we introduced intercept shift parameters in 1995 and 2005, and trend shift parameters for the periods 1995-2004 and 2005-2019. A statistically significant shift in a parameter indicates a discontinuity (ie, a finding that the FAWB had a statistically significant effect on the number of public mass shootings). We tested for statistical significance of the intercept and trend shift parameters both independently and jointly. All statistical inference was based on a significance level set at .05. We used the Huber-White robust residuals, which attenuate problems of autocorrelation, heteroscedasticity, and some types of model misspecification [74].

We then used the estimated model for two types of counterfactual analysis. First, we used the model to predict the number of public mass shootings that would have occurred had the FAWB not been in place. The difference between this counterfactual prediction and the modeled number of incidents with the FAWB in place provided an estimate of the number of public mass shootings that the FAWB prevented.

Second, we projected forward the number of public mass shootings that would have occurred had the FAWB been permanent (ie, continued from 2004 through to the end of the sample period). We note that in some sense, this is an “out of sample” exercise because even though the sample extends to 2019, the FAWB ended in 2004; thus, this exercise would not pick up events in the past 15 years that would have augmented or compromised the effects of the FAWB. The difference between the modeled number of public mass shootings and the projected counterfactual number of public mass shootings could provide an estimate of the number of public mass shootings that the FAWB prevented.

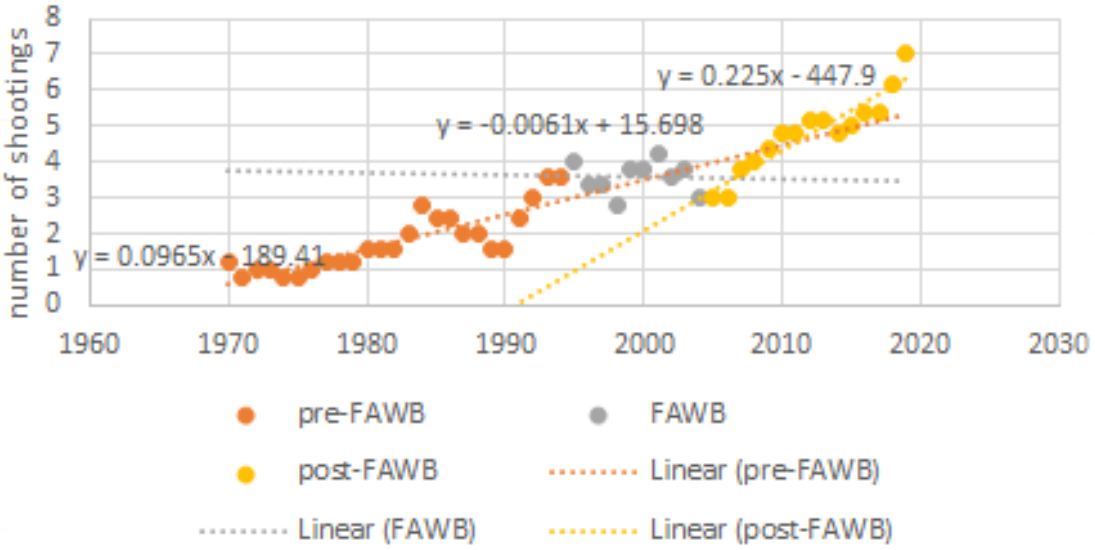
We performed a regression of the 5-year moving average of public mass shootings on the US population in millions, the homicide rate, and discontinuity variables to capture both the effects of the FAWB and its discontinuation. We did not introduce a trend line for the entire sample period because it is highly collinear with the population variable. For the period of the FAWB’s implementation, we originally introduced an intercept shift, time trend, and shift in the homicide rate; for the post-FAWB period, we introduced an intercept shift and a time trend. Due to collinearity, we retained only the trend shift in the final model for the FAWB period; for the post-FAWB period, we retained both the intercept and the trend shift.

Results

We identified a total of 170 public mass shooting events, the primary outcome variable, with 4 or more fatalities between 1966 and 2019. The 5-year cumulative number of public mass shootings is shown in Figure 1, providing a visualization of the impacts of the FAWB on the number of shootings. The first mass shooting occurred in 1966; hence, the first data point for the cumulative number of shootings over the previous 5 years occurs in 1970. For 1966 and 1967, the cumulative number of public mass shootings was 3. This number then increased to 12 in 1993 and declined to 3 in 2004. After 2004, the cumulative number of public mass shootings increased to 81 in 2019. The last year of the ban, 2004, experienced the fewest public mass shootings through 2019.

The regression results showed excellent explanatory power (R^2=0.94). The coefficient on population was positive and statistically significant (.044, P<.001). This coefficient means that for every increase in population of 1 million people, there are an additional .044 public mass shooting events per year. The coefficient on the homicide rate was negative and statistically significant (–.249, P=.01). The coefficient on the time trend for the FAWB period captures the effect of the FAWB; this coefficient was negative and statistically significant (–.187, P=.001). Using prediction models in combination with regression slopes, we estimate that 11 public mass shootings were avoided due to the FAWB. The intercept discontinuity for 2005-2019 was negative and statistically significant (–2.232, P=.001), and the trend coefficient was positive and statistically significant (.081, P=.001).

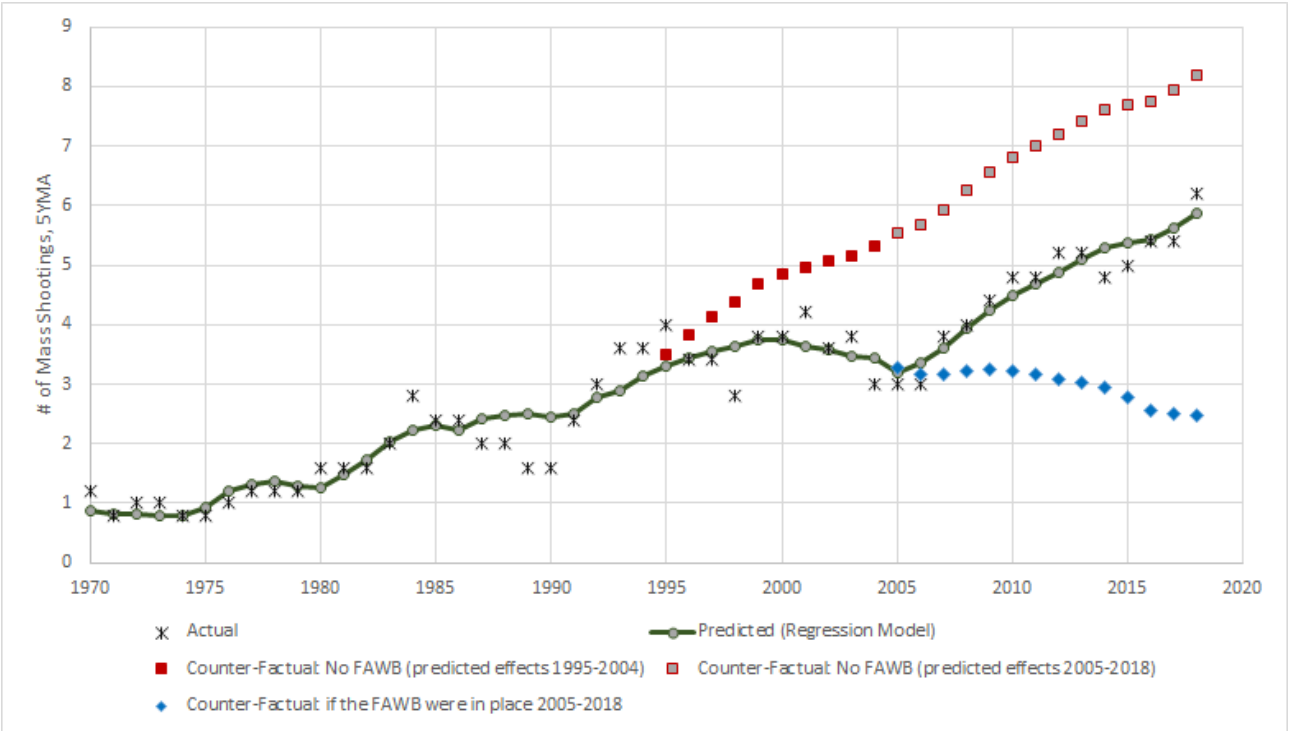
Figure 1. Public mass shooting trend line using five year moving averages (1966-2019).



These results are graphed in Figure 2 in which the black stars represent the actual data and the green line represents the predicted numbers of public mass shootings from the regression discontinuity model. A bending of the trend during the FAWB period to become downward sloping at the end of the period is apparent, as is the return of the upward trajectory upon expiration of the FAWB. The red squares represent the projected numbers of public mass shootings during the FAWB period had there been no FAWB. The difference between the red squares and the green lines represents the predicted number of public mass shootings averted by the FAWB. The model predicts that 11 public mass shootings were averted over the period of 1995-2004.

The blue diamonds represent the projected effects of a continuation of the FAWB through 2019 based on the observed trend from 1995 to 2004. This projection indicates that 30 public mass shootings would have been prevented from 2005 to 2019 had the FAWB been left in place.

Figure 2. Regression lines from discontinuity analysis of the federal assault weapons ban (1994-2004).



Discussion

Principal Findings

In total, 1225 people were killed in a mass shooting over the past 53 years with more than half occurring in the last decade, a function of increases in mass shootings and weapon lethality [62,63,75]. Public mass shooting fatalities and injuries far outpace population growth [75]. Between 1966 and 2019, the US population increased by 67% [76], whereas public mass shooting deaths increased by over 5-fold. The rise in public mass shootings throughout the sample period is in fact partially a function of population growth and homicide rate, along with the effects of the FAWB and its removal. An increase in the US population of 1 million people was associated with an increase of .040 (P<.005) public mass shootings per year. During the post-FAWB period, the increase in population from approximately 300 million in 2005 to 330 million in 2019 should be associated with an increase of 1.2 public mass shootings per year, compared to the actual increase of 4 public mass shootings per year in the data (5-year moving average). After controlling for population growth and homicide rate, a positive and statistically significant coefficient (.081, P=.001) on the 2005-2018 trend was seen. This further indicates a separate, nonpopulation trend of increasing violence operating during the post-FAWB period. The negative coefficient on the homicide rate invalidates the hypothesis that decreases in the numbers of public mass shootings are simply reflections of an overall decreasing homicide rate. The negative intercept discontinuity is consistent with an effect of the FAWB that persists somewhat beyond the immediate end of the ban. The positive trend coefficient is consistent with the hypothesis that the FAWB was associated with a decrease in the number of public mass shootings, as the expiration of the FAWB was associated with a shift from a downward trend to an upward trend in the number of public mass shootings per year.

The most striking finding from this study is that there was a reduction in the number of public mass shooting events while the FAWB was in place. Using prediction models in combination with regression slopes, we estimate that 11 public mass shootings were avoided due to the FAWB. By projecting what would have happened if the FAWB remained in place, we found that there would have been significantly fewer public mass shootings if the FAWB had remained in place to 2019. Remarkably, although it is intuitive that the removal of assault weapons and magazine clips will reduce the lethality of a mass shooting, we observed an inverse relationship between weapons/ammunition and mass shooting events, meaning that mass shooters may be less likely to perpetrate a mass shooting without rapid fire military-style weapons. This is an independent effect, which indirectly leads to fewer injuries and deaths. DiMaggio et al [64] also found evidence of a decrease in public mass shootings during the ban; however, their study period was shorter and was restricted to 51 public mass shootings. Unlike our study, they implicitly modeled public mass shootings as a random instance of general gun homicides that had a high death count [64]. In contrast, our findings suggest that public mass shootings are a unique type of premeditated gun violence. We found that prior to enactment of the FAWB, the rate of public mass shootings was increasing. During enactment of the FAWB, there was a downward trend of mass shooting events. After the FAWB was lifted, public mass shootings increased dramatically. Firearm homicides in general follow no such patterns.

This effect was not found in the work of Koper, Roth, and colleagues [53-55]; however, their inclusion of all gun homicides masks the ban's effect on mass shootings. Even though Peterson and Densley's [77] work focused on perpetrator histories and not the FAWB, their findings that ease of gun access is characteristic of public mass shooters further supports our study. We restricted the inclusion criteria to public mass shootings to specifically test the effectiveness of the FAWB on public mass shooting events.

Regardless of the FAWB, bringing a semiautomatic rifle with high magazine capacity to a massacre significantly increases the number of fatalities and injuries. The increase in deaths is a function of rapid fire and increased ballistic energy. The increase in injuries is also a function of rapid fire and high-capacity magazines, enabling the shooter to shoot more people in crowded venues quickly before the crowd can disperse or hide. When controlling for the FAWB, the use of assault rifles decreased by half during implementation of the ban and tripled after the ban was lifted. This is a particularly important finding given that the FAWB had loopholes and that overall violent crime is decreasing [78]. First, all people with an assault weapon prior to the FAWB were allowed to retain their semiautomatic weapons [54,64]. Second, without a buyback program, semiautomatic weapons remained in the community [54,64]. Third, the ban did not target some military assault-like weapons [54,64]. Finally, a major loophole found in gun control legislation is that buyers can bypass background checks by purchasing their weapons and ammunition from gun shows, through illegal purchasing, or legally purchasing their guns and ammunition from another gun owner [57,63,79-87]. Even with these loopholes and issues, there was still a significant reduction in public mass shootings during the FAWB. These loopholes indicate that most people who purchase assault weapons do not become mass shooters; however, mass shooters require assault weapons and LCMs to carry out a mass shooting. Ban effectiveness might have improved if all assault weapons were included in the FAWB.

Some recent studies have specifically analyzed the effects of LCM bans on the incidence of public mass shootings. In a review of state legislation, Webster et al [88] found that bans of LCMs were associated with a significant reduction in the incidence of fatal public mass shootings. This study shows that the FAWB, which included a ban on LCMs, was associated with fewer fatalities and injuries during mass shootings in addition to fewer public mass shooting events. Koper et al [27] previously reported that 19% of public mass shootings resulting in 4 or more fatalities included the use of LCMs, while only 10% involved an assault weapon. Klarevas et al [29] found a similar pattern in shootings of 6 or more people, in which 67% of shooters utilized LCMs, whereas only 26% utilized an assault weapon. Because our study only looked at effects of the FAWB, which included an LCM ban, we were only able to determine the combined effects of limiting assault weapons and LCMs. To be clear, the reduction in the number of public mass

shootings, and resulting fatalities and injuries, may be a function of the ban on assault weapons, assault weapons plus LCMs, or only LCMs. We cannot separate out their independent effects at the national level.

Unlike our study, Webster et al [88] did not evaluate the incidence of assault weapons used in public mass shootings. Rather, they focused on fatalities from public mass shootings vs public mass shooting events. Although Webster et al [88] utilized the FBI Supplemental Homicide Report as their dataset, which is a voluntary reporting measurement system prone to errors in reporting, their findings are applicable to our analysis.

Limitations

Although we found statistically significant decreases during the FAWB, we cannot isolate aspects of the policy that are attributed to the decline. Most notably, the FAWB also included LCMs during the ban. It may be that the type of gun and/or the type of magazine resulted in a decline. Indeed, assault weapons and LCMs provide the means to carry out a mass shooting; however, there are likely other factors beyond this study that partially explain the radical increase in public mass shootings in the post-FAWB period. For example, the FAWB was in place from 1994 to 2004, which is the same time period that the US population largely adopted the internet, along with associated social communication software and websites. This may have resulted in better tracking of public mass shootings or increased media coverage. Because our study specifically targeted the federal legislation, we omitted state-level gun policies such as state-level prohibitions on certain types of guns, LCMs, or more lethal types of bullets. It is likely that the internet serves as a contagion and as a guide to potential mass shooters, allowing them to access weapons and multiple stories about other mass shooters [62,67,89,90].

Conclusions

In summary, public mass shootings are a unique and specific type of homicide by a gun. We found evidence that public mass shootings are qualitatively different from general homicides because after the FAWB expired, mass shooting events increased while general homicides decreased. The increase in public mass shootings was more dramatic in the final 10 years of the study period following the end of the FAWB. We suspect that these outcomes may be improved by removing existing semiautomatic weapons with large bullet capacity by creating a buyback program for all rapid-firing weapons. Moreover, the legislation would be strengthened if it closed loopholes that allow gun buyers to get around the background check legislation and other purchase prohibitions by exempting gun shows and internet or person-to-person purchases, which were exempted from the FAWB and LCM ban [87].

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Conflicts of Interest

None declared.

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Abbreviations

FAWB: Federal Assault Weapons Ban
FBI: Federal Bureau of Investigation
LCM: large-capacity magazine

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EXHIBIT I

VIEWPOINT

Regulating Assault Weapons and Large-Capacity Magazines for Ammunition

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Viewpoint pages 1177, 1179, 1181, 1183, 1185, 1187, 1189, 1193, 1195, and 1197 and **Editorial** page 1201

Supplemental content

Mass public shootings in the US account for a small fraction of all firearm-related homicides, but have an outsized role in stoking the public's concern with firearm violence. The vivid instances of attacks on people in churches, schools, and offices and at other public gathering places do vastly disproportionate damage to peace of mind by creating a sense of peril in places that should feel safe. These attacks have been increasing in frequency and deadliness in recent years. As reducing this particular type of firearm violence becomes more urgent, the case for a variety of prevention measures becomes even stronger.

This Viewpoint focuses on a measure that is highly specific to the gun violence problem—stringent regulation of assault weapons and large-capacity magazines (LCMs) for ammunition. Federal law banned the introduction of new LCMs and military-style semiautomatic firearms between 1994 and 2004, but that regulation ended in 2004 and Congress did not renew it. Now, years later, the nation is experiencing the dire effects of opening the door to the manufacture and import of these weapons; it is time to close that door.

History and Current Status of Bans

The history of federal bans on weapons of mass destruction goes back to the 1934 National Firearms Act. Among other provisions, the Act required submachine guns and other firearms capable of fully automatic fire (ie, firing several shots with a single pull of the trigger) to be registered with the federal government.[1] All transactions involving such weapons were taxed at $200, a high confiscatory amount at the time. The registration and tax requirement remained in place, although inflation has substantially undercut the force of the transfer fee. The Act was expanded by Congress in 1986 to end the sale of new fully automatic weapons. There is every reason to believe that these restrictions have been effective. Even though the Thompson submachine gun was a notorious gangster weapon in the 1920s, fully automatic weapons of any kind are rarely used in crime in modern times or in mass public shootings.[1]

> Current estimates suggest that approximately 20 million assault weapons are owned by private individuals in the US, with millions of new assault weapons manufactured and imported each year.

The 1994 Federal Assault Weapons Ban extended the regulation of military-style weapons to include some semiautomatic firearms. These weapons fire 1 round of ammunition for each pull of the trigger, and are capable of firing at a rate of roughly 1 per second. The 1994 Assault Weapons Ban ended the legal manufacture and import of specified firearms, as well as ammunition-feeding devices (magazines) that held more than 10 rounds of ammunition. At the time, most prohibited assault weapons were equipped with detachable magazines that held 30 rounds and could accept magazines that could hold as many as 50 or 100 rounds, thus making it possible to fire dozens of rounds without pausing to reload.[2]

The 1994 federal ban on new assault weapons had gaping loopholes. First, the federal ban did not restrict possession or transactions of existing assault weapons and LCMs. Second, manufacturers found ways to slightly modify the design of some of the banned weapons so that they met the letter of the law while preserving the military appearance and the possibility of accepting LCMs and firing high-powered ammunition quickly. Still, there is evidence that the ban had some salutary effect on mass public shootings.

The LCM ban, also in effect during 1994 to 2004, was not subject to the redesign problem because it provided a bright line that was difficult for manufacturers to overcome. There were, however, an estimated 25 million LCMs in circulation when the ban was enacted, and those remained in circulation, but with no new additions.[2] It was not just assault weapons (as defined) that were designed to use LCMs, but a variety of other semiautomatic firearms as well, so the LCM ban had much broader scope.

When the law expired in 2004, manufacturing and importations of LCMs and previously banned weapons resumed, and a surge of sales followed. Current estimates suggest that approximately 20 million assault weapons are owned by private individuals in the US, with millions of new assault weapons manufactured and imported each year.[3] The industry initially advertised these weapons as "assault rifles," and continues to promote them with military allusions but has now rebranded this type of weapon as the "modern sporting rifle."

Seven states have some version of a ban or stringent restrictions on assault weapons: California, Connecticut, Hawaii, Maryland, Massachusetts, New Jersey, and New York, as well as the District of Columbia.[4] These laws are being challenged in the courts as a violation of the Second Amendment, but have survived these challenges to date.

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Evidence of Potential Effectiveness of a National Ban

A review conducted by the RAND Corporation concluded that the handful of published studies on the effect of the ban on mass public shootings was "inconclusive" due in part to flaws in the analysis used by the 3 studies with positive findings.[4] But it is unlikely the surge in mass public shootings that involved assault weapons and LCMs that occurred after the ban would have happened if the ban had remained in place. The logic is straightforward. The sales of these weapons, which had declined during the ban, expanded greatly following its repeal, making them more widely available to everyone including would-be mass murderers.

To document recent trends in such mass public shootings requires a precise definition. One common definition for mass public shootings has several elements,[5,6] including: (1) a minimum of 4 homicides; (2) a public location; and (3) circumstance not attributable to robbery, other felonious activity, or commonplace conflict in families or among acquaintances. A comprehensive compilation of such events is the Violence Project's database of mass shootings in the US,[7] which includes the number of people killed and injured in each event and the type of weapon or weapons used.

Information from this database indicates that in the years following when the law expired in 2004, the number of mass shooting incidents greatly increased and the number of fatalities increased even more. During the period from 2015 to 2019, the number of incidents reached 33 (or 6.6 per year), which was almost twice the number during the decade the Federal Assault Weapons Ban was in effect (eFigure and eTable in the Supplement). The number of fatalities from shootings that involved banned weapons decreased during the second half of the ban (2000-2004) and then surged during subsequent periods, reaching a total of 271 during 2015 to 2019. It was during that 5-year interval from 2015 to 2019 that 5 of the top-10 deadliest mass public shootings in US history occurred, and all were committed with assault weapons.[8] The number of fatalities resulting from mass public shootings with other weapons has remained relatively flat.

The Australian Ban on Rapid-Fire Weapons

The Australian experience has factored into the debate over reinstituting the assault weapons ban in the US. In Australia, the impetus for banning semiautomatic weapons was a 1996 mass public shooting in Port Arthur, Tasmania, in which a young man killed 35 people with a semiautomatic rifle. Swift action by the federal and state legislatures produced legislation that banned not only manufacture and import, but private possession of semiautomatic rifles. To ease the transition, a series of firearm buybacks were instituted, and 1 million weapons were ultimately relinquished, estimated to be one-third of all privately owned guns. Australia had 11 mass shootings during the decade prior to the ban,[9] and 1 since then (a family killing in 2018 that would not count as a mass public shooting by the US definition).

The Australian experience is illustrative as a proof of concept for other countries, including the US. Of note, the ban covered all semiautomatic rifles, not just those with the specific features suggestive of use in warfare as opposed to hunting. The ban on possession of existing guns rather than only on the introduction of new guns greatly accelerated its apparent effectiveness.

Potential Next Steps

On July 29, 2022, the US House of Representatives passed the Assault Weapons Ban of 2022. To a large extent this bill reinstituted the 1994 ban, including the ban on the sale of new semiautomatic firearms deemed to be assault weapons, and of new LCMs holding more than 10 rounds. An important innovation is that for LCMs, the bill only allows continued possession and use of existing devices, but not transfer. However, given the reality that the US Senate will not enact this bill, it is useful to consider other approaches.

States could institute or expand assault weapon bans. Indeed, just a ban on LCMs would be a promising first step, impeding access to these products by individuals who could otherwise use them to fire multiple rounds of ammunition at large numbers of people before law enforcement can be mobilized to stop the killing.

Conclusions

In 2017, the *New York Times* polled "32 current or retired academics in criminology, public health and law, who have published extensively in peer-reviewed academic journals on gun policy"[10] to ask them what measures would be most effective in dealing with the mass shooting problem in the US, and an assault weapons ban was deemed overall by this panel to be the single most effective measure. The evidence in support of a ban has grown tragically stronger since then.[10]

ARTICLE INFORMATION

Conflict of Interest Disclosures: Dr Donohue reported serving as an expert witness for various government entities on matters related to assault weapons bans based on his research in this area.

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CERTIFICATE OF SERVICE
IN THE UNITED STATES DISTRICT COURT
CENTRAL DISTRICT OF CALIFORNIA
SOUTHERN DIVISION

Case Name: *Rupp, et al. v. Bonta*
Case No.: 8:17-cv-00746-JLS-JDE

IT IS HEREBY CERTIFIED THAT:

I, the undersigned, am a citizen of the United States and am at least eighteen years of age. My business address is 180 East Ocean Boulevard, Suite 200, Long Beach, California 90802.

I am not a party to the above-entitled action. I have caused service of:

DECLARATION OF SEAN A. BRADY IN SUPPORT OF PLAINTIFFS' MOTION TO EXCLUDE THE TESTIMONY OF DEFENDANT'S EXPERT WITNESS LOUIS KLAREVAS UNDER FEDERAL RULE OF EVIDENCE 702

on the following party by electronically filing the foregoing with the Clerk of the District Court using its ECF System, which electronically notifies them.

Xavier Becerra
Attorney General of California
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Deputy Attorney General
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San Francisco, CA 94102

I declare under penalty of perjury that the foregoing is true and correct.

Executed March 24, 2023.

Laura Palmerin