ROB BONTA
Attorney General of California
MARK R. BECKINGTON
Supervising Deputy Attorney General
ROBERT L. MEYERHOFF
Deputy Attorney General
State Bar No. 298196
300 South Spring Street, Suite 1702
Los Angeles, CA 90013-1230
Telephone: (213) 269-6177
Fax: (916) 731-2144
E-mail: Robert.Meyerhoff@doj.ca.gov
Attorneys for Defendants Rob Bonta in his official capacity as Attorney General of the State of California and Allison Mendoza in her Official Capacity as Director of the Bureau of Firearms

IN THE UNITED STATES DISTRICT COURT

FOR THE EASTERN DISTRICT OF CALIFORNIA

SACRAMENTO DIVISION

WILLIAM WIESE, et al., Plaintiffs, **v.** **ROB BONTA, et al.,** Defendants.	Case No. 2:17-cv-00903-WBS-KJN **DECLARATION OF LOUIS KLAREVAS IN SUPPORT OF DEFENDANTS' OPPOSITION TO MOTION FOR SUMMARY JUDGMENT AND COUNTER-MOTION FOR SUMMARY JUDGMENT** Date: July 10, 2023 Time: 1:30 p.m. Courtroom: 5, 14th Floor Judge: Hon. William B. Shubb

DECLARATION OF LOUIS KLAREVAS

1. I have been asked to prepare an expert declaration addressing the relationship between large-capacity magazines (LCMs) and mass shootings, including how restrictions on LCMs impact mass shooting violence. I have also been asked to address some of the Plaintiffs assertions regarding the number of LCMs in civilian circulation. This 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 herein.

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.[1]

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, including serving as an investigator in a study funded by the National Institutes of Health that is focused on reducing intentional shootings at elementary and secondary schools.

4. During the course of my nearly 25-year career as an academic, I have served on the faculties of George Washington University, the City University of New York, New York University, and the University of Massachusetts. I have also served as

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

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 over 70 commentary pieces. In 2019, my peer-reviewed article on the effectiveness of restrictions on LCMs in reducing high-fatality mass shootings resulting in six or more victims killed was published in the *American Journal of Public Health*.[2] 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."[3]

[2] 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).

[3] 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.*

6. In the past four years (since January 1, 2019), I have been deposed, testified in court, or testified by declaration in the following federal cases, listed alphabetically by state:

California – Central District	
Rupp v. Bonta	8:17-cv-00746-JLS
California – Southern District	
Duncan v. Bonta	17-cv-1017-BEN-JLB
Jones v. Bonta	19-cv-01226-L-AHG
Miller v. Bonta	3:19-cv-1537-BEN-JBS
Nguyen v. Bonta	3:20-cv-02470-WQH
Colorado	
Gates v. Polis	1:22-cv-01866-NYW
Connecticut	
National Association for Gun Rights v. Lamont	3:22-cv-01118-JBA
Hawaii	
National Association for Gun Rights v. Lopez	1:22-cv-404-DKW-RT
Illinois – Northern District	
Viramontes v. Cook County	1:21-cv-04595
National Association for Gun Rights v. Highland Park	22-cv-04774
Herrera v. Raoul	1:23-cv-00532
Illinois – Southern District	
Harrel v. Raoul[*]	23-cv-141-SPM
Langley v. Kelly[*]	23-cv-192-SPM
Barnett v. Raoul[*]	23-cv-209-SPM
Federal Firearms Licensees of Illinois v. Pritzker[*]	23-cv-215-SPM
Kenneally v. Raoul	3:23-cv-50039
Massachusetts	
National Association for Gun Rights v. Campbell	1:22-cv-11431-FDS
Oregon	
Oregon Firearms Federation v. Kotek[†]	2:22-cv-01815-IM
Fitz v. Rosenblum[†]	3:22-cv-01859-IM
Eyre v. Rosenblum[†]	3:22-cv-01862-IM
Azzopardi v. Rosenblum[†]	3:22-cv-01869-IM
Washington – Eastern District	
Brumback v. Ferguson	1:22-cv-03093-MKD
Washington – Western District	
Sullivan v. Ferguson	3:22-cv-5403-DGE

[*]Non-Consolidated Cases on the Same Briefing Schedule / [†]Consolidated Cases

7. 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.

8. I have also submitted a declaration in the following criminal case in state court: *People of Colorado v. Sgaggio*, District Court, El Paso County, Colorado, 2022M005894.

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

10. I have been retained by the Office of Attorney General of the State of California to render expert opinions in this case. I am being compensated at a rate of $480/hour for my work on this Declaration, $600/hour for any testimony (including deposition testimony) in connection with this matter, and $120/hour for travel required to provide testimony.

OPINIONS

11. It is my professional opinion, based upon my extensive review and analysis of the 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) high-fatality mass shootings involving LCMs, on average, have resulted in a substantially larger loss of life than similar incidents that did not involve LCMs; (3) mass shootings resulting in double-digit fatalities are relatively modern phenomena in American history, largely related to the use of assault weapons and LCMs; and (4) states that restrict LCMs experience fewer high-fatality mass shooting incidents and deaths, per capita, than states that do not restrict LCMs.[4] Based on these findings, it is my opinion that restrictions on LCMs have the potential to save lives by reducing the frequency and lethality of gun massacres.

[4] For purposes of this Declaration, mass shootings are defined in a manner consistent with my book *Rampage Nation* (*see* Excerpt Attached as **Exhibit B**). "Mass shootings" are shootings resulting in four or more victims being shot (fatally or non-fatally), regardless of location or underlying motive. As a subset of mass shootings, "high-fatality mass shootings" (also referred to as "gun massacres") are defined as shootings resulting in 6 or more victims being shot to death, regardless of location or underlying motive. 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 C**. For purposes of this Declaration, LCMs are defined in a manner consistent with the State of California's statutory definition: ammunition-feeding devices holding more than 10 rounds of ammunition.

I. MASS SHOOTINGS ARE A GROWING THREAT TO PUBLIC SAFETY

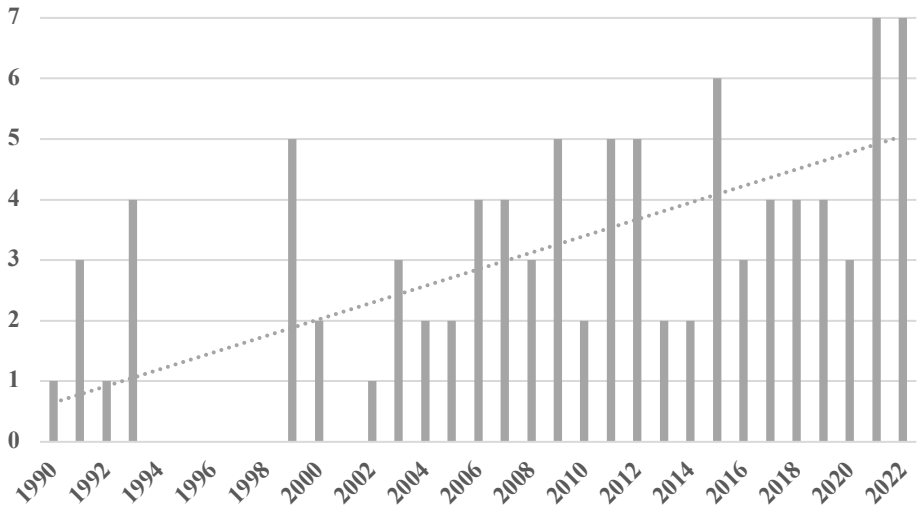
12. Examining mass-casualty acts of violence in the United States since 1990 points to two disturbing patterns.[5] First, as demonstrated in Table 1, the deadliest individual acts of intentional criminal violence in the United States since the terrorist attack of September 11, 2001, have all been mass shootings. Second, as displayed in Figures 1-2, the problem of high-fatality mass shooting violence is on the rise. To put the increase over the last three decades into perspective, between the 1990s and the 2010s, the average population of the United States increased approximately 20%. However, when the number of people killed in high-fatality mass shootings in the 1990s is compared to the number killed in such incidents in the 2010s, it reflects an increase of 260%. In other words, the rise in gun massacre violence has far outpaced the rise in national population—by a factor of 13. The obvious takeaway from these patterns and trends is that mass shootings pose a significant—and growing—threat to American public safety.

[5] Because the analysis in Section IV of this Declaration necessarily uses data from 1990 through 2022, for purposes of consistency (and to avoid any confusion), the analyses in Sections I and II also use data from 1990 through 2022. Unless stated otherwise, all of the data used to perform original analyses and to construct tables and figures in this Sections I, II, and IV of this Declaration are drawn from **Exhibit C.**

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

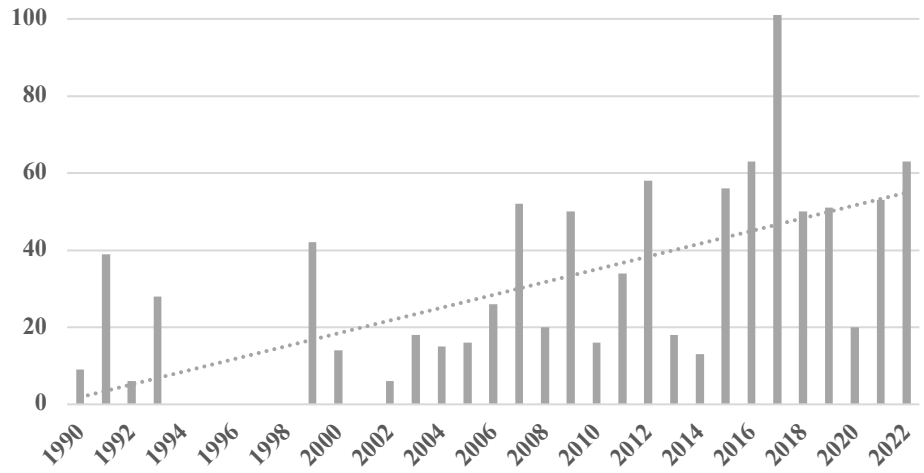
	Deaths	Date	Location	Type of Violence
1	60	October 1, 2017	Las Vegas, NV	Mass Shooting
2	49	June 12, 2016	Orlando, FL	Mass Shooting
3	32	April 16, 2007	Blacksburg, VA	Mass Shooting
4	27	December 14, 2012	Newtown, CT	Mass Shooting
5	25	November 5, 2017	Sutherland Springs, TX	Mass Shooting
6	23	August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

Figure 1. Annual Trends in High-Fatality Mass Shooting Incidents, 1990-2022



Note: The dotted line is a linear trendline. A linear trendline is a straight line that captures the overall pattern of the individual data points. When there is a positive relationship between the x-axis and y-axis variables, the trendline moves upwards from left to right. When there is a negative relationship between the x-axis and y-axis variables, the trendline moves downwards from left to right.

Figure 2. Annual Trends in High-Fatality Mass Shooting Fatalities, 1990-2022



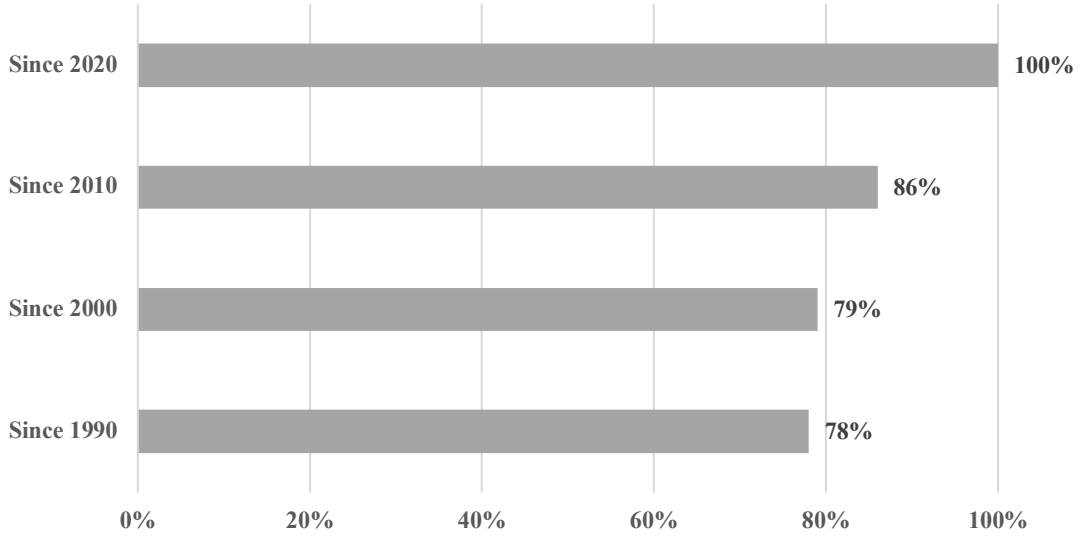
Note: The dotted line is a linear trendline. A linear trendline is a straight line that captures the overall pattern of the individual data points. When there is a positive relationship between the x-axis and y-axis variables, the trendline moves upwards from left to right. When there is a negative relationship between the x-axis and y-axis variables, the trendline moves downwards from left to right.

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

13. In addition to showing that the frequency and lethality of high-fatality mass shootings are on the rise nationally, the data point to another striking pattern: LCMs are being used with increased frequency to perpetrate gun massacres. As shown in Figure 3, based on incidents where details allowing a determination on the use of LCMs are available, the pattern is particularly marked of late, with 100% of high-fatality mass shootings since 2020 involving LCMs. A similar pattern is found when examining fatalities since 2020, with 100% of all high-

fatality mass shooting deaths in the last three years involving LCMs, as shown in Figure 4. These trends clearly demonstrate that, among high-fatality mass shooters, there is a growing preference for using LCMs to perpetrate their attacks.[6]

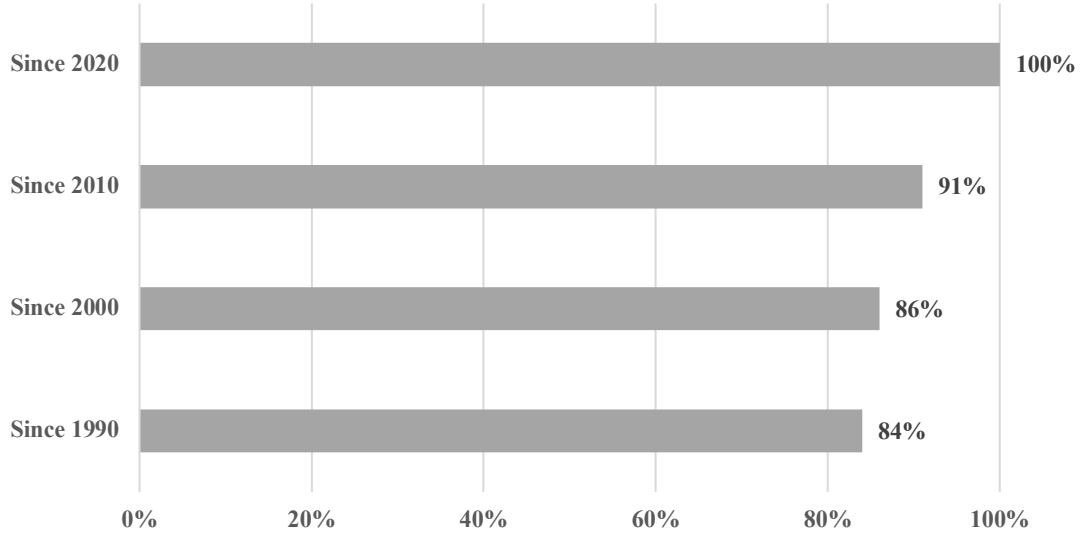
Figure 3. Share of High-Fatality Mass Shooting Incidents Involving LCMs, 1990-2022



Note: The calculations in Figure 3 exclude incidents in which it is unknown if LCMs were used.

[6] Out of all 94 high-fatality mass shootings in the United States between 1990 and 2022, it cannot be determined whether LCMs were used in 14 of those incidents. Therefore, the graphical depictions and percentages discussed in this section (Section II) are based on calculations that only use data points from the 80 incidents in which the involvement of LCMs could be determined.

Figure 4. Share of High-Fatality Mass Shooting Deaths Resulting from Incidents Involving LCMs, 1990-2022



Note: The calculations in Figure 4 exclude incidents in which it is unknown if LCMs were used.

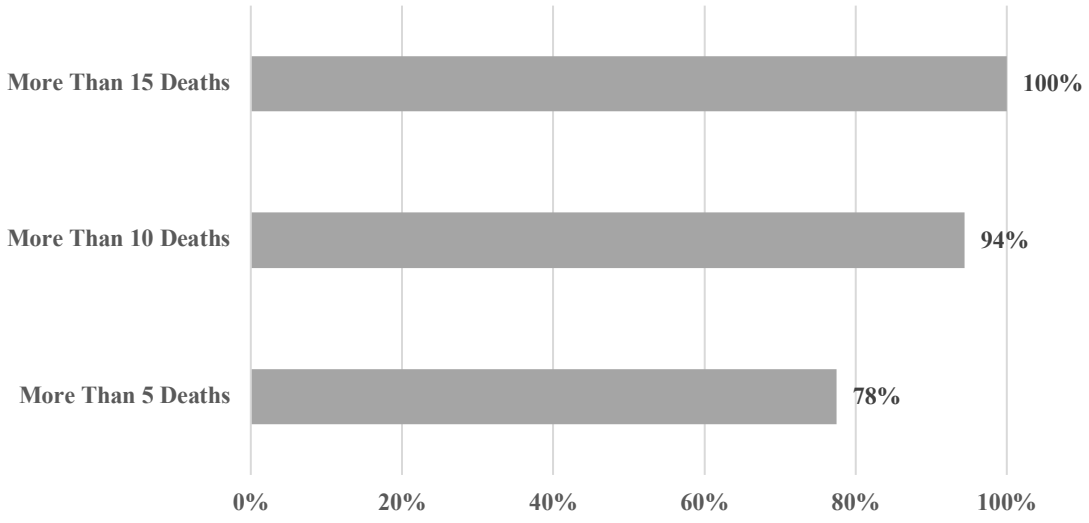
14. Another pattern that stands out when examining the relationship between LCM use and gun massacre violence reflects the disproportionately greater lethality associated with the use of LCMs. For instance, returning to the list of the seven deadliest individual acts of intentional criminal violence 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 all seven incidents (100%) involved LCMs, as shown in Table 2. When examining all high-fatality mass shootings since 1990, the relationship between LCM use and higher death tolls is striking. In the past 33 years, LCMs have been used in 78% of all high-fatality mass shootings. However, as the fatality thresholds of such incidents

increase, so too do the shares of incidents involving LCMs. For instance, LCMs were used in 94% of all mass shootings resulting in more than 10 deaths and 100% of all mass shootings resulting in more than 15 deaths (Figure 5). As the data show, there is an association between gun massacre lethality and the use of LCMs.

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

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

Figure 5. Percentage of High-Fatality Mass Shootings Involving LCMs by Fatality Threshold, 1990-2022



Note: The calculations in Figure 5 exclude incidents in which it is unknown if LCMs were used.

15. Of the 80 high-fatality mass shootings since January 1, 1990, in which LCM use can be determined, 62 involved LCMs, resulting in 713 deaths. The average death toll for these 62 incidents is 11.5 fatalities per shooting. By contrast, the average death toll for the 18 incidents in which it was determined that LCMs were not used (which resulted in 132 fatalities) is 7.3 fatalities per shooting. In other words, since 1990, the use of LCMs in high-fatality mass shootings has resulted in a 58% increase in average fatalities per incident (Table 3). This review of the data suggests that LCMs are force multipliers when used in mass shootings.

Table 3. The Average Death Tolls Associated with the Use of LCMs in High-Fatality Mass Shootings in the U.S., 1990-2022

	Average Death Toll for Incidents That Did Not Involve the Use of LCMs	Average Death Toll for Incidents That Did Involve the Use of LCMs	Percent Increase in Average Death Toll Associated with the Use of LCMs
1990-2022	7.3 Deaths	11.5 Deaths	58%

Note: The calculations in Table 3 exclude incidents in which it is unknown if LCMs were used.

III. DOUBLE-DIGIT-FATALITY MASS SHOOTINGS ARE POST-WORLD WAR II PHENOMENA IN AMERICAN HISTORY THAT INCREASINGLY INVOLVE ASSAULT WEAPONS AND LCMS

16. I have also examined the historical occurrence and distribution of mass shootings resulting in 10 or more victims killed since 1776 (Table 4 and Figure 6). A lengthy search uncovered several informative findings.[7] In terms of the origins

[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 (continued…)

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 occurred in 1949. For 70% of its 247-year existence as a nation, the United States did not experience a *single* mass shooting resulting in double-digit fatalities. They are relatively modern phenomena in American history.

17. After the first such incident in 1949, 17 years passed until a similar mass shooting occurred in 1966. The third such mass shooting then occurred 9 years later, in 1975. And the fourth such incident occurred 7 years after, in 1982. In short, the first few mass shootings resulting in 10 or more deaths did not occur until after World War II, and 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 4 and Figure 7).[8]

18. The distribution of double-digit-fatality mass shootings changes in the early 1980s, when five such events took place in a span of just five years (Table 4 and Figure 7). This timeframe also reflects the first time that assault weapons with LCMs were used to perpetrate mass shootings resulting in 10 or

---

Newspaper Archive contains local and major metropolitan newspapers dating back to 1607. 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] Figures 6-7 are reproduced in larger form as **Exhibit D** of this Declaration.

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 was followed by a 20-year period in which only 2 double-digit-fatality mass shootings occurred (Figure 7). This period of time from 1987-2007 correlates with three important federal firearms measures: the 1986 Firearm Owners Protection Act, the 1989 C.F.R. "sporting use" importation restrictions, and the 1994 Federal Assault Weapons Ban.

Table 4. Mass Shootings Resulting in Double-Digit Fatalities in U.S. History, 1776-2022

	Date	Location	Deaths	Involved Assault Weapon(s)	Involved LCM(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 an LCM if at least one of the firearms discharged had an ammunition-feeding device holding more than 10 bullets.

Figure 6. Mass Shootings Resulting in Double-Digit Fatalities in U.S. History, 1776-2022

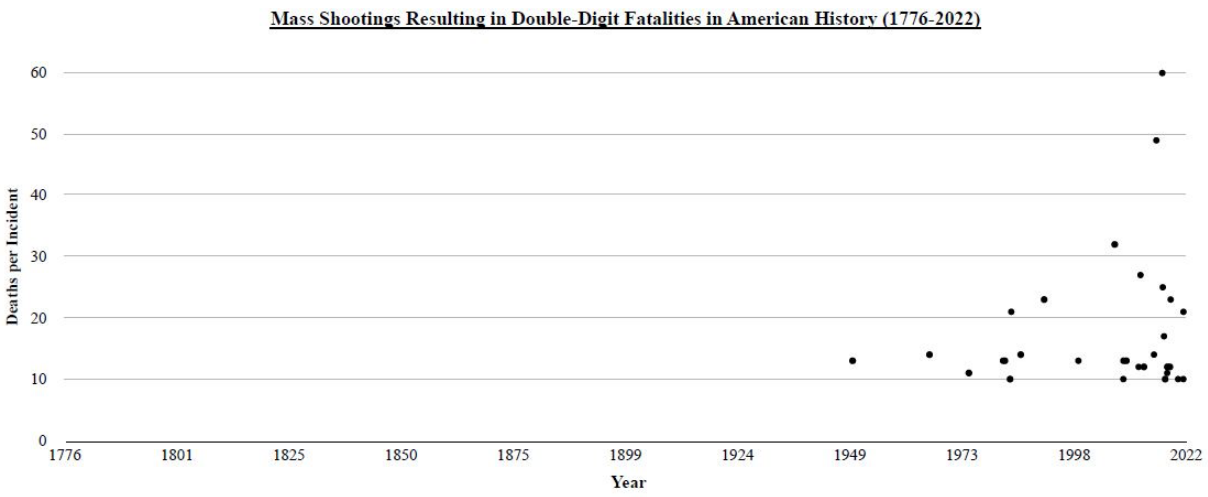
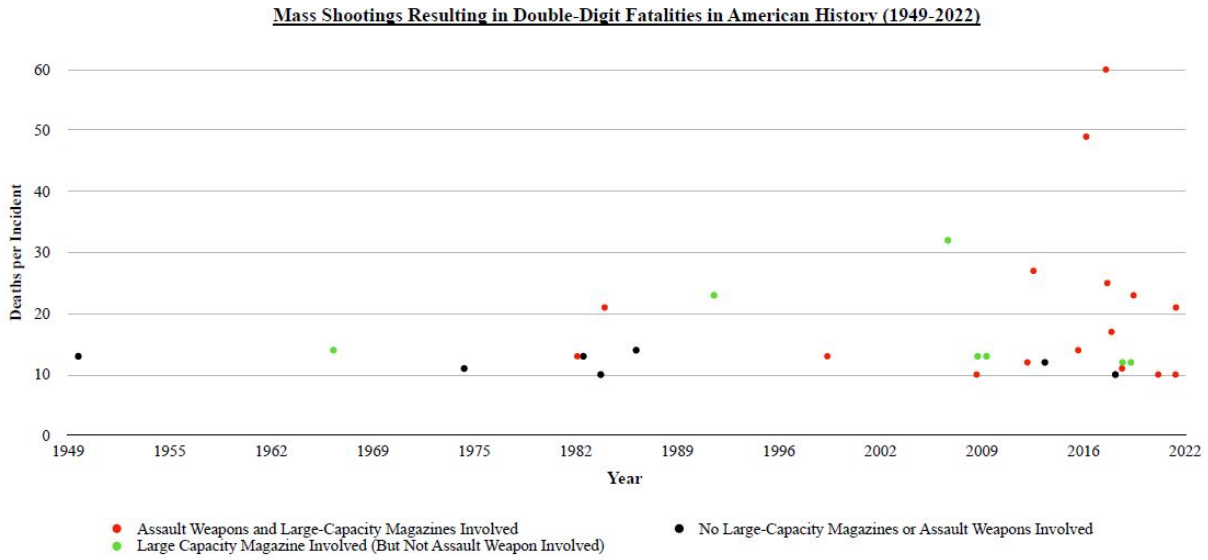


Figure 7. Mass Shootings Resulting in Double-Digit Fatalities in U.S. History, 1949-2022



19. It is well-documented in the academic literature that, after the Federal Assault Weapons Ban expired in 2004, mass shooting violence increased substantially.[9] 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 (a frequency rate of one incident every 5.6 years). In the 18 years since 2004, there have been 20 double-digit-fatality mass shootings (a frequency rate of one incident every 0.9 years). In other words, the frequency rate has increased over six-fold since the Federal Assault Weapons Ban expired (Table 4 and Figure 7). (The 1994 Federal Assault Weapons Ban and its impact on mass shooting violence is discussed in further detail in Section IV of this Declaration.)

20. Over three-quarters of mass shootings resulting in 10 or more deaths involved LCMs (Table 4). As also shown in the analyses of mass shootings in Section II, death tolls in double-digit-fatality mass shootings are related to the use of firearm technologies like assault weapons and LCMs that, in terms of mass shootings, serve as force multipliers.

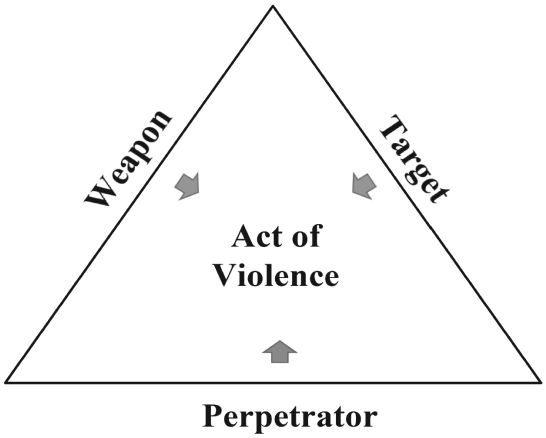
[9] *See*, for example, Louis Klarevas, *supra* note 1 (Relevant Excerpt Attached as **Exhibit E**); Louis Klarevas, et al., *supra* note 2 (Attached as **Exhibit F**); Charles DiMaggio, et al., "Changes in US Mass Shooting Deaths Associated with the 1994-2004 Federal Assault Weapons Ban: Analysis of 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**).

IV. RESTRICTIONS ON LCMS REDUCE THE INCIDENCE OF GUN MASSACRES, RESULTING IN LIVES SAVED

a. Bans in Theory

21. As conceptualized in the Trinity of Violence model that I developed in my book on mass shootings, every act of violence involves three elements: a perpetrator, a weapon, and a target (Figure 8).[10] The key to mitigating violence is to "break the trinity" by hindering at least one of the three elements. This is accomplished by dissuading the potential offender(s), denying the potential instrument(s) of violence, or defending the potential victim(s).[11]

Figure 8. The Trinity of Violence



[10] *See* Klarevas, *supra* note 1, at 27-29, 229-238.

[11] *Ibid.*

22. Bans are law-based concepts that prohibit certain behaviors by criminalizing or otherwise penalizing them.[12] Bans on LCMs generally make it illegal to manufacture, import, transfer, own, or possess certain magazines. Bans work in relation to two of the three elements of the Trinity of Violence: dissuasion and denial. With regard to perpetrators, bans use the threat of penalty to deter potential offenders from engaging in the prohibited behavior. In the case of bans on LCMs, they threaten conviction, imprisonment, and/or fines should an individual acquire a prohibited LCM. The primary mechanism at work here centers around dissuading potential shooters from trying to acquire banned firearm technologies. But there is also a secondary mechanism at work, focused on the LCM itself: deprive potential instruments of violence. Knowing that someone who is willing to commit murder might not be deterred from violating another criminal law, like possessing a prohibited item, bans on LCMs also threaten punishment against anyone who tries to transfer (through sale, gift, or loan) a restricted item to someone who is prohibited from acquiring it. This, in essence, reinforces the strategy of dissuading the offender with the strategy of denying the instrument of violence.

23. Ideally, someone intent on committing a mass shooting with an LCM would be dissuaded from going on a rampage by the fact that their means of choice are not available. In such a scenario, the attack would be quashed. This *suppression effect*

[12] Philip J. Cook, "Research in Criminal Deterrence: Laying the Groundwork for the Second Decade," 2 *Crime and Justice* 211 (1980); and Daniel S. Nagin, "Deterrence in the Twenty-First Century," 42 *Crime and Justice* 199 (2013).

is akin to what economists and psychologists refer to as a positive spillover effect, where one desirable outcome produces a second, loosely-related desirable outcome.[13] A real-world example of this is the so-called "Matrix Killings," where a 19-year-old Virginia man blamed *The Matrix* film for driving him to murder his parents with a shotgun (that did not have an LCM). At the time of the crime in 2003, the Federal Assault Weapons Ban was in effect, preventing him from obtaining an assault rifle and LCMs. In a 2013 jailhouse interview, he told CNN, "If I had an assault weapon, things would have been much worse." He added that had he had an AR-15 instead of a shotgun, he is positive that, after killing his parents, he would have gone on a rampage and "killed as many people as I possibly could." As he noted, "because I didn't have an assault weapon, that didn't happen."[14] In this case, the unavailability of an assault weapon due to the federal ban appears to have suppressed the perpetrator's impulse to commit a mass shooting.

24. Of course, some potential mass shooters will not be discouraged from going on a killing spree just because their means of choice are unavailable. They will instead replace their desired instruments of violence with available alternatives.

---

[13] Paul Dolan and Mateo M. Galizzi, "Like Ripples on a Pond: Behavioral Spillovers and Their Implications for Research and Policy," 47 *Journal of Economic Psychology* 1 (2015); K. Jane Muir and Jessica Keim-Malpass, "Analyzing the Concept of Spillover Effects for Expanded Inclusion in Health Economics Research," 9 *Journal of Comparative Effectiveness Research* 755 (2020).

[14] "Inside the Mind of a Killer," CNN (Transcripts), August 23, 2013, *available at* https://transcripts.cnn.com/show/pmt/date/2013-08-23/segment/01 (last accessed January 24, 2023.

This is commonly referred to as the *substitution effect*, wherein an act of violence is still perpetrated, but with a different, less lethal instrument of violence.[15] A real-world example of the substitution effect at work is the 2019 synagogue rampage in Poway, California. In that attack, the gunman appears to have been unable to acquire an assault rifle and LCMs due to California's ban on both. Instead, he acquired what is known as a California-compliant semiautomatic, centerfire rifle (which lacked features such as a pistol grip and a forward hand grip) and 10-round magazines. As a result, the gunman quickly ran out of bullets, and while pausing to reload—which appears to have been extremely difficult given that he did not have assault weapon features on his rifle that facilitated fast reloading—a congregant chased him away, preventing him from continuing his attack.[16] In this incident, which resulted in one death, California's ban on assault weapons and LCMs appears to have worked exactly as intended. It kept the active shooter from being able to kill more people, preventing this attack from becoming a mass murder.

25. It might seem perverse to think that restrictions on certain instruments of violence operate on the premise that, if

[15] Philip J. Cook, "The Effect of Gun Availability on Violent Crime Patterns," 455 *Annals of the American Academy of Political and Social Science* 63 (1981); Anthony A. Braga, et al. "Firearm Instrumentality: Do Guns Make Violent Situations More Lethal?", 4 *Annual Review of Criminology* 147 (2021).

[16] Elliot Spagat and Julie Watson, "Synagogue Shooter Struggled with Gun, Fled with 50 Bullets," Associated Press, April 30, 2019, *available at* https://apnews.com/article/shootings-north-america-us-news-ap-top-news-ca-state-wire-8417378d6b934a8f94e1ea63fd7c0aea (last accessed January 24, 2023).

an act of violence cannot be averted, then it will proceed with an alternative instrument. Nevertheless, this is exactly how bans on LCMs (and assault weapons) work in theory. They suppress the inclinations of potential mass shooters to go on killing rampages in the first place because their means of choice are unavailable. And, should deterrence fail, bans force perpetrators to substitute less lethal instruments for more dangerous, prohibited ones, reducing the casualty tolls of attacks when they do occur.

b. The Operative Mechanism of LCM Bans: Forcing Pauses in Active Shootings

26. LCMs provide multiple advantages to active shooters. Offensively, LCMs increase kill potential. Basically, the more bullets a shooter can fire at a target within a finite amount of time, the more potential wounds they can inflict. Furthermore, the more bullets that strike a victim, the higher the odds that that person will die. These two factors—sustained-fire capability and multiple-impact capability—allow LCMs to increase a shooter's kill potential.

27. When inserted into either a semiautomatic or fully automatic firearm, an LCM facilitates the ability of an active shooter to fire a large number of rounds at an extremely quick rate without pause. When a target is in a gunman's line of sight for only a few seconds, this phenomenon—sustained-fire capability—gives the shooter numerous chances to hit a target in a short window of opportunity, especially when ammunition capacity is large.

28. LCMs also facilitate the ability of a shooter to strike a human target with more than one round. This phenomenon—multiple-impact capability—increases the chances that the victim, when struck by multiple rounds, will die. At least two separate studies have found that, when compared to 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 one bullet were over 60 percent higher.[17] The implication is straightforward: being able to strike human targets with more than one bullet increases a shooter's chances of killing their victims. In essence, LCMs are force multipliers when it comes to kill potential—and the evidence from gun massacres supports this conclusion (*see* Section II).

29. In addition to offensive advantages, LCMs also provide the shooter with the defensive advantage of extended cover. During an active shooting, a perpetrator is either firing their gun or not firing their gun. While the shooter is pulling the trigger, it is difficult for those in harm's way to take successful defensive maneuvers. But if the shooter runs out of bullets, there is a lull in the attack. This precious downtime affords those in the line of fire with a chance to flee, hide, or fight back.

[17]Daniel W. Webster, et al., "Epidemiologic Changes in Gunshot Wounds in Washington, DC, 1983–1990," 127 *Archives of Surgery* 694 (June 1992); Angela Sauaia, et al., "Fatality and Severity of Firearm Injuries in a Denver Trauma Center, 2000–2013," 315 *JAMA* 2465 (June 14, 2016).

30. There are several examples of individuals fleeing or taking cover while active shooters paused to reload. For instance, in 2012, several first-graders at Sandy Hook Elementary School in Newtown, Connecticut, escaped their attacker as he was swapping out magazines, allowing them to exit their classroom and dash to safety.[18] Other well-known examples include the 2007 Virginia Tech and the 2018 Borderline Bar and Grill rampages.[19] There is also the possibility that someone will rush an active shooter and try to tackle them (or at the very least try to wrestle their weapon away from them) while they pause to reload.[20] In recent history, there have been numerous instances of gunmen being physically confronted by unarmed civilians while reloading, bringing their gun attacks to an abrupt end. Prominent examples include the 1993 Long Island Rail Road, the 2011 Tucson shopping

[18] *See* Dave Altimari, et al., "Shooter Paused and Six Escaped," *Hartford Courant*, December 23, 2012 (Attached as **Exhibit J**).

[19] Virginia Tech Review Panel, *Mass Shootings at Virginia Tech, April 16, 2007: Report of the Virginia Tech Review Panel Presented to Governor Kaine, Commonwealth of Virginia*, Revised with Addendum, November 2009, *available at* https://scholar.lib.vt.edu/prevail/docs/April16ReportRev20091204.pdf (last accessed February 1, 2023); "California Bar Shooting: Witnesses Describe Escaping as Gunman Reloaded," CBS News, December 7, 2018, *available at* https://www.cbsnews.com/news/borderline-bar-shooting-thousand-oaks-california-12-dead-witnesses-describe-gunman-storming-in (last accessed February 1, 2023).

[20] The longer a shooter can fire without interruption, the longer they can keep potential defenders at bay. The longer potential defenders are kept from physically confronting a shooter, the more opportunity there is for the shooter to inflict damage.

center, the 2018 Nashville Waffle House, and the 2022 Laguna Woods church shooting rampages.[21] When there are pauses in the shooting to reload, opportunities arise for those in the line of fire and for law enforcement to take life-saving action.

c. Bans in Practice

31. In light of the growing threat posed by mass shootings, legislatures have enacted restrictions on assault weapons and LCMs in an effort to reduce the occurrence and lethality of such deadly acts of firearm violence. Prominent among these measures was the 1994 Federal Assault Weapons Ban. In September 1994, moved to action by high-profile shooting rampages that occurred the previous year at a San Francisco law firm and on a Long Island Rail Road commuter train, the U.S. Congress enacted a ban on assault weapons and LCMs that applied to all 50 states plus

[21] *See* Rich Schapiro, "LIRR Massacre 20 Years Ago: 'I Was Lucky,' Says Hero Who Stopped Murderer," *New York Daily News*, December 7, 2013, *available at* http://www.nydailynews.com/new-york/nyc-crime/lirr-massacre-20-years-lucky-hero-stopped-murderer-article-1.1540846 (last accessed February 1, 2023); Sam Quinones and Nicole Santa Cruz, "Crowd Members Took Gunman Down," *Los Angeles Times*, January 9, 2011, *available at* https://www.latimes.com/archives/la-xpm-2011-jan-09-la-na-arizona-shooting-heroes-20110110-story.html (last accessed February 1, 2023); Brad Schmitt, "Waffle House Hero: Could You Rush Toward a Gunman Who Just Killed People?" *The Tennessean*, April 24, 2018, *available at* https://www.tennessean.com/story/news/crime/2018/04/24/waffle-house-hero-could-you-rush-toward-gunman-who-just-killed-people/543943002 (last accessed February 1, 2023); "Parishioners Stop Gunman in Deadly California Church Attack," NPR, May 16, 2022, *available at* https://www.npr.org/2022/05/16/1099168335/parishioners-stop-gunman-in-california-church-shooting (last accessed February 1, 2023).

the District of Columbia, bringing the entire country under the ban.[22]

32. Like the state bans on assault weapons and LCMs 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 and LCMs not legally owned by civilians prior to the date of the law's effect (September 13, 1994).[23] 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. As Congress ultimately chose not to renew the law, the federal ban expired on September 13, 2004. In the aftermath of the federal ban's expiration, mass shooting violence in the United States increased substantially.[24]

33. Currently, 37.5% of the U.S. population is subject to restrictions on LCMs. The following is a list of the 15 state-level jurisdictions that presently have statutes restricting LCMs: New Jersey (March 30, 1990), Hawaii (July 1, 1992), Maryland (June 1, 1994), Massachusetts (July 23, 1998), California (January 1, 2000), New York (November 1, 2000), Washington, D.C. (March 31, 2009), Connecticut (April 4, 2013),

---

[22] 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)).

[23] 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).

[24] *See* sources cited *supra* note 9.

Colorado (July 1, 2013), Vermont (April 11, 2018), Rhode Island (June 21, 2022), Washington (July 1, 2022), Delaware (August 29, 2022), Oregon (December 8, 2022), and Illinois (January 10, 2023).[25] As a reminder, from September 13, 1994, through September 12, 2004, the entire country was subject to nationwide restrictions on LCMs.

34. The rationale for restricting LCMs is to reduce the loss of life associated with the increased kill potential of such firearm technologies, because, on average, the use of LCMs results in higher death tolls in gun massacres. 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 states, in a manner that captures whether or not bans on LCMs 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

[25] The dates in parentheses mark the effective dates on which the listed states became subject to bans on LCMs. At present, state courts have enjoined Oregon and Illinois from enforcing their restrictions on LCMs. *See Arnold v. Brown*, No. 22CV41008 (Harney Cnty., Or., Cir. Ct.); *Accuracy Firearms, LLC, et al. v. Pritzker, et al.*, 23-MR-4 (Ill. 4th Jud. Cir. Ct.).

events across different jurisdictions—also provide insights into the impact of LCM bans on mass shooting violence.[26]

35. Since 1990, when New Jersey became the first state to ban LCMs, through 2022, there have been 94 high-fatality mass shootings in the United States (**Exhibit C**).[27] Calculating incidence and fatality rates for this time-period, across jurisdictions with and without bans on LCMs, reveals that states subject to such bans experienced a 51% decrease in high-fatality mass shooting incidence rates. They also experienced a 62% decrease in high-fatality mass shooting fatality rates, regardless of whether LCMs were used by the mass murderers (Table 6).[28]

36. When calculations go a step further and are limited to gun massacres involving LCMs, the difference between the two jurisdictional categories is even more pronounced. In the time-period from January 1, 1990, through December 31, 2022, accounting for population, states with bans on LCMs experienced a 58% decrease in the rate of high-fatality mass shootings

[26] For purposes of this Declaration, 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).

[27] There were no state bans on LCMs in effect prior to March 1, 1990. Therefore, 1990 is a logical starting point for an analysis of the impact of bans on LCMs.

[28] 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 restricted LCMs. As such, the entire country is coded as being under a ban on LCMs during the timeframe that the Federal Assault Weapons Ban was in effect.

involving LCMs. Similarly, jurisdictions with such bans in effect experienced a 69% decrease in the rate of deaths resulting from high-fatality mass shootings involving LCMs (Table 6). The above epidemiological calculations lead to the same conclusion: when bans on LCMs are in effect, per capita, fewer high-fatality mass shootings occur and fewer people die in such shootings—especially incidents involving LCMs, where the impact is most striking.

37. The main purpose of bans on LCMs is to restrict the availability of LCMs. The rationale is that, if there are fewer LCMs in circulation, then potential mass shooters will either be dissuaded from attacking or they will be forced to use less-lethal firearm technologies, resulting in fewer lives lost. Moreover, forcing active shooters to reload creates critical pauses in an attack. These pauses provide opportunities for people in the line of fire to take life-saving measures (such as fleeing the area, taking cover out of the shooter's sight, or fighting back), which in turn can help reduce casualties.

38. The epidemiological data lend support to the policy choices of California that seek to enhance public safety through restrictions on civilian access to LCMs. While imposing constraints on LCMs will not prevent every mass shooting, the data suggest that legislative efforts to restrict LCMs should result in lives being saved.

Table 6. Incidence and Fatality Rates for High-Fatality Mass Shootings, by Whether or Not Bans on LCMs 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-Ban States	162.7	67	1.25	713	13.28
Ban States	133.6	27	0.61	224	5.08
Percentage Decrease in Rate for Ban States			51%		62%
High-Fatality Mass Shootings Involving LCMs					
Non-Ban States	162.7	46	0.86	568	10.58
Ban States	133.6	16	0.36	145	3.29
Percentage Decrease in Rate for Ban States			58%		69%

Note: The above analysis codes incidents as high-fatality mass shootings involving LCMs if a magazine with a capacity greater than 10 rounds was used in the shooting. However, Colorado law defines LCMs are magazines holding more than 15 rounds. Coding the May 9, 2021, incident in Colorado Springs, CO, which involved 15-round magazines, as an incident not involving LCMs, results in an incident rate of 0.34 and a fatality rate of 3.15 for ban states in the second portion of Table 6 ("High-Fatality Mass Shootings Involving LCMs"). This, in turn, results in corresponding percentage decreases for ban state rates (when compared to non-ban state rates) of 60% and 70%, as opposed to 58% and 69%.

Source: Incident and fatality data are from **Exhibit C.** 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).

V. PROBLEMS WITH PLAINTIFFS' ASSERTIONS REGARDING THE NUMBER OF LCMS IN CIVILIAN CIRCULATION

39. The Plaintiffs present questionable estimates regarding the number of LCMs that are owned by Americans. The Office of the Attorney General of the State of California has requested that I address these assertions.

40. The current number of LCMs in American society is unknown. This is a point conceded by James Curcuruto, who, in 2017, submitted a declaration in the present case. At the time he submitted his declaration, Curcuruto was the Director of Industry Research and Analysis for the National Shooting Sports Foundation (NSSF), which is the trade association for the firearms industry. According to Curcuruto, he is "not aware of any singular public source providing reliable figures identifying exactly how many ammunition magazines are manufactured or imported for sale within the United States each year."[29]

41. That said, a decade ago, in 2013, the estimated number of LCMs in circulation was approximately 40 million.[30] This is not inconsistent with Curcuruto's claim that "it is safe to say that whatever the actual number of such magazines [with a capacity greater than 10 rounds] in United States' consumers' hands is, it is in the tens-of-millions."[31] But without source data, estimates like the one from 2013 news report (40 million)

---

[29] Declaration of James Curcuruto, *Wiese v. Bonta*, 2:17-cv-00903-WBS-KJN (E.D. Calif.), June 14, 2017, Dkt. 28-3, para. 6.

[30] *See* Patrik Jonsson, "Gun Debate 101: Time to Ban High-Capacity Magazines?" *Christian Science Monitor*, January 16, 2013, *available at* https://www.csmonitor.com/USA/Politics/DC-Decoder/2013/0116/Gun-debate-101-Time-to-ban-high-capacity-magazines (last accessed March 19, 2023).

[31] Curcuruto, *supra* note 29, para. 13.

and Curcuruto's 2017 declaration (tens-of-millions) are unverifiable.

42. In the present case, Plaintiffs offer drastically different estimates of how many LCMs are privately-owned in the United States. According to Curcuruto, based on estimates that he calculated while at the NSSF, between 1990 and 2015, "magazines capable of holding more than 10 rounds of ammunition accounted for approximately 115 million or approximately half of all magazines owned."[32]

43. By contrast, citing a survey that was conducted in 2021 by William English, Plaintiffs claim that "American gun owners have owned as many as 269 million handgun magazines that hold over 10 rounds and an additional 273 million rifle magazines over that threshold for a total of 542 million such magazines."[33]

44. To put all of these figures in perspective, from an estimated 40 million such magazines in 2013, in less than 10 years the number of privately-owned LCMs has either increased nearly three-fold, if we accept Curcuruto's larger estimate of at least 115 million LCMs, or nearly fourteen-fold, if we accept English's estimate of 542 million.

45. There is good reason to be suspicious of both estimates advanced by the Plaintiffs. For starters, the Curcuruto estimates are asserted without any reviewable evidence to support

[32] *Ibid.*, para. 8.

[33] Memorandum of Points and Authorities in Support of Plaintiffs' Motion for Summary Judgment, *Wiese v. Bonta*, 2:17-cv-00903-WBS-KJN (E.D. Calif.), March 31, 2023, Dkt. 123-1, at 11, citing William English, "2021 National Firearms Survey: Updated Analysis Including Types of Firearms Owned," Unpublished Paper (May 13, 2022; Revised September 22, 2022), *available at* https://papers.ssrn.com/sol3/cf_dev/AbsByAuth.cfm?per_id=4283305 (last accessed April 27, 2023), at 20, 24.

them. They are merely blanket claims offered with zero proof. Indeed, as Curcuruto himself explains, "the figure of 115 million magazines with a capacity greater than 10 rounds in circulation is an estimation based on extrapolation from indirect sources and cannot be confirmed as unequivocally accurate."[34]

46. In addition, while the English survey is discussed in an unpublished academic paper that is publicly available online, there are at least two significant problems with the survey which call into question all of the findings reported in the paper. First, the survey (as reported in the paper) appears to be in serious violation of the Code of Professional Ethics and Practices of the American Association for Public Opinion Research (AAPOR).[35] Among the ways that the English survey seemingly runs afoul of AAPOR canons, it fails to identify the source of sponsorship funding and it fails to fully disclose the measurement tools (Rules III.A.2-3). The former is vital to assuring that the survey was not designed and conducted to further the political or economic interests of particular people or organizations. The latter allows independent observers and researchers to assess if, among other factors, question order, question wording, or answer options biased responses. The latter is also crucial to assuring that select findings were not suppressed because they would, if publicized, undermine the agenda of the survey's sponsor(s).[36] Without release of the

[34] Curcuruto, *supra* note 29, para. 13.

[35] *See* "AAPOR Code of Professional Ethics and Practices," April 2021 (Attached as **Exhibit K**).

[36] With regard to this last point, the paper at one point discusses an open-answer question that was posed to survey respondents. It is the only such open-ended question discussed (continued…)

entire questionnaire and the full results, it cannot be confirmed that questions and corresponding responses were not suppressed.

47. Second, the paper reports some counter-intuitive findings and then interprets them in a manner that appears to be a speculative, tortured attempt to make sense of those findings. In one example, discussed above, respondents were asked if they ever found themselves in a situation "in which it would have been useful for defensive purposes to have a firearm with a magazine capacity in excess of 10 rounds." Approximately 550 respondents answered this question in the affirmative.[37] Over 10% of the paper is allocated to reproducing, verbatim, 31 select answers to this question. Presumably, the 31 reproduced answers are the most instructive as to the utility of LCMs in self-defense situations.[38] Out of these 31 scenarios, ***only two*** involved an armed citizen actually firing his or her firearm, and in ***only one*** of these two scenarios did the respondent confirm that they fired more than 10 rounds. Neither scenario involved self-defense against a criminal. Instead, both involved the use of gunfire to ward off animals: in one instance a bear and in another a pack of

---

in the paper. However, the question that is reported implies that there might have been an earlier open-ended question in the survey: "Have you ever been in a situation (*including any referenced in earlier responses*) in which it would have been useful for defensive purposes to have a firearm with a magazine capacity in excess of 10 rounds? If so, please briefly describe that situation." English, *supra* note 33, at 26, 28 (emphasis added). Indeed, one answer to this question is reported word-for-word verbatim: "Yes. The first incident I mentioned." English, *supra* note 33, at 28. As this response indicates, there might have been at least one other open-answer question that is not reported in the paper.

[37] *Ibid.*, at 28.

[38] *Ibid.*, at 28–33. Again, without all 550 answers available for review, it is difficult to assess the insightfulness of the responses provided by the other 519 survey participants who answered this question in the affirmative.

coyotes.[39] Taking situations that involved brandishing a firearm, driving away from the potential threat, or having one's dog chase away criminals, and interpreting them as examples that reflect the usefulness of LCMs for purposes of self-defense, is unfounded. In another example, English reports the percentage of gun owners who have owned LCMs in each state. The state with the highest rate of LCM ownership is the District of Columbia, with 69.2% of D.C. respondents reporting that they have owned LCMs.[40] This is a mind-boggling finding because the District of Columbia has the strictest prohibitions on LCMs in the U.S.[41] Intuitively, the District of Columbia should be one of the states with the lowest LCM ownership rates. To make sense of this baffling finding, English then offers some possible explanations: (1) LCM owners were including magazines that they keep in another state or that are legal to possess because they are "grandfathered" and (2) states with low gun ownership rates "such as DC and Hawaii" are more likely to have a higher concentration of "gun enthusiasts."[42] English offers no evidence whatsoever that LCM owners in the District of Columbia store their LCMs in other states (not to mention that neighboring Maryland also restricts LCM possession). Nor does English offer any evidence that there is a higher concentration of gun enthusiasts in Washington, D.C.[43]

---

[39] *Ibid.*

[40] *Ibid.*, at 27.

[41] *See* Giffords Law Center to Prevent Gun Violence, "Large-Capacity Magazines," available at https://giffords.org/lawcenter/gun-laws/policy-areas/hardware-ammunition/large-capacity-magazines (last accessed March 7, 2023).

[42] English, *supra* note 33, at 25-26.

[43] *Ibid.* English also fails to explain how the rate of gun ownership is related to the percentage of gun enthusiasts.

And, we can rule out the "grandfathering" theory because the District of Columbia does not grandfather LCMs.

48. In sum, suspicions about the integrity and findings of this survey appear warranted. For the foregoing reasons, the survey cannot be deemed reliable.

49. In addition to relying on the unsubstantiated Declaration of James Curcuruto and the questionable survey conducted by William English, the Plaintiffs also, at one point, turn to a law review article to support their claims regarding LCMs in circulation. Writing in their Memorandum of Points and Authorities, the Plaintiffs state:

> Many of the most popular handguns in the country are manufactured with magazines holding more than 10 rounds…. The same is true of many of the most popular semi-automatic rifles. *See, e.g.*, David B. Kopel, *The History of Firearm Magazines and Magazine Prohibitions*, 78 Alb. L. Rev. 849, 859 (2015) (Lee Decl., Ex. H) ("The most popular rifle in American history is the AR-15 platform, a semiautomatic rifle with standard magazines of twenty or thirty rounds.")[44]

Plaintiffs do not provide any quantitative data to support this specific claim regarding semi-automatic rifles manufactured with factory-issue LCMs. Instead, they rely on the cited law review article by David Kopel.[45] But turning to the specific page of the Kopel article does not turn up any evidence in support of this statement. On the other hand, the sentence from Kopel's article that Plaintiffs parenthetically quote does appear on the cited page of the article as part of a broader discussion of the

---

[44] Memorandum of Points and Authorities in Support of Plaintiffs' Motion for Summary Judgment, *supra* note 33, at 2-3.

[45] The Plaintiffs also cite an NSSF press release on the number of so-called "modern sporting rifles" in circulation, but this does not mention magazines, let alone magazine capacity. *Ibid.*

availability of assault rifles in the civilian marketplace in the 1950s and 1960s. But this too is subject to challenge (and speaks to the risks of relying on non-peer-reviewed law review articles as primary sources of data). According to *Gun Digest*, the factory-issue magazine that was sold with the genuine AR-15, produced by Colt, was 5 rounds in capacity, not 20 or 30 rounds.[46] When Plaintiffs insist that "[m]any of the most popular semi-automatic rifles are manufactured with standard magazines holding more than ten rounds," a natural follow-up question is: How many exactly? The Plaintiffs' cited sources do not say.

50. A decade-by-decade analysis of the civilian firearms market in the United States during the latter portion of the 20th century indicates how many makes and models of new firearms (handguns and long guns) were sold with factory-issue magazines having a capacity greater than 10 rounds of ammunition.[47] The information is drawn from *Gun Digest*, which since its 1955 edition has systematically published this data in what is now known as the *Gun Digest* GUNDEX.[48] The objective of this

[46] *See*, for example, *Gun Digest 1966* and *Gun Digest 1991* (Attached as **Exhibit L**).

[47] Air, pellet, and BB guns have been excluded from this analysis.

[48] GUNDEX is a registered trademark of *Gun Digest*. While *Gun Digest* has provided information on guns available for purchase in the United States since the publication of its first edition in 1944, it was not until the 1955 edition that *Gun Digest* began presenting this information in a quasi-systematic fashion, including make, model, and estimated price (at the time of publication). *Gun Digest* first referenced its catalog as the GUNDEX in its 1984 edition. Prior to that, it was referred to as the *Gun Digest* "Complete Compact Catalog." Describing the Complete Compact Catalog in its 1980 edition, *Gun Digest* wrote: "Its all-inclusive nature provides, if you look at a lot of them, a history of firearms availability in the United States. It covers virtually all firearms available to U.S. shooters, whether manufactured in the United States or elsewhere, or marketed by

(continued…)

evaluation is to identify the percentage of new firearm models sold with factory-issue LCMs in the U.S. civilian marketplace from the mid-1950s until the mid-1990s, when LCMs were restricted nationwide. As mentioned above, in 1994, Congress enacted the Federal Assault Weapons Ban, which prohibited the manufacture, importation, and sale of new LCMs that were not legally possessed prior to the ban taking effect.[49] As such, after the ban took effect on September 13, 1994, firearms sold in the civilian marketplace were not sold with new magazines holding more than 10 rounds of ammunition. These restrictions remained in effect until September 13, 2004, when the Federal Assault Weapons Ban expired.

51. Table 7 shows the number of new firearm models, current at-the-time, being sold with factory-issue magazines holding more than 10 rounds of ammunition at mid-decade, between 1955 and 1995.[50] According to *Gun Digest*, in 1955, only two new firearm

---

United States firms or others, and whether the arm is rimfire, centerfire, muzzleloader, rifle, handgun, shotgun." *Gun Digest, 34th Anniversary, 1980 Deluxe Edition* (1979), at 288.

[49] As mentioned above, the 1994 Federal Assault Weapons Ban prohibited the manufacture, transfer, or possession of assault weapons and LCMs not in circulation at the time that the law took effect on September 13, 1994. The ban applied nationwide, restricting assault weapons and LCMs in all 50 states plus the District of Columbia. Because the law contained a 10-year sunset provision, as it was not renewed, it expired on September 13, 2004. 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)).

[50] For purposes of this analysis, data is drawn from the 1955, 1965, 1975, 1985, and 1995 editions of the GUNDEX. These editions, respectively, reflect market availability of firearm models in 1954, 1964, 1974, 1984, and 1994. The 1995 *Gun Digest*, which contains the 1995 GUNDEX, was published in 1994. Despite being in the 1995 edition, the 1995 GUNDEX predominantly captures gun models available in the marketplace in 1994. The same pattern holds for all *Gun Digest* GUNDEXs—they reflect the firearm models available in the American marketplace in the year of

(continued…)

models were sold in the United States with factory-issue LCMs. By 1995, this number had reached 152 new firearm models available in the civilian marketplace. As a share of all firearm models available in the American marketplace in the decades prior to the Federal Assault Weapons Ban taking effect, the range ran from a low of less than 1% in the 1950s and 1960s to a high of just over 7% of all new firearms sold with factory-issue large-capacity magazines in the 1990s (immediately prior to the federal ban imposing prohibitions on LCMs).

Table 7. Firearm Models Sold with Factory-Issue LCMs in U.S., 1955-1995

	Number of New Firearm Models Sold with Factory-Issue LCMs in Civilian Market	Number of New Firearm Models Sold in Civilian Market	New Firearm Models Sold with Factory-Issue LCMs as a Share of New Firearm Models Sold in Civilian Market
1955	2	301	0.7%
1965	3	510	0.6%
1975	14	834	1.7%
1985	69	1,270	5.4%
1995	152	2,108	7.2%

Sources: *Gun Digest, 1955*; *Gun Digest, 1965*; *Gun Digest, 1975*; *Gun Digest, 1985*; and *Gun Digest, 1995*.

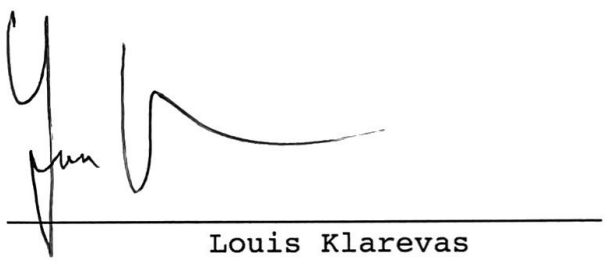
As Table 7 shows, the highest percentage of new firearm models sold with factory-issue large-capacity magazines prior to the enactment of the Federal Assault Weapons Ban peaked at 7% of all new firearm models sold in the civilian marketplace.

---

publication (not the year of the *Gun Digest*'s annual edition, which is the year appearing on the cover). Again, every annual *Gun Digest* is published in the year prior to the edition listed on the cover.

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

Executed on May 1, 2023 at Nassau County, New York.



Louis Klarevas

Exhibit A

Louis J. Klarevas

Email: ljk2149@tc.columbia.edu

Education

Ph.D. International Relations, 1999
School of International Service
American University
Washington, DC

B.A. Political Science, *Cum Laude*, 1989
School of Arts and Sciences
University of Pennsylvania
Philadelphia, PA

Author

Rampage Nation: Securing America from Mass Shootings

Current Positions

Research Professor, Teachers College, Columbia University, New York, NY, 2018-Present

Faculty Affiliate, Media and Social Change Lab (MASCLab), Teachers College, Columbia University, New York, NY, 2019-Present

Professional Experience

Academic Experience (Presented in Academic Years)

Associate Lecturer, Department of Global Affairs, University of Massachusetts – Boston, Boston, MA, 2015-2020

Senior Fulbright Scholar (Security Studies), Department of European and International Studies, University of Macedonia, Thessaloniki, Greece, 2011-2012

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

Faculty Affiliate, A. S. Onassis Program in Hellenic Studies, New York University, New York, NY, 2007-2011

Clinical Faculty, Center for Global Affairs, New York University, New York, NY, 2006-2011

Adjunct Professor, Center for Global Affairs, New York University, New York, NY, 2004-2006

Assistant Professor of Political Science, City University of New York – College of Staten Island, Staten Island, NY, 2003-2006

Associate Fellow, European Institute, London School of Economics and Political Science, London, England, UK, 2003-2004

Defense Analysis Research Fellow, London School of Economics and Political Science, London, England, UK, 2002-2004

Visiting Assistant Professor of Political Science and International Affairs, George Washington University, Washington, DC, 1999-2002

Adjunct Professor of Political Science, George Washington University, Washington, DC, 1998-1999

Adjunct Professor of International Relations, School of International Service, American University, Washington, DC, 1994-1995

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

Professional Experience (Presented in Calendar Years)

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

Faculty Advisor, National Youth Leadership Forum, Washington, DC, 1992

Courses Taught

Graduate
Counter-Terrorism and Homeland Security
International Political Economy
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.)

Rampage Nation: Securing America from Mass Shootings, Prometheus Books, 2016

"No Relief in Sight: Barring *Bivens* Suits in Torture Cases," *Presidential Studies Quarterly*, June 2013

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)

"Trends in Terrorism Since 9/11," *Georgetown Journal of International Affairs*, Winter/Spring 2011

"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

Greeks Bearing Consensus: An Outline for Increasing Greece's Soft Power in the West, Hellenic Observatory Discussion Paper 18, London School of Economics, November 2004

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 Preventive Medicine

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

Participant, Minnesota Chiefs of Police Association, Survey of Measures to Reduce Gun Violence, 2023

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

Expert Witness Service

State of Connecticut, 2023-

State of Hawaii, 2023-

State of Illinois, 2023-

State of Massachusetts, 2023-

State of Oregon, 2023-

City of Highland Park, Illinois, 2022-

County of Cook, Illinois, 2022-

State of Washington, 2022-

Government of Canada, 2021-2022

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

State of California, 2017-

State of Colorado, 2016-2017, 2022-

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 (Branas and 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

LOUIS KLAREVAS

RAMPAGE NATION

SECURING AMERICA FROM MASS SHOOTINGS

Prometheus Books
59 John Glenn Drive
Amherst, New York 14228

Table 2.1. The Concept of a Mass Shooting.

Definition of a Mass Shooting:

Any violent attack that results in four or more individuals incurring gunshot wounds.

Categories of Mass Shooting:

1. *Nonfatal*
   Mass shootings in which no one dies.

2. *Fatal*
   Mass shootings in which at least one victim dies.

3. *High-Fatality / Gun Massacre*
   Mass shootings in which six or more victims die.

It's easy to dismiss conceptual discussions and debates as exercises in Ivory Tower intellectualism. But how we identify and think about mass shootings impacts which attacks capture national attention and which are disregarded—something which has far-reaching policy consequences. Thus, coming up with the best possible definition and conceptualization is a vital first step toward explaining and preventing rampage violence. As the Socratic adage reminds us, "The beginning of wisdom is the definition of terms."[43]

Exhibit C

Exhibit C

High-Fatality Mass Shootings in the United States, 1990-2022

	Date	City	State	Deaths	Involved Large-Capacity Magazine(s)
1	6/18/1990	Jacksonville	FL	9	Y
2	1/26/1991	Chimayo	NM	7	N
3	8/9/1991	Waddell	AZ	9	N
4	10/16/1991	Killeen	TX	23	Y
5	11/7/1992	Morro Bay and Paso Robles	CA	6	N
6	1/8/1993	Palatine	IL	7	N
7	5/16/1993	Fresno	CA	7	Y
8	7/1/1993	San Francisco	CA	8	Y
9	12/7/1993	Garden City	NY	6	Y
10	4/20/1999	Littleton	CO	13	Y
11	7/12/1999	Atlanta	GA	6	U
12	7/29/1999	Atlanta	GA	9	Y
13	9/15/1999	Fort Worth	TX	7	Y
14	11/2/1999	Honolulu	HI	7	Y
15	12/26/2000	Wakefield	MA	7	Y
16	12/28/2000	Philadelphia	PA	7	Y
17	8/26/2002	Rutledge	AL	6	N
18	1/15/2003	Edinburg	TX	6	U
19	7/8/2003	Meridian	MS	6	N
20	8/27/2003	Chicago	IL	6	N
21	3/12/2004	Fresno	CA	9	N
22	11/21/2004	Birchwood	WI	6	Y
23	3/12/2005	Brookfield	WI	7	Y
24	3/21/2005	Red Lake	MN	9	Y
25	1/30/2006	Goleta	CA	7	Y
26	3/25/2006	Seattle	WA	6	N
27	6/1/2006	Indianapolis	IN	7	Y
28	12/16/2006	Kansas City	KS	6	N
29	4/16/2007	Blacksburg	VA	32	Y
30	10/7/2007	Crandon	WI	6	Y
31	12/5/2007	Omaha	NE	8	Y
32	12/24/2007	Carnation	WA	6	U
33	2/7/2008	Kirkwood	MO	6	Y
34	9/2/2008	Alger	WA	6	U
35	12/24/2008	Covina	CA	8	Y
36	1/27/2009	Los Angeles	CA	6	N
37	3/10/2009	Kinston, Samson, and Geneva	AL	10	Y

	Date	City	State	Deaths	Involved Large-Capacity Magazine(s)
38	3/29/2009	Carthage	NC	8	N
39	4/3/2009	Binghamton	NY	13	Y
40	11/5/2009	Fort Hood	TX	13	Y
41	1/19/2010	Appomattox	VA	8	Y
42	8/3/2010	Manchester	CT	8	Y
43	1/8/2011	Tucson	AZ	6	Y
44	7/7/2011	Grand Rapids	MI	7	Y
45	8/7/2011	Copley Township	OH	7	N
46	10/12/2011	Seal Beach	CA	8	N
47	12/25/2011	Grapevine	TX	6	N
48	4/2/2012	Oakland	CA	7	N
49	7/20/2012	Aurora	CO	12	Y
50	8/5/2012	Oak Creek	WI	6	Y
51	9/27/2012	Minneapolis	MN	6	Y
52	12/14/2012	Newtown	CT	27	Y
53	7/26//2013	Hialeah	FL	6	Y
54	9/16/2013	Washington	DC	12	N
55	7/9/2014	Spring	TX	6	Y
56	9/18/2014	Bell	FL	7	U
57	2/26/2015	Tyrone	MO	7	U
58	5/17/2015	Waco	TX	9	Y
59	6/17/2015	Charleston	SC	9	Y
60	8/8/2015	Houston	TX	8	U
61	10/1/2015	Roseburg	OR	9	Y
62	12/2/2015	San Bernardino	CA	14	Y
63	2/21/2016	Kalamazoo	MI	6	Y
64	4/22/2016	Piketon	OH	8	U
65	6/12/2016	Orlando	FL	49	Y
66	5/27/2017	Brookhaven	MS	8	Y
67	9/10/2017	Plano	TX	8	Y
68	10/1/2017	Las Vegas	NV	60	Y
69	11/5/2017	Sutherland Springs	TX	25	Y
70	2/14/2018	Parkland	FL	17	Y
71	5/18/2018	Santa Fe	TX	10	N
72	10/27/2018	Pittsburgh	PA	11	Y
73	11/7/2018	Thousand Oaks	CA	12	Y
74	5/31/2019	Virginia Beach	VA	12	Y
75	8/3/2019	El Paso	TX	23	Y
76	8/4/2019	Dayton	OH	9	Y
77	8/31/2019	Midland and Odessa	TX	7	Y
78	3/15/2020	Moncure	NC	6	U

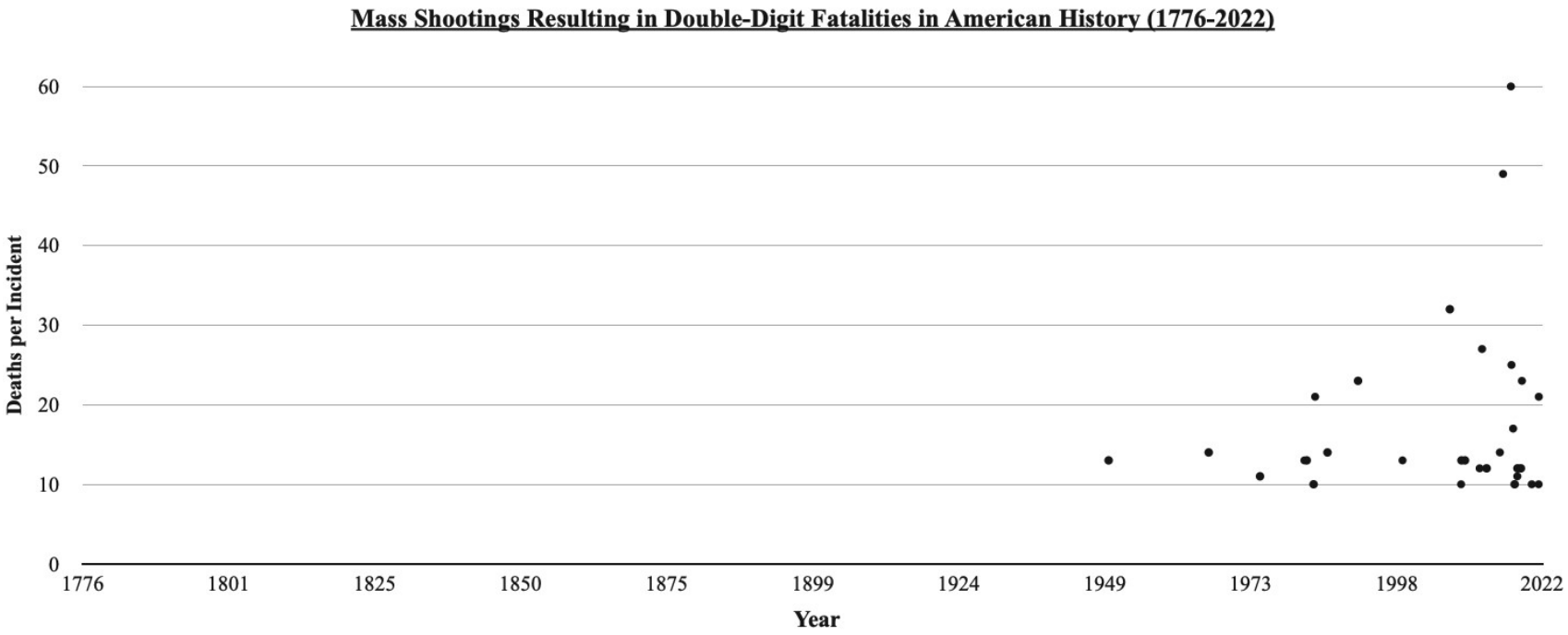
	Date	City	State	Deaths	Involved Large-Capacity Magazine(s)
79	6/4/2020	Valhermoso Springs	AL	7	Y
80	9/7/2020	Aguanga	CA	7	U
81	2/2/2021	Muskogee	OK	6	U
82	3/16/2021	Acworth and Atlanta	GA	8	Y
83	3/22/2021	Boulder	CO	10	Y
84	4/7/2021	Rock Hill	SC	6	Y
85	4/15/2021	Indianapolis	IN	8	Y
86	5/9/2021	Colorado Springs	CO	6	Y†
87	5/26/2021	San Jose	CA	9	Y
88	1/23/2022	Milwaukee	WI	6	U
89	4/3/2022	Sacramento	CA	6	Y
90	5/14/2022	Buffalo	NY	10	Y
91	5/24/2022	Uvalde	TX	21	Y
92	7/4/2022	Highland Park	IL	7	Y
93	10/27/2022	Broken Arrow	OK	7	U
94	11/22/2022	Chesapeake	VA	6	U

Note: High-fatality mass shootings are mass shootings resulting in 6 or more fatalities, not including the perpetrator(s), regardless of location or motive. For purposes of this Exhibit, LCM use is coded in a manner consistent with the State of California's statutory definition of LCM—an ammunition-feeding device holding more than 10 rounds of ammunition. Incidents in gray shade are those incidents that occurred at a time when and in a state where legal prohibitions on large-capacity magazines were in effect statewide or nationwide.

† The May 9, 2021, high-fatality mass shooting in Colorado Springs is coded as involving an LCM because the gunman used 15-round magazines, which exceed the ammunition-capacity threshold of 10 rounds that is established under the State of Washington's statutory definition of LCM (and which, therefore, guides this Declaration). However, under Colorado state law, an LCM is defined as an ammunition-feeding device holding more than 15 rounds. As such, this shooting involved an LCM under the broader definition of LCM, but not under the narrower definition in Colorado statutes.

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 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)

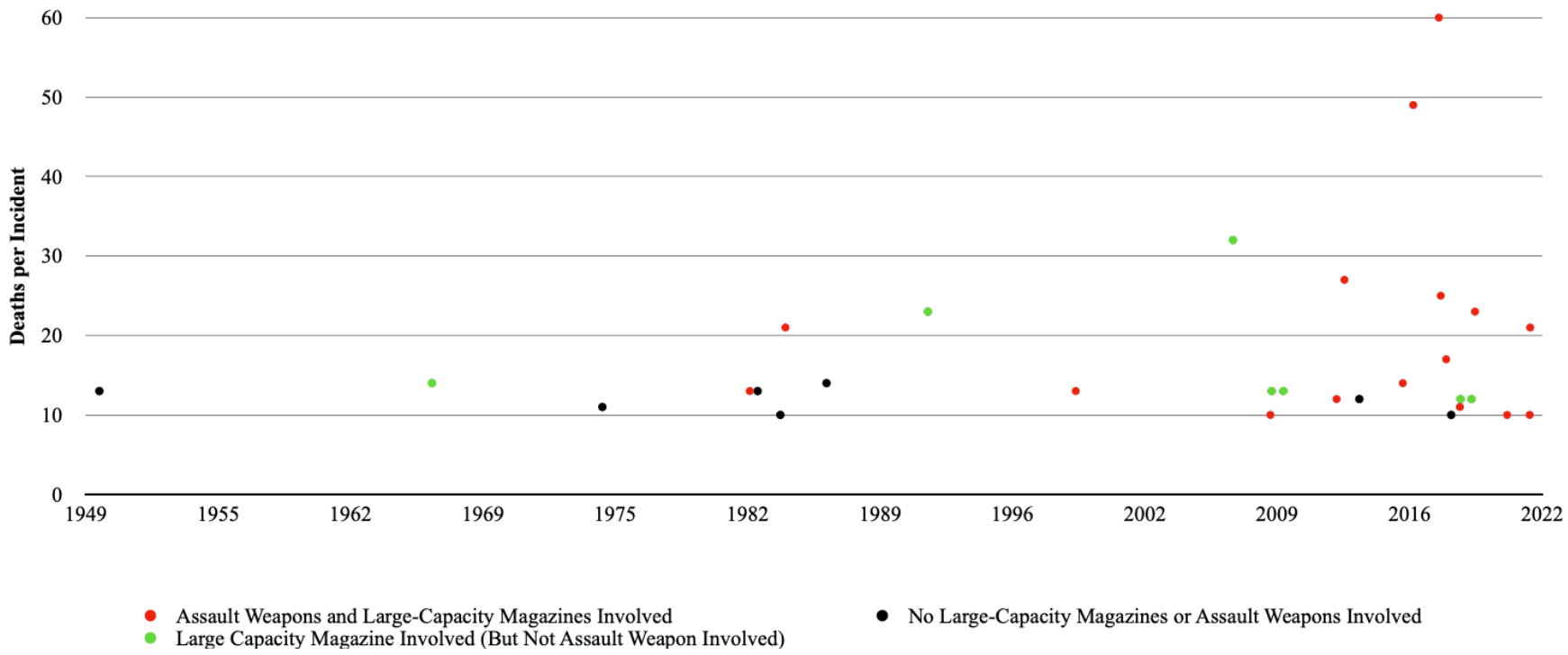


Exhibit E

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

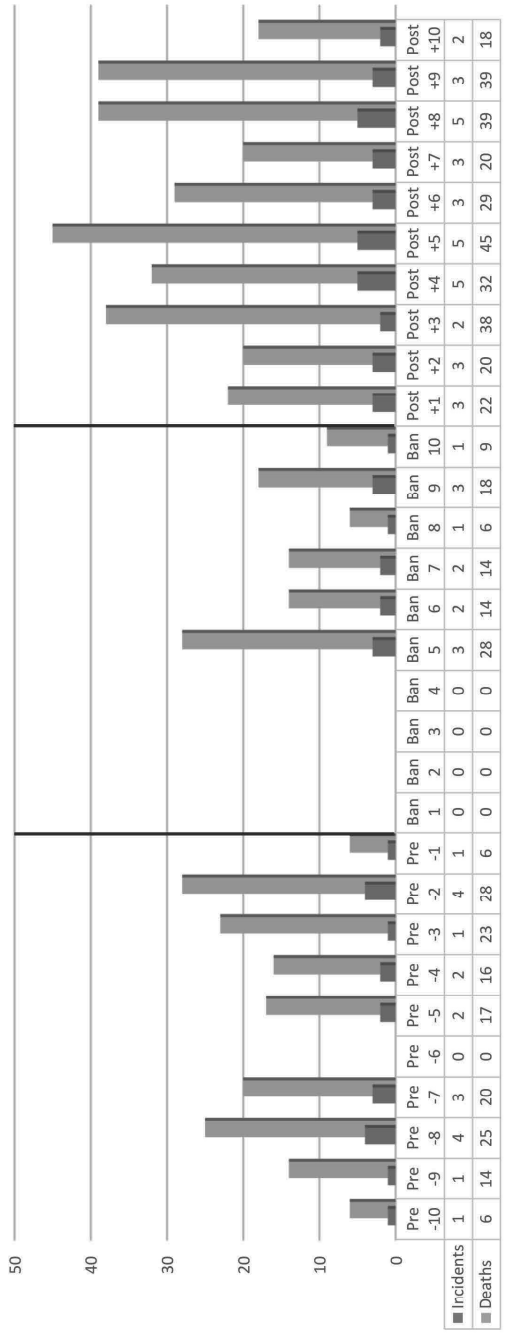


Fig. 7.1. Gun Massacres Before, During, and After the Assault Weapons Ban of 1994.
Note: The lines in the graph demarcate the start and end points of the Assault Weapons Ban, which was in effect from September 13, 1994, through September 12, 2004. The data are drawn from Table 3.2.

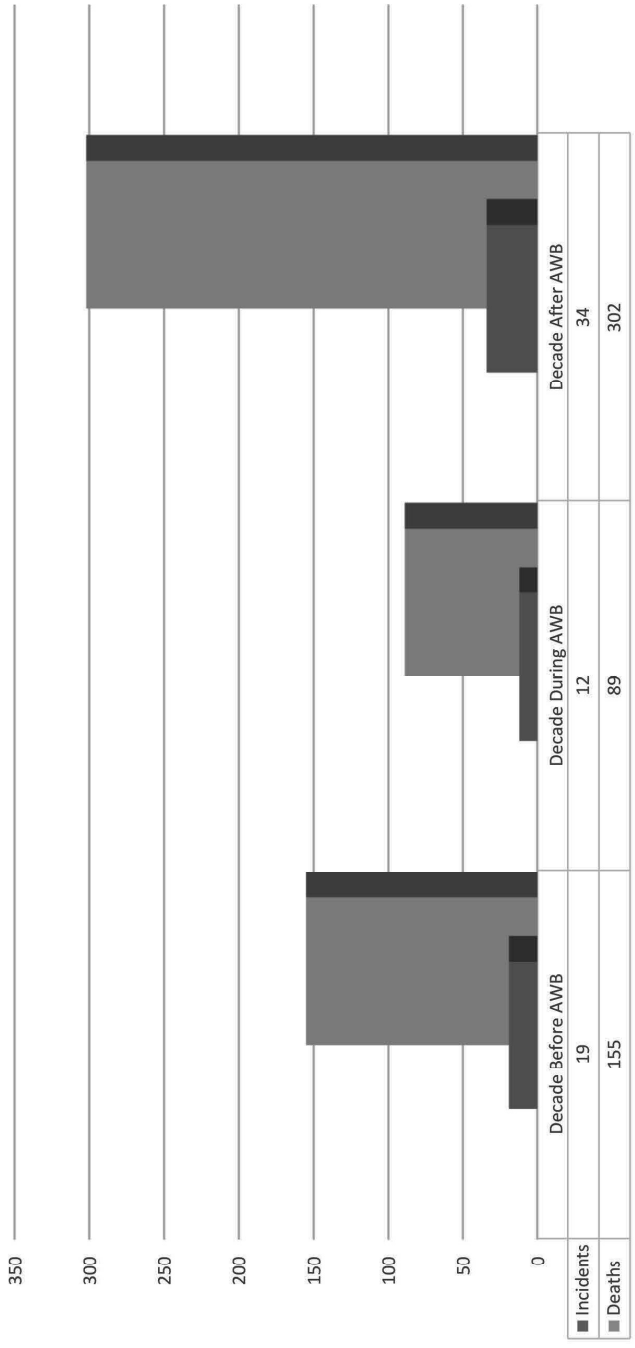


Fig. 7.2. Gun Massacres by Decade Before, During, and After the Assault Weapons Ban of 1994.
Note: The Assault Weapons Ban was in effect from September 13, 1994, through September 12, 2004.
The data are drawn from Table 3.2.

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

ABOUT THE AUTHORS

Louis Klarevas is with the Teachers College, Columbia University, New York, NY. Andrew Conner is with the Frank H. Netter, MD, School of Medicine, Quinnipiac University, North Haven, CT. David Hemenway is with the Harvard T. H. Chan School of Public Health, Harvard University, Boston, MA.

Correspondence should be sent to Louis Klarevas, Research Professor, Office of the Provost, Teachers College, Columbia University, 525 W 120th St, New York, NY 10027 (e-mail: ljk2149@tc.columbia.edu). Reprints can be ordered at http://www.ajph.org by clicking the "Reprints" link.

This article was accepted July 22, 2019.

doi: 10.2105/AJPH.2019.305311

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.

ACKNOWLEDGMENTS

The authors would like to thank John Berrigan, research assistant at the Harvard Injury Control Research Center, for his assistance with the undertaking of this study.

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.

REFERENCES

1. Wintemute GJ. How to stop mass shootings. *N Engl J Med*. 2018;379(13):1193–1196.

2. Reeping PM, Cerda M, Kalesan B, Wiebe DJ, Galea S, Branas CC. State gun laws, gun ownership, and mass shootings in the US: cross sectional time series. *BMJ*. 2019; 364(8190):1542–1548.

3. Sanger-Katz M, Bui Q. How to reduce mass shooting deaths? Experts rank gun laws. *New York Times*. October 5, 2017. Available at: https://www.nytimes.com/interactive/2017/10/05/upshot/how-to-reduce-mass-shooting-deaths-experts-say-these-gun-laws-could-help.html. Accessed June 10, 2019.

4. Kamerow D. Guns don't kill crowds, people with semi-automatics do. *BMJ*. 2011;342(1):d477.

5. Barry CL, Webster DW, Stone E, Crifasi CK, Vernick JS, McGinty EE. Public support for gun violence prevention policies among gun owners and non–gun owners in 2017. *Am J Public Health*. 2018;108(7): 878–881.

6. Lenett MG. Taking a bite out of violent crime. *Univ Dayton Law Rev*. 1995;20(2):573–617.

7. Muchnick JY. The assault weapons ban: saving lives. *Univ Dayton Law Rev*. 1995;20(2):641–651.

8. Koper CS, Roth JA. The impact of the 1994 federal assault weapon ban on gun violence outcomes: an assessment of multiple outcome measures and some lessons for policy evaluation. *J Quant Criminol*. 2001;17(1):33–74.

9. Koper CS, Johnson WD, Nicholas JL, Ayers A, Mullins N. Criminal use of assault weapons and high-capacity semiautomatic firearms: an updated examination of local and national sources. *J Urban Health*. 2018;95(3):313–321.

10. Giffords Law Center to Prevent Gun Violence. Large capacity magazines. Available at: http://lawcenter.giffords.org/gun-laws/policy-areas/hardware-ammunition/large-capacity-magazines. Accessed June 10, 2019.

11. Giffords Law Center to Prevent Gun Violence. Assault weapons. Available at: https://lawcenter.giffords.org/gun-laws/policy-areas/hardware-ammunition/assault-weapons. Accessed June 10, 2019.

12. Webster DW, Champion HR, Gainer PS, Sykes L. Epidemiologic changes in gunshot wounds in Washington, DC, 1983–1990. *Arch Surg*. 1992;127(6): 694–698.

13. Koper CS, Roth JA. A priori assertions versus empirical inquiry: a reply to Kleck. *J Quant Criminol*. 2001; 17(1):81–88.

14. Livingston DH, Lavery RF, Lopreiato MC, Lavery DF, Passannante MR. Unrelenting violence: an analysis of 6,322 gunshot wound patients at a level I trauma center. *J Trauma Acute Care Surg*. 2014;76(1):2–9.

15. Manley NR, Fabian TC, Sharpe JP, Magnotti LJ, Croce MA. Good news, bad news: an analysis of 11,294 gunshot wounds (GSWs) over two decades in a single center. *J Trauma Acute Care Surg*. 2017;84(1):58–65.

16. McCullough J. *The Ultimate Guide to US Army Combat Skills, Tactics and Techniques*. New York, NY: Skyhorse; 2012.

17. Fox JA, DeLateur MJ. Mass shootings in America: moving beyond Newtown. *Homicide Stud*. 2014;18(1): 125–145.

18. Krouse WJ, Richardson DJ. Mass murder with firearms: incidents and victims, 1999–2013. CRS Report R44126. Washington, DC: Congressional Research Service; 2015.

19. Wilson LC. *The Wiley Handbook of the Psychology of Mass Shootings*. Hoboken, NJ: Wiley; 2016.

20. Klarevas L. *Rampage Nation: Securing America From Mass Shootings*. Amherst, NY: Prometheus; 2016.

21. Schildkraut J, Elsass HJ. *Mass Shootings: Media, Myths, and Realities*. Denver, CO: Praeger; 2016.

22. Schildkraut J. *Mass Shootings in America: Understanding the Debates, Causes, and Responses*. Denver, CO: ABC-CLIO; 2018.

23. Rocque M, Duwe G. Rampage shootings: an historical, empirical, and theoretical overview. *Curr Opin Psychol*. 2018;19(1):28–33.

24. Phaneuf SW. Mass shootings: understanding the complexities. In: Hilinski-Rosick CM, Lee DR, eds. *Contemporary Issues in Victimology: Identifying Patterns and Trends*. New York, NY: Lexington; 2018.

25. Moody CE, Marvell TB. Clustering and standard error bias in fixed effects panel data regressions. *J Quant Crim*; 2018:1–23.

26. Gius M. The impact of state and federal assault weapons bans on public mass shootings. *Appl Econ Lett*. 2015;22(4):281–284.

27. Blau BM, Gorry DH, Wade C. Guns, laws and public shootings in the United States. *Appl Econ*. 2016;48(49): 4732–4746.

28. Follman M, Aronsen G, Pan D. A guide to mass shootings in America. *Mother Jones*. May 31, 2019. Available at: https://www.motherjones.com/politics/2012/07/mass-shootings-map. Accessed June 10, 2019.

29. Kleck G. Large-capacity magazines and the casualty counts in mass shootings: the plausibility of linkages. *Justice Res Policy*. 2016;17(1):28–47.

30. Webster DW, Donohue JJ, Klarevas L, et al. Firearms on college campuses: research evidence and policy implications. Report of the Johns Hopkins University Center for Gun Policy and Research. Baltimore, MD: Johns Hopkins Bloomberg School of Public Health; 2016.

31. Kleck G. *Targeting Guns: Firearms and Their Control*. Hawthorne, NY: Aldine de Gruyter; 1997.

32. Hemenway D. *Private Guns, Public Health*. Ann Arbor, MI: University of Michigan Press; 2017.

33. Azrael D, Cook PJ, Miller M. State and local prevalence of firearms ownership: measurement, structure and trends. *J Quant Criminol*. 2004;20(1):43–62.

34. Conley TG, Taber CR. Inference with "difference in differences" with a small number of policy changes. *Rev Econ Stat*. 2011;93(1):113–125.

35. Button KS, Ioannidis JPA, Mokrysz C, et al. Power failure: why small sample size undermines the reliability of neuroscience [erratum *Nat Rev Neurosci*. 2013;14(6):451]. *Nat Rev Neurosci*. 2013;14(5):365–376.

Exhibit G

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

Charles DiMaggio, PhD, MPH, Jacob Avraham, MD, Cherisse Berry, MD, Marko Bukur, MD, Justin Feldman, ScD, Michael Klein, MD, Noor Shah, MD, Manish Tandon, MD, *and* **Spiros Frangos, MD, MPH**, *New York, New York*

AAST Continuing Medical Education Article

Accreditation Statement

This activity has been planned and implemented in accordance with the Essential Areas and Policies of the Accreditation Council for Continuing Medical Education through the joint providership of the American College of Surgeons and the American Association for the Surgery of Trauma. The American College Surgeons is accredited by the ACCME to provide continuing medical education for physicians.

AMA PRA Category 1 Credits™

The American College of Surgeons designates this journal-based CME activity for a maximum of 1 *AMA PRA Category 1 Credit*™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

Of the *AMA PRA Category 1 Credit*™ listed above, a maximum of 1 credit meets the requirements for self-assessment.

Credits can only be claimed online

AMERICAN COLLEGE OF SURGEONS
Inspiring Quality: Highest Standards, Better Outcomes
100+*years*

Objectives

After reading the featured articles published in the *Journal of Trauma and Acute Care Surgery*, participants should be able to demonstrate increased understanding of the material specific to the article. Objectives for each article are featured at the beginning of each article and online. Test questions are at the end of the article, with a critique and specific location in the article referencing the question topic.

Claiming Credit

To claim credit, please visit the AAST website at http://www.aast.org/ and click on the "e-Learning/MOC" tab. You must read the article, successfully complete the post-test and evaluation. Your CME certificate will be available immediately upon receiving a passing score of 75% or higher on the post-test. Post-tests receiving a score of below 75% will require a retake of the test to receive credit.

Disclosure Information

In accordance with the ACCME Accreditation Criteria, the American College of Surgeons, as the accredited provider of this journal activity, must ensure that anyone in a position to control the content of *J Trauma Acute Care Surg* articles selected for CME credit has disclosed all relevant financial relationships with any commercial interest. Disclosure forms are completed by the editorial staff, associate editors, reviewers, and all authors. The ACCME defines a `commercial interest' as "any entity producing, marketing, re-selling, or distributing health care goods or services consumed by, or used on, patients." "Relevant" financial relationships are those (in any amount) that may create a conflict of interest and occur within the 12'months preceding and during the time that the individual is engaged in writing the article. All reported conflicts are thoroughly managed in order to ensure any potential bias within the content is eliminated. However, if you'perceive a bias within the article, please report the circumstances on the evaluation form.

Please note we have advised the authors that it is their responsibility to disclose within the article if they are describing the use of a device, product, or drug that is not FDA approved or the off-label use of an approved device, product, or drug or unapproved usage.

Disclosures of Significant Relationships with Relevant Commercial Companies/Organizations by the Editorial Staff

Ernest E. Moore, Editor: PI, research support and shared U.S. patents Haemonetics; PI, research support, Instrumentation Laboratory, Inc.; Co-founder, Thrombo Therapeutics. Associate Editors David Hoyt, Ronald V. Maier and Steven Shackford have nothing to disclose. Editorial staff and Angela Sauaia have nothing to disclose.

Author Disclosures

The authors have nothing to disclose.

Reviewer Disclosures

The reviewers have nothing to disclose.

Cost

For AAST members and *Journal of Trauma and Acute Care Surgery* subscribers there is no charge to participate in this activity. For those who are not a member or subscriber, the cost for each credit is $25.

System Requirements

The system requirements are as follows: Adobe® Reader 7.0 or above installed; Internet Explorer® 7 and above; Firefox® 3.0 and above, Chrome® 8.0 and above, or Safari™ 4.0 and above.

Questions

If you have any questions, please contact AAST at 800-789-4006. Paper test and evaluations will not be accepted.

From the Department of Surgery, Division of Trauma and Critical Care Surgery (C.D., J.A., C.B., M.B., J.F., M.K., N.S., M.T., S.F.), New York University School of Medicine, New York, New York.
Address for reprints: Charles DiMaggio, PhD, MPH, Department of Surgery, New York University School of Medicine, 462 First Ave, NBV 15, New York, NY 10016-9196; email: Charles.DiMaggio@nyumc.org.
77th Annual Meeting of AAST and the World Trauma Congress, Sep 26 - 29, 2018, San Diego, California.

DOI: 10.1097/TA.0000000000002060

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

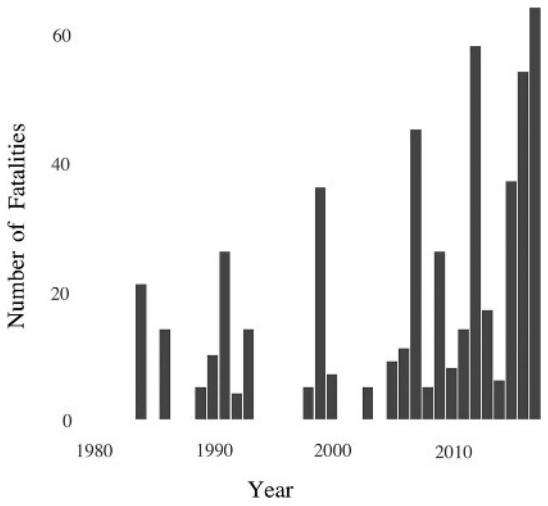


Figure 1. Mass shooting deaths. United States 1981–2017.

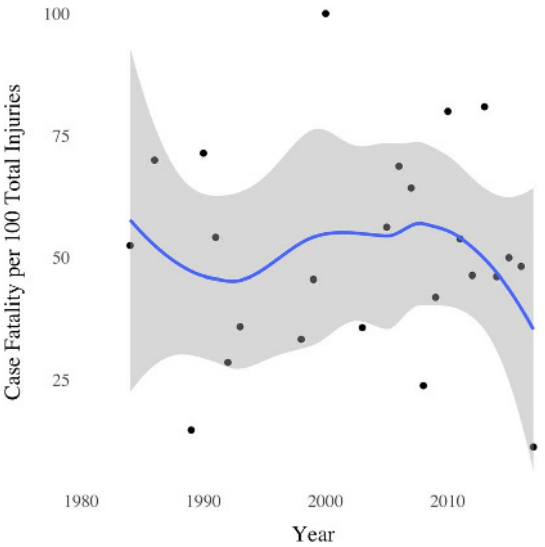


Figure 2. Case fatality per 100 total mass-shooting injuries with loess smoothing line for trend and standard error bounds. United States 1981–2017.

(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

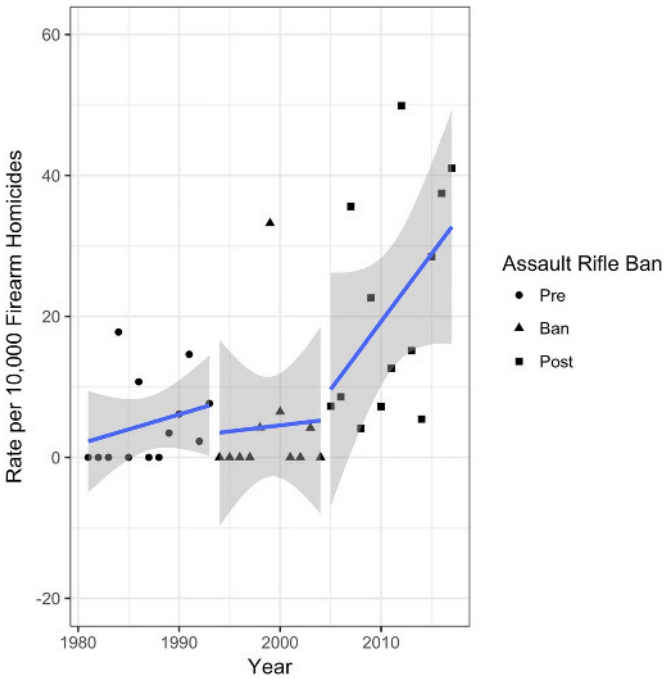


Figure 3. Mass shooting deaths per 10,000 firearm-related homicides with linear trends for preban, ban, and postban periods. United States 1981–2017.

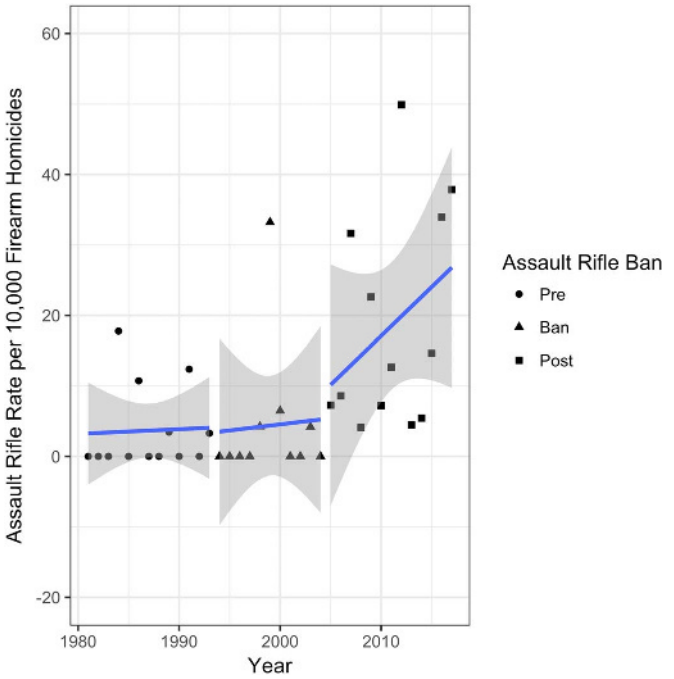


Figure 4. Mass-shooting shooting deaths per 10,000 firearm-related homicides restricted to incidents involving assault weapons with linear trends for preban, ban, and postban periods. United States 1981–2017.

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.
There are no federal or nonfederal funding sources associated with this study.

REFERENCES

1. Wolchover N. Why gun control is so contentious in the US. *LiveScience*. 20 July 2012 https://www.livescience.com/21741-gun-control-second-amendment.html. Accessed 10 August 2018.
2. Bond S. Students take the lead in US gun control debate. *Financial Times*. 23 February 2018. https://www.ft.com/content/9341021e-1818-11e8-9376-4a6390addb44. Accessed 10 August 2018.
3. Lemieux F. 6 things to know about mass shootings in America. *Scientific American*. 13 June 2016. https://www.scientificamerican.com/article/6-things-to-know-about-mass-shootings-in-america/. Accessed 6 June 2018.
4. Webster DW. The true effect of mass shootings on Americans. *Annals of Internal Medicine*. 16 May 2017. The http://annals.org/aim/fullarticle/2624992/true-effect-mass-shootings-americans. Accessed 6 June 2018.
5. Katsiyannis A, Whitford DK, Ennis RB. Historical examination of United States intentional mass school shootings in the 20th and 21st centuries: implications for students, schools, and society. *Child Fam Stud*. (19 April 2018). https://doi.org/10.1007/s10826-018-1096-2.
6. Follman M. Mass shootings: maybe what we need is a better mental-health policy. *Mother Jones*. 9 November 2012. https://www.motherjones.com/politics/2012/11/jared-loughner-mass-shootings-mental-illness/. Accessed 11 August 2018.
7. Carey B. "Are mass murderers insane? Usually not, researchers say". *New York Times*. 8 November 2017. https://www.nytimes.com/2017/11/08/health/mass-murderers-mental-illness.html. Accessed 11 August 2018.
8. Duwe G, Rocque M. Actually, there is a clear link between mass shootings and mental illness. *Los Angeles Times*. 23 February 2018. http://www.latimes.com/opinion/op-ed/la-oe-duwe-rocque-mass-shootings-mental-illness-20180223-story.html. Accessed 11 August 2018.
9. Gillin J, Greenberg J, Jacobson L, Valverde M. The facts on mass shootings in the United States. *Politifact*. 8 November 2017. http://www.politifact.com/truth-o-meter/article/2017/nov/08/facts-mass-shootings-united-states/. Access 6 June 2018.
10. Sanger-Katz M, Bui Q. How to reduce mass shooting deaths? Experts rank gun laws. *New York Times*. 5 October 2017. https://www.nytimes.com/interactive/2017/10/05/upshot/how-to-reduce-mass-shooting-deaths-experts-say-these-gun-laws-could-help.html. Accessed 6 June 2018.

11. Weil DS, Knox RC. The Maryland ban on the sale of assault pistols and high-capacity magazines: estimating the impact in Baltimore. *Am J Public Health*. 1997;87(2):297–298.
12. Safavi A, Rhee P, Pandit V, Kulvatunyou N, Tang A, Aziz H, Green D, O'Keeffe T, Vercruysse G, Friese RS, et al. Children are safer in states with strict firearm laws: a national inpatient sample study. *J Trauma Acute Care Surg*. 2014;76(1):146–150; discussion 150–1.
13. Koper CS, Roth JA. The impact of the 1994 Federal Assault Weapon ban on gun violence outcomes: an assessment of multiple outcome measures and some lessons for policy evaluation. *J Quant Criminol*. 2001; Vol. 17, No. 1.
14. Gius M. The impact of state and federal assault weapons bans on public mass shootings. *Applied Economics Letters*. 2015;22(4):281–284.
15. Lemieux F, Bricknell S, Prenzler T. Mass shootings in Australia and the United States, 1981-2013. *Journal of Criminological Research, Policy and Practice*. 1(3):131–142.
16. Follman M, Aronsen G, Pan D, Caldwell M. US mass shootings, 1982-2018: data from mother Jones' investigation. *Mother Jones*. 2012; https://www.motherjones.com/politics/2012/12/mass-shootings-mother-jones-full-data/. Accessed 3 June 2018.
17. The Los Angeles times staff. "Deadliest U.S. mass shootings", 1984-2017. *Los Angeles Times*. Oct 1, 2017, timelines latimes.com/deadliest-shooting-rampages/. Accessed 29 August 2018.
18. Stanford mass shootings in America, courtesy of the Stanford Geospatial Center and Stanford libraries. 2016. Available at: https://library.stanford.edu/projects/mass-shootings-america. Accessed 29 August 2018.
19. Fox JA, Levin J, Fridel EE. *Extreme Killing: Understanding Serial and Mass Murder*. Sage Publications; 2018.
20. Dillon L. *Mass Shootings in the U.S.: An Exploratory Study of the Trends from 1982–2012*. PhD thesis; 2014.
21. Lankford A. Public mass shooters and firearms: a cross-national study of 171 countries. *Violence Vict*. 2016;31(2):187.
22. Lowe SR, Galea S. The mental health consequences of mass shootings. *Trauma Violence Abuse*. 2017;18(1):62–82.
23. Fox JA, Fridel EE. The tenuous connections involving mass shootings, mental illness, and gun laws. *Violence Gend*. 2016;3(1):14–19.
24. Luca M, Malhotra DK, Poliquin C. The impact of mass shootings on gun policy. *Harvard Business School NOM Unit Working Paper No*. 2016;1:16–126.
25. Buchholtz LK. Command-directed mental health evaluations and mental health related discharges from the U.S. military: an argument for command authority. *J Health Care Finance*. 2016.
26. Bradley K. Code blue: the expanding field of tactical/battlefield medicine. *J Law Enforcement*. 2017;6(2).
27. Smart R. Mass shootings: definitions and trends. RAND Corporation. https://www.rand.org/research/gun-policy/analysis/supplementary/mass-shootings.html. Accessed 2 June 2018.
28. Krouse WJ, Richardson DJ. *Mass Murder with Firearms: Incidents and Victims, 1999–2013*. Washington, D.C.: Congressional Research Service, R44126 2015.
29. Centers for Disease Control and Prevention. CDC's WISQARS (web-based injury statistics query and reporting system). https://www.cdc.gov/injury/wisqars/fatal.html. Accessed 12 February 2018.
30. The online gun violence archive: past summary ledgers. http://www.gunviolencearchive.org/past-tolls. Accessed 12 February 2018.
31. Studdert DM, Donohue JJ, Mello MM. Testing the immunity of the firearm industry to tort litigation. *JAMA Intern Med*. 2017;177(1):102–105.
32. Public Safety and Recreational Firearms Act. P.L. 103-322, Title XI. 103rd Cong. (1994).
33. Kuhls DA, Campbell BT, Burke PA, Allee L, Hink A, Letton RW, Masiakos PT, Coburn M, Alvi M, Lerer TJ, et al. Survey of American College of Surgeons Committee on trauma members on firearm injury: consensus and opportunities. *J Trauma Acute Care Surg*. 2017;82(5):877–886.
34. Puls M, Kuhls D, Campbell B, Burke P, Michelassi F, Stewart R. Survey of the American College of Surgeons Board of governors on firearm injury prevention: consensus and opportunities. *Bull Am Coll Surg*. 2017; 102(10):30–36.
35. Weinberger SE, Hoyt DB, Lawrence HC 3rd, Levin S, Henley DE, Alden ER, Wilkerson D, Benjamin GC, Hubbard WC. Firearm-related injury and death in the U.S.: a call to action from 8 health professional organizations and the American Bar Association. *Ann Intern Med*. 2015;162(7):513–516.
36. Chapman S, Alpers P, Jones M. Association between gun law reforms and intentional firearm deaths in Australia, 1979-2013. *JAMA*. 2016;316(3): 291–299.
37. DiMaggio C, Ayoung-Chee P, Shinseki M, Wilson C, Marshall G, Lee DC, Wall S, Maulana S, Leon Pachter H, Frangos S. Traumatic injury in the U.S.: in-patient epidemiology 2000-2011. *Injury*. 2016;47(7):1393–1403.
38. Peek-Asa C, Butcher B, Cavanaugh JE. Cost of hospitalization for firearm injuries by firearm type, intent, and payer in the U.S. *Inj Epidemiol*. 2017; 4(1):20.
39. Wexler L. "gun shy: how a lack of funds translates to inadequate research on gun violence in America". *Hopkins Bloomberg Public Health Fall*. 2017; https://magazine.jhsph.edu/2017/fall/features/cassandra-crifasi-hopkins-moderate-gun-owner-gun-policy-researcher/how-the-dickey-amendment-affects-gun-violence-research.html. Access 5 June 2018.
40. Greenberg J. Spending bill's gun research line: does it nullify dickey amendment? *Politifact*. 27 March 2018. http://www.politifact.com/truth-o-meter/article/2018/mar/27/spending-bills-gun-research-line-does-it-matter/. Accessed 6 June 2018.
41. Pinals DA, Anacker L. Mental illness and firearms: legal context and clinical approaches. *Psychiatr Clin North Am*. 2016;39(4):611–621.
42. Leiner M, De la Vega I, Johansson B. Deadly mass shootings, mental health, and policies and regulations: what we are obligated to do!. *Front Pediatr*. 2018;6:99.
43. Swartz MS, Bhattacharya S, Robertson AG, Swanson JW. Involuntary outpatient commitment and the elusive pursuit of violence prevention. *Can J Psychiatry*. 2017;62(2):102–108.
44. Studdert DM, Zhang Y, Rodden JA, Hyndman RJ, Wintemute GJ. Handgun acquisitions in California after two mass shootings. *Ann Intern Med*. 2017; 166(10):698–706.
45. Stroebe W, Leander NP, Kruglanski AW. The impact of the Orlando mass shooting on fear of victimization and gun-purchasing intentions: not what one might expect. *PLoS One*. 2017;12(8):e0182408.
46. Smith ER, Shapiro G, Sarani B. The profile of wounding in civilian public mass shooting fatalities. *J Trauma Acute Care Surg*. 2016;81(1):86–92.
47. Behrman P, Redding CA, Raja S, Newton T, Beharie N, Printz D. Society of Behavioral Medicine (SBM) position statement: restore CDC funding for firearms and gun violence prevention research. *Transl Behav Med*. 2018.
48. Wong S. "GOP chairman: congress should rethink CDC ban on gun violence research". *The Hill*. 15 February 2018 http://thehill.com/homenews/house/374149-gop-chairman-congress-should-rethink-cdc-ban-on-gun-violence-research. Accessed 5 June 2018.
49. Basu S, Meghani A, Siddiqi A. Evaluating the health impact of large-scale public policy changes: classical and novel approaches. *Annu Rev Public Health*. 2017;38:351–370.
50. Drange M. The Kentucky gun owner who developed his own count of gun violence in the US. *The Guardian*. 23 April 2016. https://www.theguardian.com/world/2016/apr/23/kentucky-gun-owner-gun-violence-archive-mark-bryant. Accessed 5 June 2018.
51. Murphy SL, Xu J, Kochanek KD, Curtin SA, Elizabeth Arias E. *National Vital Statistics Reports*. Volume 66, Number 6 November 27, 2017. Deaths: Final Data for 2015. Centers for Disease Control and Prevention.

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.

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

Lori Post[1], PhD; Maryann Mason[1], PhD; Lauren Nadya Singh[1], MPH; Nicholas P Wleklinski[2], MD; Charles B Moss[3], PhD; Hassan Mohammad[1]; Tariq Z Issa[2], BA; Adesuwa I Akhetuamhen[2], MD; Cynthia A Brandt[4], MD, MPH; Sarah B Welch[1], MPH; James Francis Oehmke[1], PhD

[1]Buehler Center for Health Policy and Economics, Feinberg School of Medicine, Northwestern University, Chicago, IL, United States
[2]Feinberg School of Medicine, Northwestern University, Chicago, IL, United States
[3]Institute of Food and Agricultural Sciences, University of Florida, Gainsville, FL, United States
[4]Yale Center for Medical Informatics, Yale School of Medicine, Yale University, New Haven, CT, United States

Corresponding Author:
Lori Post, PhD
Buehler Center for Health Policy and Economics
Feinberg School of Medicine
Northwestern University
420 E Superior
Chicago, IL, 60611
United States
Phone: 1 203 980 7107
Email: lori.post@northwestern.edu

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.

(JMIR Public Health Surveill 2021;7(4):e26042) doi: 10.2196/26042

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.

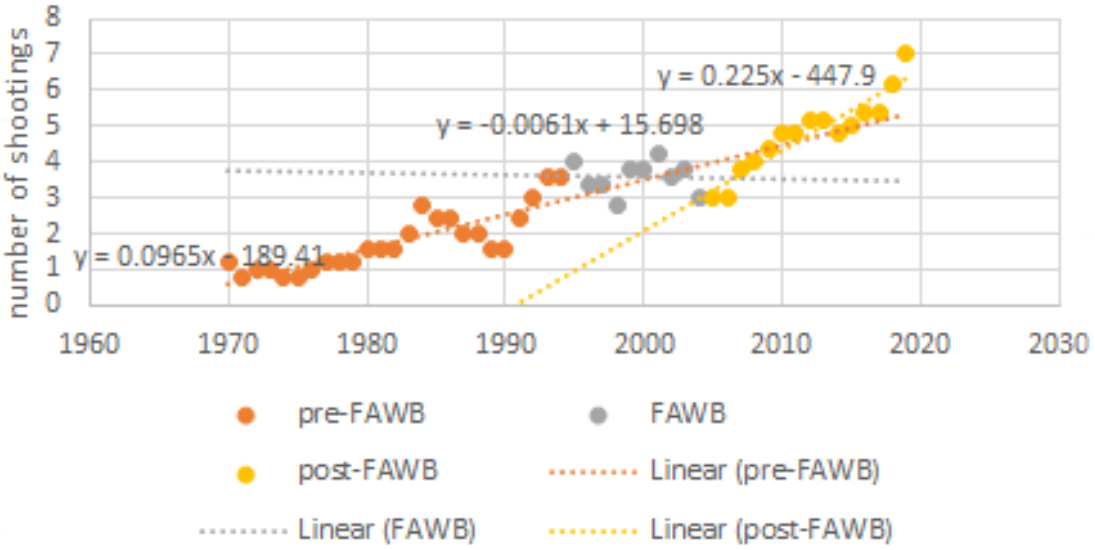
We performed a regression of the 5-year moving average of public mass shootings on the US population in millions, the homicide rate, and discontinuity variables to capture both the effects of the FAWB and its discontinuation. We did not introduce a trend line for the entire sample period because it is 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).

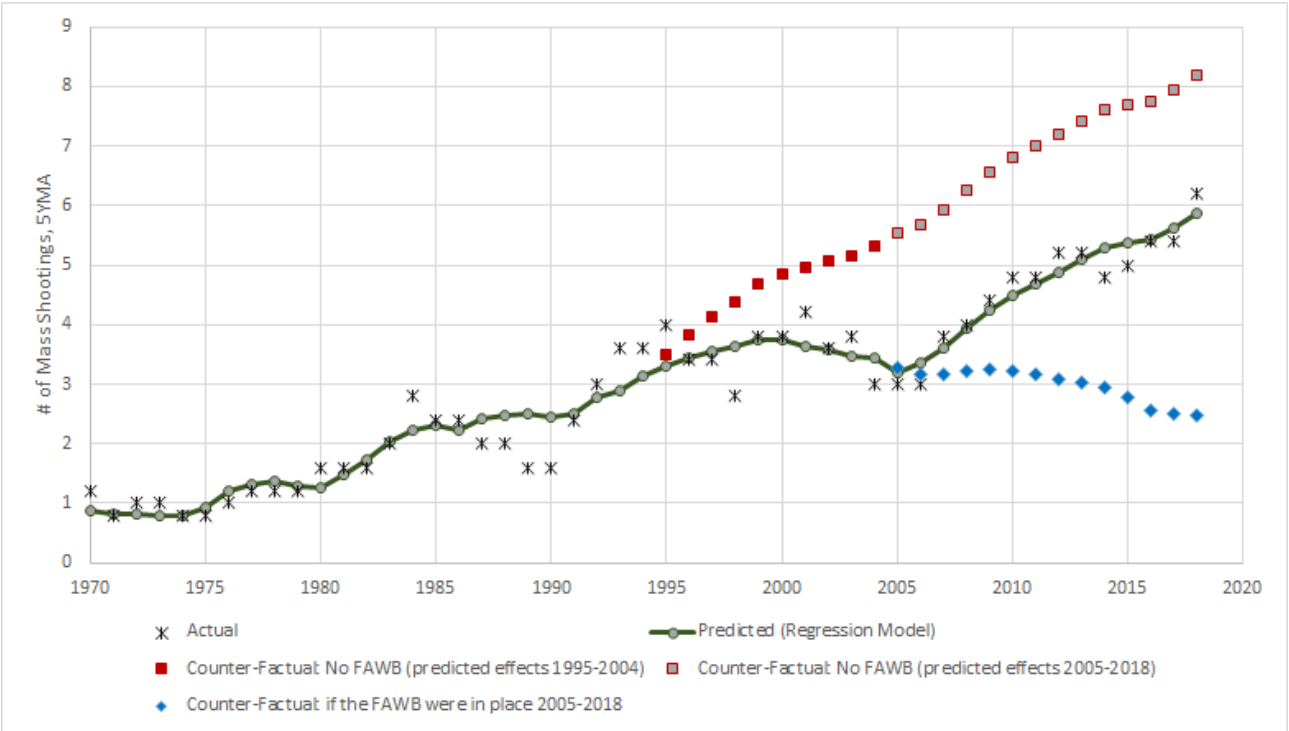
Figure 1. Public mass shooting trend line using five year moving averages (1966-2019).



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].

Acknowledgments

The Violence Project Mass Shooter database generated data for our surveillance. This study was financially supported by the Buehler Endowment at Feinberg School of Medicine.

Conflicts of Interest

None declared.

References

1. Web-based Injury Statistics Query and Reporting System. Centers for Disease Control and Prevention, Injury Prevention and Control. 2020 Jul 01. URL: https://www.cdc.gov/injury/wisqars/index.html [accessed 2021-01-15]
2. Christensen AJ, Cunningham R, Delamater A, Hamilton N. Introduction to the special issue on gun violence: addressing a critical public health challenge. J Behav Med 2019 Aug;42(4):581-583. [doi: 10.1007/s10865-019-00075-8] [Medline: 31367923]
3. Drake B. Mass shootings rivet national attention, but are a small share of gun violence. Pew Research Center. 2013 Sep 17. URL: https://www.pewresearch.org/fact-tank/2013/09/17/mass-shootings-rivet-national-attention-but-are-a-small-share-of-gun-violence/ [accessed 2020-12-10]
4. Bowers TG, Holmes ES, Rhom A. The nature of mass murder and autogenic massacre. J Police Crim Psych 2009 Nov 7;25(2):59-66. [doi: 10.1007/s11896-009-9059-6]
5. Delisi M, Scherer AM. Multiple homicide offenders. Crim Justice Behav 2016 Jun 30;33(3):367-391. [doi: 10.1177/0093854806286193]
6. Mass shooter database. The Violence Project. 2020. URL: https://www.theviolenceproject.org/ [accessed 2021-01-14]
7. Shelby D. Association between adult alcohol misuse, adult mental health, and firearm storage practices in households with children: findings from the Behavioral Risk Factor Surveillance System (BRFSS). MPH Thesis. ScholarWorks @ Georgia State University. 2021 Dec 09. URL: https://scholarworks.gsu.edu/iph_theses/725 [accessed 2021-01-08]
8. Loder R, Mishra A, Atoa B, Young A. Spinal injury associated with firearm use. Cureus 2021 Mar 16;13(3):e13918 [FREE Full text] [doi: 10.7759/cureus.13918]
9. Mueller KL, Trolard A, Moran V, Landman JM, Foraker R. Positioning public health surveillance for observational studies and clinical trials: The St. Louis region-wide hospital-based violence intervention program data repository. Contemp Clin Trials Commun 2021 Mar;21:100683 [FREE Full text] [doi: 10.1016/j.conctc.2020.100683] [Medline: 33385095]

10. Horn DL, Butler EK, Stahl JL, Rowhani-Rahbar A, Littman AJ. A multi-state evaluation of the association between mental health and firearm storage practices. Prev Med 2021 Apr;145:106389. [doi: 10.1016/j.ypmed.2020.106389] [Medline: 33385422]
11. Gunn JF, Boxer P. Gun laws and youth gun carrying: results from the youth risk behavior surveillance system, 2005-2017. J Youth Adolesc 2021 Mar;50(3):446-458. [doi: 10.1007/s10964-020-01384-x] [Medline: 33420890]
12. Rozel J, Soliman L, Jain A. The gun talk: how to have effective conversations with patients and families about firearm injury prevention. In: Zun LS, Nordstrom K, Wilson MP, editors. Behavioral Emergencies for Healthcare Providers. Switzerland: Springer; Jan 05, 2021:465-473.
13. Keyes KM, Kandula S, Olfson M, Gould MS, Martínez-Alés G, Rutherford C, et al. Suicide and the agent–host–environment triad: leveraging surveillance sources to inform prevention. Psychol Med 2021 Mar 05;51(4):529-537. [doi: 10.1017/s003329172000536x]
14. Bluestein G, Hallerman T. Future directions for firearm injury intervention, policy, and research. In: Lee LK, Fleeger EW, editors. Pediatric Firearm Injuries and Fatalities: The Clinician's Guide to Policies and Approaches to Firearm Harm Prevention. Switzerland: Springer; Feb 06, 2021:223-234.
15. Oehmke J, Moss C, Singh L, Oehmke T, Post L. Dynamic panel surveillance of COVID-19 transmission in the United States to inform health policy: observational statistical study. J Med Internet Res 2020 Oct 05;22(10):e21955 [FREE Full text] [doi: 10.2196/21955] [Medline: 32924962]
16. Oehmke J, Oehmke T, Singh L, Post L. Dynamic panel estimate-based health surveillance of SARS-CoV-2 infection rates to inform public health policy: model development and validation. J Med Internet Res 2020 Sep 22;22(9):e20924 [FREE Full text] [doi: 10.2196/20924] [Medline: 32915762]
17. Post L, Benishay E, Moss C, Murphy R, Achenbach C, Ison M, et al. Surveillance metrics of SARS-CoV-2 transmission in central Asia: longitudinal trend analysis. J Med Internet Res 2021 Feb 03;23(2):e25799 [FREE Full text] [doi: 10.2196/25799] [Medline: 33475513]
18. Post LA, Issa TZ, Boctor MJ, Moss CB, Murphy RL, Ison MG, et al. Dynamic public health surveillance to track and mitigate the US COVID-19 epidemic: longitudinal trend analysis study. J Med Internet Res 2020 Dec 03;22(12):e24286 [FREE Full text] [doi: 10.2196/24286] [Medline: 33216726]
19. Post LA, Lin JS, Moss CB, Murphy RL, Ison MG, Achenbach CJ, et al. SARS-CoV-2 wave two surveillance in East Asia and the Pacific: longitudinal trend analysis. J Med Internet Res 2021 Feb 01;23(2):e25454 [FREE Full text] [doi: 10.2196/25454] [Medline: 33464207]
20. Post L, Marogi E, Moss CB, Murphy RL, Ison MG, Achenbach CJ, et al. SARS-CoV-2 surveillance in the Middle East and North Africa: longitudinal trend analysis. J Med Internet Res 2021 Jan 15;23(1):e25830 [FREE Full text] [doi: 10.2196/25830] [Medline: 33302252]
21. Post LA, Argaw ST, Jones C, Moss CB, Resnick D, Singh LN, et al. A SARS-CoV-2 surveillance system in Sub-Saharan Africa: modeling study for persistence and transmission to inform policy. J Med Internet Res 2020 Nov 19;22(11):e24248 [FREE Full text] [doi: 10.2196/24248] [Medline: 33211026]
22. Teutsch S, Thacker S. Planning a public health surveillance system. Epidemiol Bull 1995 Mar;16(1):1-6. [Medline: 7794696]
23. Jacobs J, Fuhr Z. The Safe Act: New York's ban on assault weapons and large capacity magazines. Crim Law Bull 2017 Jun 29;53(1):4 [FREE Full text]
24. Wallace EG. Assault weapon myths. South Ill Univ Law J 2018 Nov 18;43:193. [doi: 10.4135/9781452229300.n127]
25. Kopel D, Lowy J, Rostron A. Heller and "Assault Weapons". Campbell Law Rev 2018 Feb 02;40(2):461-480 [FREE Full text]
26. Pfau MW. Defining the deadly: definitional argument and the assault weapons ban controversy. Argum Advocacy 2020 Jul 20;56(3):155-173. [doi: 10.1080/10511431.2020.1793276]
27. Koper CS, Johnson WD, Nichols JL, Ayers A, Mullins N. Criminal use of assault weapons and high-capacity semiautomatic firearms: an updated examination of local and national sources. J Urban Health 2018 Jun;95(3):313-321 [FREE Full text] [doi: 10.1007/s11524-017-0205-7] [Medline: 28971349]
28. United States Congress House Committee on the Judiciary. Subcommittee on Crime and Criminal Justice. Public Safety and Recreational Firearms Use Protection Act. In: Hearing before the Subcommittee on Crime and Criminal Justice of the Committee on the Judiciary, House of Representatives, One Hundred Third Congress, second session, on H.R. 3527. Washington, DC: US Government; Apr 25, 1994.
29. Klarevas L, Conner A, Hemenway D. The effect of large-capacity magazine bans on high-fatality mass shootings, 1990–2017. Am J Public Health 2019 Dec;109(12):1754-1761. [doi: 10.2105/ajph.2019.305311]
30. Kleck G. Large-capacity magazines and the casualty counts in mass shootings. Justice Res Policy 2016 Jun 01;17(1):28-47. [doi: 10.1177/1525107116674926]
31. Abbasi J. Large-capacity magazine bans linked with fewer mass shootings, deaths. JAMA 2020 Jan 14;323(2):108-109. [doi: 10.1001/jama.2019.20457] [Medline: 31851333]
32. Koper CS. Assessing the potential to reduce deaths and injuries from mass shootings through restrictions on assault weapons and other high‐capacity semiautomatic firearms. Criminol Public Policy 2020 Jan 10;19(1):147-170. [doi: 10.1111/1745-9133.12485]

33. Towers S, Wallace D, Hemenway D. Temporal trends in public mass shootings: high-capacity magazines significantly increase fatality counts, and are becoming more prevalent. medRxiv preprint server. 2019 Dec 15. URL: https://www.medrxiv.org/content/10.1101/2019.12.12.19014738v1 [accessed 2021-04-17]
34. Webster DW, McCourt AD, Crifasi CK, Booty MD, Stuart EA. Evidence concerning the regulation of firearms design, sale, and carrying on fatal mass shootings in the United States. Criminol Public Policy 2020 Jan 30;19(1):171-212. [doi: 10.1111/1745-9133.12487]
35. Lowy J. Comments on assault weapons, the right to arms, and the right to live. Harv J Law Public Policy 2020;43(2):375-386 [FREE Full text]
36. Kim A. United States gun policy and the effect on mass shootings. California State University Northridge Scholarworks Open Access Repository. Northridge, CA: CSU Northridge University Library; 2020 Aug 25. URL: http://hdl.handle.net/10211.3/217278 [accessed 2020-12-06]
37. Pfau MW. Defining the deadly: definitional argument and the assault weapons ban controversy. Argum Advocacy 2020 Jul 20;56(3):155-173. [doi: 10.1080/10511431.2020.1793276]
38. Balakrishna M, Wilbur KC. How the Massachusetts Assault Weapons Ban Enforcement Notice changed firearm sales. SSRN J 2021 Feb 4:1-51 [FREE Full text] [doi: 10.2139/ssrn.3779510]
39. Soto L, Chheda S, Soto J. Reducing fatalities in mass attacks and the related matter of gun control policy following the El Paso August 2019 shooting. Tex Hisp J Law Policy 2020;26:85.
40. Nagin DS, Koper CS, Lum C. Policy recommendations for countering mass shootings in the United States. Criminol Public Policy 2020 Jan 10;19(1):9-15. [doi: 10.1111/1745-9133.12484]
41. Gay C. 'Red Flag' laws: how law enforcement's controversial new tool to reduce mass shootings fits within current Second Amendment jurisprudence. Boston Coll Law Rev 2020 Apr 30;61(4):1491-1533 [FREE Full text]
42. Nielsen D. Disarming dangerous persons: how Connecticut's Red Flag Law saves lives without jeopardizing constitutional protections. Quinnipiac Health Law J 2020;23(3):253.
43. Blocher J, Charles J. Firearms, extreme risk, and legal design: “Red Flag” laws and due process. Virginia Law Rev 2020 Oct 19;106(6):1285.
44. Kopel DB. Red Flag Laws: proceed with caution. Law Psychol Rev 2020 Jul 16:forthcoming [FREE Full text] [doi: 10.2139/ssrn.3653555]
45. Blodgett S. Dementia, guns, Red Flag laws: Can Indiana's Statute balance elders' constitutional rights and public safety? NAELA J 2020 Sep;16:1-22 [FREE Full text]
46. Kerr S. "What We Need Is Bullet Control": could regulation of bullets reduce mass shootings? In: Crews G, editor. Handbook of Research on Mass Shootings and Multiple Victim Violence. Hershey, PA: IGI Global; Oct 2019:432-446.
47. Moore EE. Another mass shooting: Time to ban the assault rifle. J Trauma Acute Care Surg 2018 Jun;84(6):1036. [doi: 10.1097/TA.0000000000001863] [Medline: 29799817]
48. Delaney GA, Charles JD. A double-filter provision for expanded Red Flag laws: a proposal for balancing rights and risks in preventing gun violence. J Law Med Ethics 2020 Dec;48(4_suppl):126-132. [doi: 10.1177/1073110520979412] [Medline: 33404308]
49. Honberg RS. Mental illness and gun violence: research and policy options. J Law Med Ethics 2020 Dec;48(4_suppl):137-141. [doi: 10.1177/1073110520979414] [Medline: 33404306]
50. Laqueur HS, Wintemute GJ. Identifying high‐risk firearm owners to prevent mass violence. Criminol Public Policy 2019 Dec 16;19(1):109-127. [doi: 10.1111/1745-9133.12477]
51. Pallin R, Schleimer JP, Pear VA, Wintemute GJ. Assessment of extreme risk protection order use in California from 2016 to 2019. JAMA Netw Open 2020 Jun 01;3(6):e207735 [FREE Full text] [doi: 10.1001/jamanetworkopen.2020.7735] [Medline: 32556258]
52. Hurka S, Knill C. Does regulation matter? A cross‐national analysis of the impact of gun policies on homicide and suicide rates. Regul Gov 2018 Dec 21;14(4):787-803. [doi: 10.1111/rego.12235]
53. Koper C, Roth J. The impact of the 1994 Federal Assault Weapon Ban on gun violence outcomes: an assessment of multiple outcome measures and some lessons for policy evaluation. J Quant Criminol 2001 Mar;17(1):33-74.
54. Koper C, Woods D, Roth J. Updated Assessment of the Federal Assault Weapons Ban: Impacts on Gun Markets and Gun Violence, 1994-2003. Report to the National Institute of Justice, United States Department of Justice. 2004 Jul. URL: https://www.ojp.gov/pdffiles1/nij/grants/204431.pdf [accessed 2020-12-11]
55. Roth J, Koper C, Adams W, Johnson S, Marcotte J, McGready J, et al. Impact Evaluation of the Public Safety and Recreational Firearms Use Protection Act of 1994 Final Report. Urban Institute. Washington, DC: The Urban Institute; 1997 Mar 13. URL: https://www.urban.org/research/publication/impact-evaluation-public-safety-and-recreational-firearms-use-protection-act-1994/view/full_report [accessed 2021-02-10]
56. Webster D, Vernick J, McGinty E, Alcorn T. Regulating Gun Sales: An Excerpt from Reducing Gun Violence in America: Informing Policy with Evidence and Analysis. Baltimore, MD: Johns Hopkins University Press; 2013.
57. Jacobs J. Can Gun Control Work? (Studies in Crime and Public Policy). Oxford: Oxford University Press; Oct 14, 2004.

58. Lee LK, Fleegler EW, Farrell C, Avakame E, Srinivasan S, Hemenway D, et al. Firearm laws and firearm homicides: a systematic review. JAMA Intern Med 2017 Jan 01;177(1):106-119. [doi: 10.1001/jamainternmed.2016.7051] [Medline: 27842178]
59. Gius M. An examination of the effects of concealed weapons laws and assault weapons bans on state-level murder rates. Appl Econ Lett 2013 Nov 26;21(4):265-267. [doi: 10.1080/13504851.2013.854294]
60. Cook P, Goss K. The Gun Debate: What Everyone Needs to Know. New York: Oxford University Press; May 01, 2014.
61. Cook P, Goss K. The Gun Debate: What Everyone Needs to Know, 2nd Edition. New York: Oxford University Press; Apr 16, 2020.
62. Lankford A, Silver J. Why have public mass shootings become more deadly? Criminol Public Policy 2019 Dec 16;19(1):37-60. [doi: 10.1111/1745-9133.12472]
63. Schiff M. IZA Discussion Paper 12784: Greater US gun ownership, lethality and murder rates: analysis and policy proposals. IZA Institute of Labor Economics. 2019 Nov 27. URL: https://www.iza.org/publications/dp/12784/greater-us-gun-ownership-lethality-and-murder-rates-analysis-and-policy-proposals [accessed 2021-04-17]
64. DiMaggio C, Avraham J, Berry C, Bukur M, Feldman J, Klein M, et al. Changes in US mass shooting deaths associated with the 1994–2004 federal assault weapons ban: Analysis of open-source data. J Trauma Acute Care Surg 2019 Jan;86(1):11-19. [doi: 10.1097/ta.0000000000002060]
65. World Telecommunication/ICT Indicators Database 2020 (24th Edition). International Telecommunications Union. Geneva: International Telecommunications Union; 2021 Jan. URL: https://www.itu.int/en/ITU-D/Statistics/Pages/publications/wtid.aspx [accessed 2021-04-17]
66. Lopez G. America's unique gun violence problem, explained in 17 maps and charts. Vox. 2021 Mar 23. URL: https://www.vox.com/policy-and-politics/2017/10/2/16399418/boulder-colorado-mass-shooting-gun-violence-statistics-charts [accessed 2021-03-29]
67. Silver J, Simons A, Craun S. A study of the pre-attack behaviors of active shooters in the United States between 2000 and 2013. FBI Documents. Washington, DC: US Department of Justice, Federal Bureau of Investigations; 2018. URL: https://www.fbi.gov/file-repository/pre-attack-behaviors-of-active-shooters-in-us-2000-2013.pdf/view [accessed 2020-10-25]
68. DeFoster R, Swalve N. Guns, culture or mental health? Framing mass shootings as a public health crisis. Health Commun 2018 Oct;33(10):1211-1222. [doi: 10.1080/10410236.2017.1350907] [Medline: 28841045]
69. Fridel EE. A multivariate comparison of family, felony, and public mass murders in the United States. J Interpers Violence 2021 Feb;36(3-4):1092-1118. [doi: 10.1177/0886260517739286] [Medline: 29294976]
70. Duwe G. Mass murder in the United States: a history. Jefferson, NC: McFarland & Company; Jan 07, 2007.
71. Fox J, Levin J. Mass confusion concerning mass murder. Criminologist 2015;40(1):8-11 [FREE Full text] [doi: 10.4135/9781412950619.n277]
72. Fox JA, Levin J. Firing back: the growing threat of workplace homicide. An Am Acad Pol Soc Sci 2016 Sep 08;536(1):16-30. [doi: 10.1177/0002716294536001002]
73. Stevenson AJ, Flores-Vazquez IM, Allgeyer RL, Schenkkan P, Potter JE. Effect of removal of Planned Parenthood from the Texas Women's Health Program. N Engl J Med 2016 Mar 03;374(9):853-860. [doi: 10.1056/nejmsa1511902]
74. Freedman DA. On the so-called "Huber Sandwich Estimator" and "Robust Standard Errors". Am Statistician 2006 Nov;60(4):299-302. [doi: 10.1198/000313006x152207]
75. Duwe G. Mass shootings are getting deadlier, not more frequent. Politico Magazine. 2017 Oct 04. URL: https://www.politico.com/magazine/story/2017/10/04/mass-shootings-more-deadly-frequent-research-215678/ [accessed 2021-01-30]
76. Population Trends. United States Census Bureau. 2019. URL: https://www.census.gov/ [accessed 2019-08-26]
77. Peterson J, Densley J. We have studied every mass shooting since 1966. Here's what we've learned about the shooters. Los Angeles Times. 2019 Aug 04. URL: https://www.latimes.com/opinion/story/2019-08-04/el-paso-dayton-gilroy-mass-shooters-data [accessed 2020-02-01]
78. Klingner DE, Williams E. Topic: Public Safety. Public Integrity 2019 Mar 06;21(2):220-224. [doi: 10.1080/10999922.2019.1565268]
79. Hand C. Gun control and the Second Amendment. Minneapolis, MN: ABDO; Dec 15, 2016.
80. Popovits A. Dominican University of California Political Science & International Studies (Senior Thesis). 2020 May. URL: https://tinyurl.com/se3vrmd6 [accessed 2020-12-01]
81. Miller SV. What Americans think about gun control: evidence from the General Social Survey, 1972-2016. Soc Sci Quart 2018 Nov 18;100(1):272-288. [doi: 10.1111/ssqu.12555]
82. Kellner D. School shootings, societal violence and gun culture. In: Shapiro H, editor. The Wiley Handbook on Violence in Education: Forms, Factors, and Preventions. Medford, MA: John Wiley & Sons, Inc; 2018:53-68.
83. Schildkraut J. Assault weapons, mass shootings, and options for lawmakers. Rockefeller Institute of Government. 2019 Mar 22. URL: https://rockinst.org/issue-area/assault-weapons-mass-shootings-and-options-for-lawmakers/ [accessed 2021-02-11]
84. Jacobs J, Fuhr Z. The potential and limitations of universal background checking for gun purchasers. Wake Forest J Law Policy 2017;7(2):537-583.

85. Braga AA, Brunson RK, Cook PJ, Turchan B, Wade B. Underground gun markets and the flow of illegal guns into the Bronx and Brooklyn: a mixed methods analysis. J Urban Health 2020 Sep 04:online ahead of print. [doi: 10.1007/s11524-020-00477-z] [Medline: 32888157]
86. Chai C. Gun control: can we take a shot at it? AMASS 2019;24(2):34-36.
87. Goldberg J. The case for more guns (and more gun control). The Atlantic. 2012 Dec. URL: https://www.theatlantic.com/magazine/archive/2012/12/the-case-for-more-guns-and-more-gun-control/309161/ [accessed 2020-11-20]
88. Webster DW, McCourt AD, Crifasi CK, Booty MD, Stuart EA. Evidence concerning the regulation of firearms design, sale, and carrying on fatal mass shootings in the United States. Criminol Public Policy 2020 Jan 30;19(1):171-212. [doi: 10.1111/1745-9133.12487]
89. Lankford A, Madfis E. Media coverage of mass killers: content, consequences, and solutions. Am Behav Sci 2018 Mar 20;62(2):151-162. [doi: 10.1177/0002764218763476]
90. Kien S, Begay T, Lee A, Stefanidis A. Social media during the school shooting contagion period. Violence Gender 2019 Dec 01;6(4):201-210. [doi: 10.1089/vio.2019.0043]

Abbreviations

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

Edited by G Eysenbach, T Sanchez; submitted 19.02.21; peer-reviewed by T Alcorn; comments to author 12.03.21; revised version received 24.03.21; accepted 30.03.21; published 22.04.21

Please cite as:
Post L, Mason M, Singh LN, Wleklinski NP, Moss CB, Mohammad H, Issa TZ, Akhetuamhen AI, Brandt CA, Welch SB, Oehmke JF
Impact of Firearm Surveillance on Gun Control Policy: Regression Discontinuity Analysis
JMIR Public Health Surveill 2021;7(4):e26042
URL: https://publichealth.jmir.org/2021/4/e26042
doi: 10.2196/26042
PMID: 33783360

Exhibit I

VIEWPOINT

Regulating Assault Weapons and Large-Capacity Magazines for Ammunition

Philip J. Cook, PhD
Duke University, Durham, North Carolina.

John J. Donohue, PhD, JD
Stanford University, Stanford, California.

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

Supplemental content

Corresponding Author: Philip J. Cook, PhD, Sanford School of Public Policy, Duke University, PO Box 90545, Durham, NC 27708 (pcook@duke.edu).

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.

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.

REFERENCES

1. Cook PJ, Goss KA. *The Gun Debate: What Everyone Needs to Know*. 2nd ed. Oxford University Press; 2020.

2. Koper CS. An updated assessment of the federal assault weapons ban: impacts on gun markets and gun violence, 1994-2003. Accessed September 6, 2022. https://www.ojp.gov/pdffiles1/nij/grants/204431.pdf

3. Bump P. Tallying America's fascination with AR-15-style rifles. Accessed September 6, 2022. https://www.washingtonpost.com/politics/2022/05/26/tallying-americas-fascination-with-ar-15-style-rifles/

4. Smart R, Morral AR, Smucker S, et al. *The Science of Gun Policy*. RAND; 2020.

5. Duwe G. Patterns and prevalence of lethal mass violence. *Criminol Public Policy*. 2020;19(1):17-35. doi:10.1111/1745-9133.12478

6. Smart R, Schell TL. Mass shootings in the United States. Accessed September 6, 2022. https://www.rand.org/research/gun-policy/analysis/essays/mass-shootings.html

7. Violence Project. Mass shooter database: version 5.0. Accessed August 30, 2022. https://www.theviolenceproject.org/mass-shooter-database/

8. Wikipedia. Mass shootings in the United States. Accessed August 31, 2022. https://en.wikipedia.org/wiki/Mass_shootings_in_the_United_States

9. Chapman S, Alpers P, Jones M. Association between gun law reforms and intentional firearm deaths in Australia, 1979-2013. *JAMA*. 2016;316(3):291-299. doi:10.1001/jama.2016.8752

10. Sanger-Katz M, Bui Q. How to reduce mass shooting deaths? experts rank gun laws. Published October 5, 2017. Accessed September 6, 2022. https://www.nytimes.com/interactive/2017/10/05/upshot/how-to-reduce-mass-shooting-deaths-experts-say-these-gun-laws-could-help.html

Exhibit J

AMERICA'S OLDEST CONTINUOUSLY PUBLISHED NEWSPAPER

Hartford Courant

VOLUME CLXXVI NUMBER 358 COURANT.COM • MOBILE.COURANT.COM SUNDAY, DECEMBER 23, 2012

STARTING OVER

NEW SCHOOL, MADE FAMILIAR

Hundreds Of Volunteers Help Ease Transition For Sandy Hook Kids

By BRIAN DOWLING
bdowling@courant.com

Sandy Hook Elementary School students will find that volunteers have painted the walls of their new school green and white, their school colors. The movers set furniture, desks, computers and supplies in the same places as their old classrooms in Newtown. Volunteers pinned the same posters to new classroom walls.

The re-creation of Sandy Hook Elementary at Chalk Hill School in Monroe involved hundreds of people over the past week. Locksmiths, plumbers, electricians, custodians, experts in fire suppression and security systems, as well as residents with paint brushes, all volunteered time to create an around-the-clock renovation team, which peaked at 500 workers.

Thanks to that effort, the surroundings will be

CHALK HILL, A4

WFSB | POOL

THE WELCOME sign is ready at Chalk Hill School in Monroe, where Sandy Hook students will begin classes Jan. 3.

ADAM LANZA

Shooter Paused, And Six Escaped

By DAVE ALTIMARI, EDMUND H. MAHONY and JON LENDER
daltimari@courant.com

As many as a half-dozen first-graders may have survived Adam Lanza's deadly shooting spree at Sandy Hook Elementary School because he stopped firing briefly, perhaps to reload his rifle or because it jammed, according to law enforcement officials familiar with the events.

A source said that the Bushmaster rifle that Lanza used in the shootings is at the state police forensic laboratory undergoing several tests, including tests to determine whether it jammed.

The children escaped from the first-grade classroom of teacher Victoria Soto, one of the six educators Lanza killed in Newtown after shooting his way through a glass door with the .223-caliber semiautomatic rifle on the morning of Dec. 14.

On Friday, detectives obtained and began examining records related to psychiatric care Lanza had received

RIFLE, A6

A6 SUNDAY, DECEMBER 23, 2012 THE HARTFORD COURANT

TRAGEDY IN NEWTOWN

Rifle

Continued from Page A1

in an attempt to determine a motive. Several friends of his mother have said that he had Asperger's syndrome but authorities have neither confirmed that nor indicated it had anything to do with the shootings.

Lanza killed 27 people — 20 children, four teachers, the school principal, a school psychologist and his mother, Nancy — before shooting himself in the head as police began arriving at the school.

The arriving officers encountered a shocking scene in Soto's classroom. Lanza had shot her, as well as special education teacher Anne Marie Murphy and six of Soto's 6- and 7-year old students. Seven of Soto's students were found huddled and unharmed in a classroom closet, apparently bidden by Soto when she heard shooting. The other students fled the classroom.

Based on initial statements from surviving children and the fact that unfired cartridges from Lanza's rifle were found on the ground, detectives suspect that some students were able to run to safety when Lanza stopped firing, probably for a short period of time, the officials said.

It is possible that Lanza, who reloaded the rifle frequently, mishandled or dropped a magazine and cartridges fell to the floor, they said.

But it also is possible, they said, that the mechanism that fed cartridges into the rifle jammed, causing Lanza to remove the magazine and clear the weapon. Unfired cartridges could have fallen to the classroom floor during that process as well, law enforcement officials said.

The six children who escaped Lanza's rampage ran to a home a short distance from the school. Upon reaching the home, one of the boys told the owner that "we obeyed the rules, we stayed on the sidewalk," one of the officials said.

The authorities have learned generally from the children who ran away that something may have happened to Lanza's rifle that caused him to stop firing. The substance of the statements, which are not entirely consistent, is that a piece of the weapon, probably a magazine holding live cartridges, was dropped or fell to the classroom floor.

Investigators have decided not to formally interview the children, based on advice from Yale child psychologists. Given the chaotic nature of the scene, it is also possible that some children escaped while Lanza was shooting others.

State police are expected to wrap up work at the school and release the school as a crime scene in the next few days. They still are trying to determine how many shots Lanza fired.

Lanza killed himself in Soto's classroom with one of the two pistols he carried into the building. He killed himself as police entered the building.

Police found a loaded 20-round shotgun in the trunk of the car similar to what is known as a "street sweeper." Police believe that Lanza didn't bring it into the school because he couldn't carry all of the weapons and ammunition. Lanza, who was about 6 feet tall, weighed barely 110 pounds, law enforcement sources said.

The few people who knew Lanza have portrayed him in the days since the mass shootings as an awkward, emotionally isolated, withdrawn young man. He attended public schools in Newtown, but at times was home-schooled by his mother, who was said by authorities and others to be the only person with whom he was socially engaged.

Lanza lived with his mother. He had two bedrooms and used one of them to keep computer equipment on which he is said to have enjoyed playing video games involving violent war games.

Before the shootings at the elementary school, Lanza shot his mother four times with a .22-caliber rifle as she lay in bed. He left that rifle at the house. All the guns were properly registered to Nancy Lanza.

Adam Lanza also broke apart his computer equipment in a way that has prevented authorities from retrieving data that could reveal with whom he may have corresponded or played video games.

He then drove to the school, getting there about 9:30 a.m. He walked up to the front entrance and fired at least a half-dozen rounds into the glass doors. The thunderous sound of Lanza blowing an opening big enough to walk through the locked school door caused Principal Dawn Hochsprung and school psychologist Mary Scherlach to bolt from a nearby meeting room to investigate.

He shot and killed them both as they ran toward him. Two other staff workers in a meeting with Hochsprung and Scherlach were injured in the hail of bullets but made it back inside the conference room where one called 911 from under a table.

Lanza then turned toward the first classroom on his left, that of teacher Kaitlin Roig. By then, authorities said, Roig had bidden with her students in a closet in her classroom. Before securing the closet door, which opened inward, authorities said she concealed the door behind a movable bookcase.

Lanza then walked past Soto's classroom into the third one, where Lauren Rousseau was teaching. He shot and killed Rousseau, special education teacher Rachel D'Avino and 14 students.

One member of the class was not killed, although it is not clear if the child escaped the shooting or was not in the room.

"I think the community is very much respecting their privacy," Newtown schools Superintendent Janet Robinson said of the student's family. "I think that everyone is very sensitive to what a horrific experience this 6-year-old ... has been through."

Much later, after police had found Lanza's body and were searching for survivors, an officer had to slide a badge beneath the closet door before Roig could be persuaded to open it.

Courant staff writer Matthew Sturdevant contributed to this story.

Exhibit K

The Code of Professional Ethics and Practices

We—the members of the American Association for Public Opinion Research (AAPOR) and its affiliated chapters—subscribe to the principles expressed in this document, the AAPOR Code of Professional Ethics and Practices ("the Code"). Our goals are to support sound and ethical practice in the conduct of public opinion and survey research and promote the informed and appropriate use of research results.

The Code is based in fundamental ethical principles that apply to the conduct of research regardless of an individual's membership in AAPOR or any other organization. Adherence to the principles and actions set out in the Code is expected of all public opinion and survey researchers.

As AAPOR members, we pledge to maintain the highest standards of scientific competence, integrity, accountability, and transparency in designing, conducting, analyzing, and reporting our work, and in our interactions with participants (sometimes referred to as respondents or subjects), clients, and the users of our research. We pledge to act in accordance with principles of basic human rights in research. We further pledge to reject all tasks or assignments that would require activities inconsistent with the principles of this Code.

The Code sets the standard for the ethical conduct of public opinion and survey research at the time of publication. Recommendations on best practices for research design, conduct, analysis, and reporting are beyond the scope of the Code but may be published separately by AAPOR Executive Council.

Definitions of Terms Used in the Code

1. "Public opinion and survey research" refers to the systematic collection and analysis of information from or about individuals, groups, or organizations concerning their behaviors, cognitions, attitudes or other characteristics. It encompasses both quantitative and qualitative research methods, traditional or emerging.
2. "Participants" refers to individuals whose behaviors, cognitions, attitudes, or other characteristics are measured and analyzed. Participants can include individuals representing groups or organizations, and individuals such as minors or those unable to consent directly, for whom a parent, legal guardian, or other proxy makes participation decisions or provides information.
3. "Personally identifiable information" refers to (i) measurements, records, or other data that can be used alone or in combination to distinguish or trace an individual's identity and (ii) any other information that is linkable to an individual (e.g., employment information, medical history, academic records).

I. Principles of Professional Responsibility in Our Research

A. Responsibilities to Participants

1. We will avoid practices or methods that may harm, endanger, humiliate, or unnecessarily mislead participants and potential participants.

2. We will not misrepresent the purpose of our research or conduct other activities (such as sales, fundraising, or political campaigning) under the guise of conducting research.
3. We recognize that participation in our research is voluntary except where specified by regulation or law. Participants may freely decide, without coercion, whether to participate in the research, and whether to answer any question or item presented to them.
4. We will make no false or misleading claims as to a study's sponsorship or purpose and will provide truthful answers to participants' questions about the research. If disclosure of certain information about the research could endanger or cause harm to persons, could bias responses, or does not serve research objectives, it is sufficient to indicate, in response to participants' questions about the research, that some information cannot be revealed.
5. We recognize the critical importance of protecting the rights of minors and other vulnerable individuals when obtaining participation decisions and conducting our research.
6. We will act in accordance with laws, regulations, and the rules of data owners (providers of research or administrative records previously collected for other purposes) governing the collection, use, and disclosure of information obtained from or about individuals, groups, or organizations.

B. Responsibilities When Collecting Personally Identifiable Information

1. We recognize the right of participants to be provided with honest and forthright information about how personally identifiable information that we collect from them will be used.
2. We recognize the importance of preventing unintended disclosure of personally identifiable information. We will act in accordance with all relevant best practices, laws, regulations, and data owner rules governing the handling and storage of such information. We will restrict access to identifiers and destroy them as soon as they are no longer required, in accordance with relevant laws, regulations, and data owner rules.
3. We will not disclose any information that could be used, alone or in combination with other reasonably available information, to identify participants with their data, without participant permission.
4. When disclosing personally identifiable data for purposes other than the current research, we will relay to data users any conditions of their use specified in the participant permission we have obtained.
5. We understand that the use of our research results in a legal proceeding does not relieve us of our ethical obligation to protect participant privacy and keep confidential all personally identifiable data, except where participants have permitted disclosure.

C. Responsibilities to Clients or Sponsors

1. When undertaking work for a client, we will hold confidential all proprietary information obtained about the client and about the conduct and findings of the research undertaken for the client, except when the dissemination of the information is expressly authorized by the client.
2. We will inform those (partners, co-investigators, sponsors, and clients) for whom we conduct publicly released research studies about AAPOR's Standards for Disclosure in Section III of the Code, and provide information on what should be disclosed in their releases.

3. We will be mindful of the limitations of our expertise and capacity to conduct various types of research and will accept only those research assignments that we can reasonably expect to accomplish within these limitations.

D. Responsibilities to the Public

1. We will disclose to the public the methods and procedures used to obtain our own publicly disseminated research results in accordance with Section III of the Code.
2. We will correct any errors in our own work that come to our attention which could influence interpretation of the results. We will make good faith efforts to identify and issue corrective statements to all parties who were presented with the factual misrepresentation or distortions. If such factual misrepresentations or distortions were made publicly, we will correct them in a public forum that is as similar as possible to original data dissemination.
3. We will correct factual misrepresentations or distortions of our data or analysis, including those made by our research partners, co-investigators, sponsors, or clients. We will make good faith efforts to identify and issue corrective statements to all parties who were presented with the factual misrepresentations or distortions, and if such factual misrepresentations or distortions were made publicly, we will correct them in a public forum that is as similar as possible. We also recognize that differences of opinion in the interpretation of analysis are not necessarily factual misrepresentations or distortions and will exercise professional judgment in handling disclosure of such differences of opinion.

E. Responsibilities to the Profession

1. We recognize the importance to the science of public opinion and survey research of disseminating as freely as practicable the ideas and findings that emerge from our research.
2. We can point with pride to our membership in AAPOR and adherence to the Code as evidence of our commitment to high standards of ethics in our relations with research participants, our clients or sponsors, the public, and the profession. However, we will not cite our membership in the Association nor adherence to this Code as evidence of professional competence, because the Association does not certify the professional competence of any persons or organizations.

II. Principles of Professional Practice in the Conduct of Our Work

A. We will exercise due care in developing research designs, samples, and instruments, and in collecting, processing, and analyzing data, taking all reasonable steps to assure the reliability and validity of results.

1. We will recommend and employ only those tools and methods of analysis that, in our professional judgment, are fit for the purpose of the research questions.
2. We will not knowingly select research tools and methods of analysis that yield misleading conclusions.
3. We will not knowingly make interpretations of research results that are inconsistent with the data available, nor will we tacitly permit such interpretations. We will ensure that any findings we report, either privately or for public release, are a balanced and accurate portrayal of research results.
4. We will not knowingly imply that interpretations are accorded greater confidence than the data warrant. When we generalize from samples to make statements about populations, we will only make claims of precision and applicability to broader populations that are warranted by the sampling frames and other methods employed.

5. We will not engage in data fabrication or falsification.
6. We will accurately describe and attribute research from other sources that we cite in our work, including its methodology, content, comparability, and source.

B. We will describe our methods and findings accurately and in appropriate detail in all research reports, adhering to the standards for disclosure specified in Section III of the Code.

III. Standards for Disclosure

Broadly defined, research on public opinion can be conducted using a variety of quantitative and qualitative methodologies, depending on the research questions to be addressed and available resources. Accordingly good professional practice imposes the obligation upon all public opinion and survey researchers to disclose sufficient information about how the research was conducted to allow for independent review and verification of research claims, regardless of the methodology used in the research. Full and complete disclosure for items listed in Section A will be made at the time results are released, either publicly or to a research client, as the case may be. As detailed below, the items listed in Section B, if not immediately available, will be released within 30 days of any request for such materials. If the results reported are based on multiple samples or multiple modes, the preceding items (as applicable) will be disclosed for each.

A. Items for Immediate Disclosure

1. **Data Collection Strategy:** Describe the data collection strategies employed (e.g. surveys, focus groups, content analyses).

2. **Who Sponsored the Research and Who Conducted It**. Name the sponsor of the research and the party(ies) who conducted it. If the original source of funding is different than the sponsor, this source will also be disclosed.

3. **Measurement Tools/Instruments.** Measurement tools include questionnaires with survey questions and response options, show cards, vignettes, or scripts used to guide discussions or interviews. The exact wording and presentation of any measurement tool from which results are reported as well as any preceding contextual information that might reasonably be expected to influence responses to the reported results and instructions to respondents or interviewers should be included. Also included are scripts used to guide discussions and semi-structured interviews and any instructions to researchers, interviewers, moderators, and participants in the research. Content analyses and ethnographic research will provide the scheme or guide used to categorize the data; researchers will also disclose if no formal scheme was used.

4. **Population Under Study.** Survey and public opinion research can be conducted with many different populations including, but not limited to, the general public, voters, people working in particular sectors, blog postings, news broadcasts, an elected official's social media feed. Researchers will be specific about the decision rules used to define the population when describing the study population, including location, age, other social or demographic characteristics (e.g., persons who

access the internet), time (e.g., immigrants entering the US between 2015 and 2019). Content analyses will also include the unit of analysis (e.g., news article, social media post) and the source of the data (e.g., Twitter, Lexis-Nexis).

5. **Method Used to Generate and Recruit the Sample.** The description of the methods of sampling includes the sample design and methods used to contact or recruit research participants or collect units of analysis (content analysis).
    a. Explicitly state whether the sample comes from a frame selected using a probability-based methodology (meaning selecting potential participants with a known non-zero probability from a known frame) or if the sample was selected using non-probability methods (potential participants from opt-in, volunteer, or other sources).
    b. Probability-based sample specification should include a description of the sampling frame(s), list(s), or method(s).
        i. If a frame, list, or panel is used, the description should include the name of the supplier of the sample or list and nature of the list (e.g., registered voters in the state of Texas in 2018, pre-recruited panel or pool).
        ii. If a frame, list, or panel is used, the description should include the coverage of the population, including describing any segment of the target population that is not covered by the design.

    c. For surveys, focus groups, or other forms of interviews, provide a clear indication of the method(s) by which participants were contacted, selected, recruited, intercepted, or otherwise contacted or encountered, along with any eligibility requirements and/or oversampling.
    d. Describe any use of quotas.
    e. Include the geographic location of data collection activities for any in-person research.
    f. For content analysis, detail the criteria or decision rules used to include or exclude elements of content and any approaches used to sample content. If a census of the target population of content was used, that will be explicitly stated.
    g. Provide details of any strategies used to help gain cooperation (e.g., advance contact, letters and scripts, compensation or incentives, refusal conversion contacts) whether for participation in a survey, group, panel, or for participation in a particular research project. Describe any compensation/incentives provided to research subjects and the method of delivery (debit card, gift card, cash).

6. **Method(s) and Mode(s) of Data Collection.** Include a description of all mode(s) used to contact participants or collect data or information (e.g., CATI, CAPI, ACASI, IVR, mail, Web for survey; paper and pencil, audio or video recording for qualitative research, etc.) and the language(s) offered or included. For qualitative research such as in-depth interviews and focus groups, also include length of interviews or the focus group session.

7. **Dates of Data Collection.** Disclose the dates of data collection (e.g., data collection from January 15 through March 10 of 2019). If this is a content analysis, include the dates of the content analyzed (e.g., social media posts between January 1 and 10, 2019).

8. **Sample Sizes (by sampling frame if more than one frame was used) and (if applicable) Discussion of the Precision of the Results**.
    a. Provide sample sizes for each mode of data collection (for surveys include sample sizes for each frame, list, or panel used).
    b. For probability sample surveys, report estimates of sampling error (often described as "the margin of error") and discuss whether or not the reported sampling error or statistical analyses have been adjusted for the design effect due to weighting, clustering, or other factors.
    c. Reports of non-probability sample surveys will only provide measures of precision if they are defined and accompanied by a detailed description of how the underlying model was specified, its assumptions validated, and the measure(s) calculated.
    d. If content was analyzed using human coders, report the number of coders, whether inter-coder reliability estimates were calculated for any variables, and the resulting estimates.

9. **How the Data Were Weighted.** Describe how the weights were calculated, including the variables used and the sources of the weighting parameters.

10. **How the Data Were Processed and Procedures to Ensure Data Quality.** Describe validity checks, where applicable, including but not limited to whether the researcher added attention checks, logic checks, or excluded respondents who straight-lined or completed the survey under a certain time constraint, any screening of content for evidence that it originated from bots or fabricated profiles, re-contacts to confirm that the interview occurred or to verify respondent's identity or both, and measures to prevent respondents from completing the survey more than once. Any data imputation or other data exclusions or replacement will also be discussed. Researchers will provide information about whether any coding was done by software or human coders (or both); if automated coding was done, name the software and specify the parameters or decision rules that were used.

11. **A General Statement Acknowledging Limitations of the Design and Data Collection**. All research has limitations and researchers will include a general statement acknowledging the unmeasured error associated with all forms of public opinion research.

B. Additional Items for Disclosure. After results are reported, we will make the following items available within 30 days of any request for such materials:

1. Procedures for managing the membership, participation, and attrition of the panel, if a pool, panel, or access panel was used. This should be disclosed for both probability and non-probability surveys relying on recruited panels of participants.

2. Methods of interviewer or coder training and details of supervision and monitoring of interviewers or human coders. If machine coding was conducted, include description of the machine learning involved in the coding.

3. Details about screening procedures, including any screening for other surveys or data collection that would have made sample or selected members ineligible for the current data collection (e.g., survey, focus group, interview) will be disclosed (e.g., in the case of online surveys if a router was used).

4. Any relevant stimuli, such as visual or sensory exhibits or show cards. In the case of surveys conducted via self-administered computer-assisted interviewing, providing the relevant screen shot(s) is strongly encouraged, though not required.

5. Summaries of the disposition of study-specific sample records so that response rates for probability samples and participation rates for non-probability samples can be computed. If response or cooperation rates are reported, they will be computed according to AAPOR Standard Definitions. If dispositions cannot be provided, explain the reason(s) why they cannot be disclosed, and this will be mentioned as a limitation of the study.

6. The unweighted sample size(s) on which one or more reported subgroup estimates are based.

7. Specifications adequate for replication of indices or statistical modeling included in research reports.

C. Access to Datasets

Reflecting the fundamental goals of transparency and replicability, AAPOR members share the expectation that access to datasets and related documentation will be provided to allow for independent review and verification of research claims upon request. In order to protect the privacy of individual respondents, such datasets will be de-identified to remove variables that can reasonably be expected to identify a respondent. Datasets may be held without release for a period of up to one year after findings are publicly released to allow full opportunity for primary analysis. Those who commission publicly disseminated research have an obligation to disclose the rationale for why eventual public release or access to the datasets is not possible, if that is the case.

D. AAPOR Standards Complaint

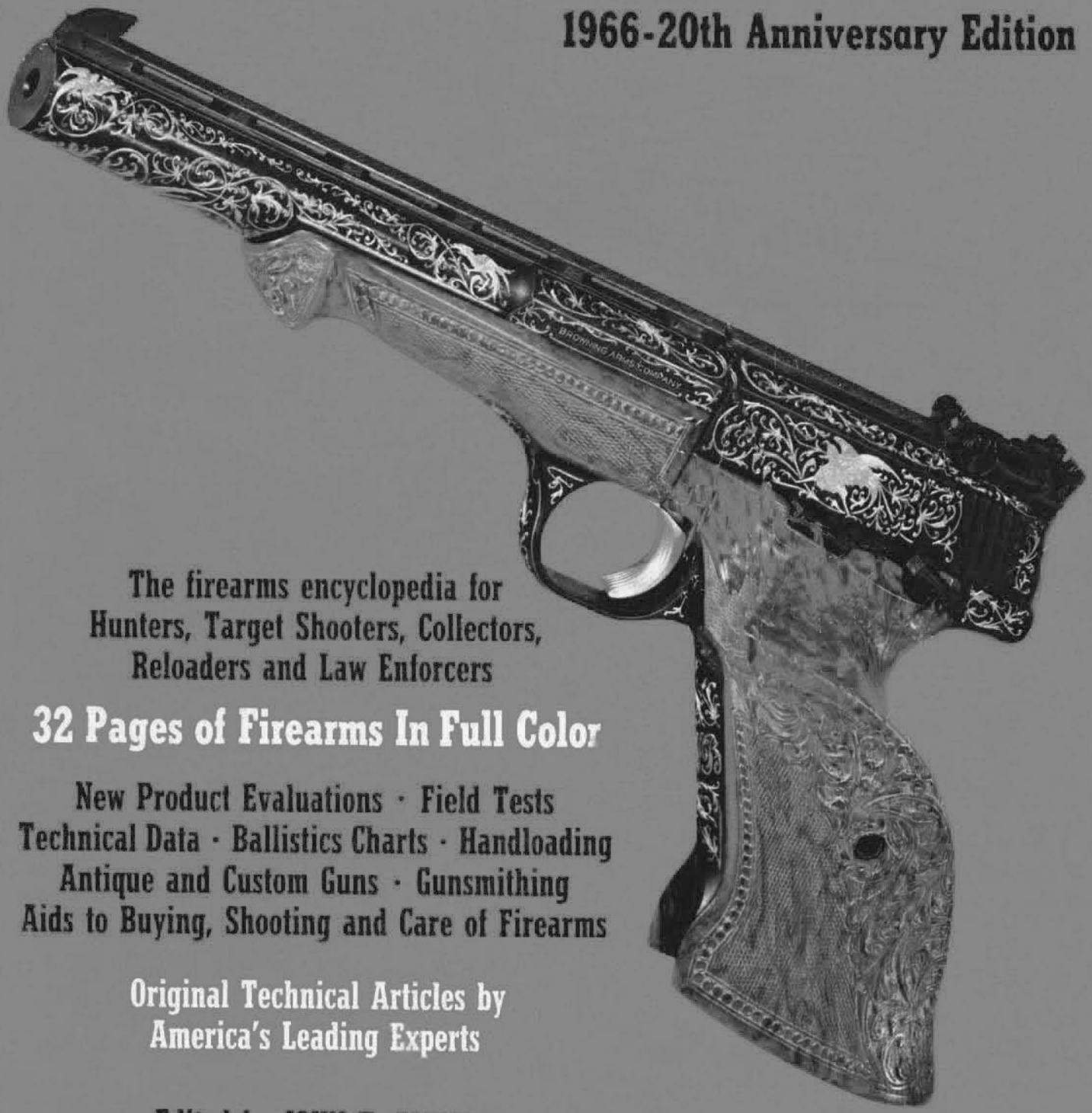
If any of our work becomes the subject of a formal investigation of an alleged violation of this Code, undertaken with the approval of the AAPOR Executive Council, we will provide additional information on the research study in such detail that a fellow researcher would be able to conduct a professional evaluation of the study.

.

Exhibit L

GUN DIGEST

1966-20th Anniversary Edition



The firearms encyclopedia for
Hunters, Target Shooters, Collectors,
Reloaders and Law Enforcers

32 Pages of Firearms In Full Color

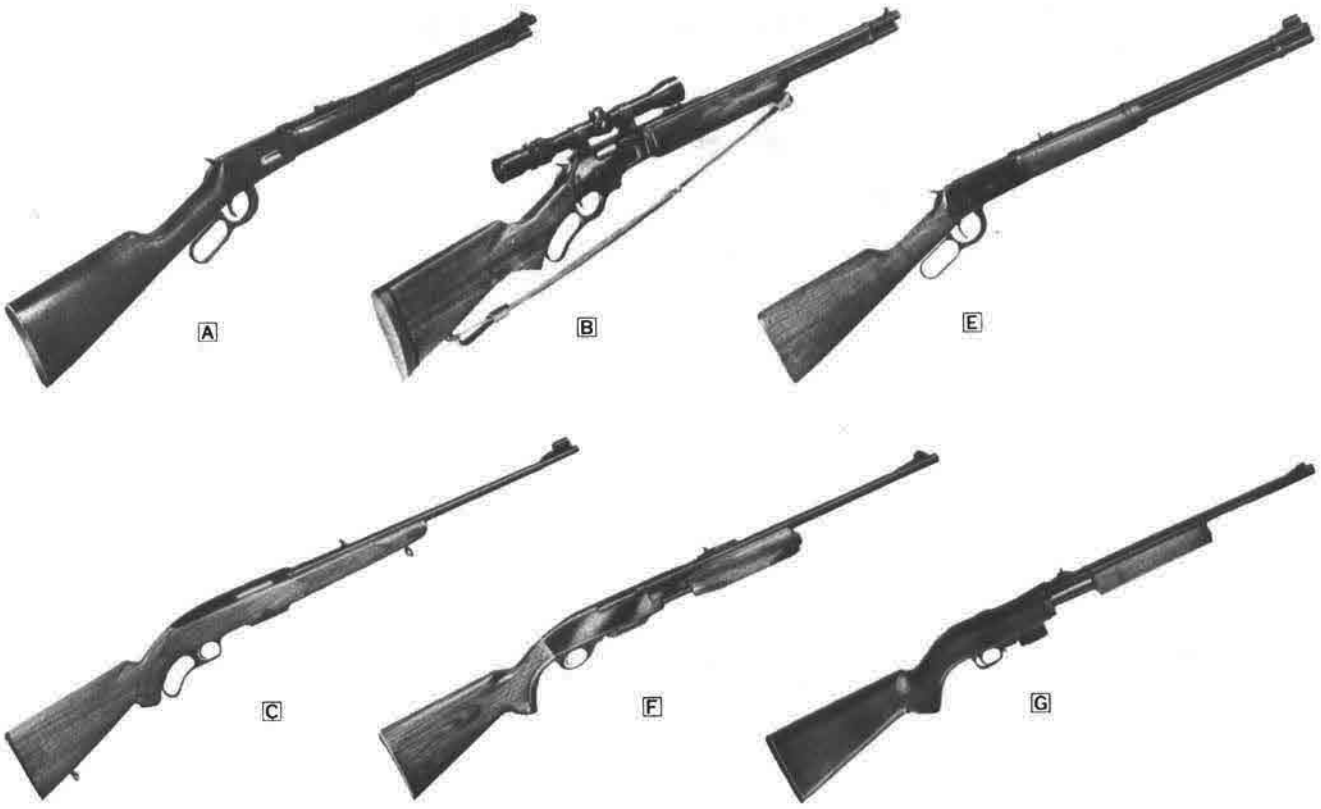
New Product Evaluations · Field Tests
Technical Data · Ballistics Charts · Handloading
Antique and Custom Guns · Gunsmithing
Aids to Buying, Shooting and Care of Firearms

Original Technical Articles by
America's Leading Experts

Edited by JOHN T. AMBER

The world's most complete Firearms Book with latest prices on all modern domestic and imported rifles, shotguns, handguns and accessories

FOUR DOLLARS AND NINETY-FIVE CENTS



Lever and Slide Action Rifles

A SEARS 54 LEVER ACTION CARBINE
Solid frame, 6-shot tubular mag. 20" bbl. Half-cock hammer safety. Walnut straight grip stock with nickelplated checkered steel buttplate; metal tipped fore-end (13⅛"x1⅞"x2⅝"). Bead front sight on ramp; open notch rear windage adj. Tapped for receiver sights and Sears 3x scope and #784 side mount. Wgt. 6½ lbs., 37¾" over-all. Cal. 30-30 only **$73.95**

B WESTERN FIELD LEVER ACTION CARBINE
6-shot full length mag., 20" bbl., solid top receiver, side ejection. Walnut stock and fore-end, fluted comb; recoil pad, 1" leather sling strap with swivels. Hammer spur for cocking with scope mounted. Open rear, beaded front sight. Wgt. 7½ lbs., 38½" over-all. Cal. 30-30 only. **$75.95**

C WINCHESTER 88 LEVER ACTION CARBINE
Hammerless, rotating 3-lug front-locking bolt. Side ejection, cross-bolt safety. Solid frame with one-piece p.g. stock (13¾"x1½"x2⅝"), basket-weave checkered. Short stroke, fast operating lever. 22" round bbl. Bead front sight on ramp, with cover; folding leaf rear. Tapped for scope mounts; 4-shot detachable magazine, (3-shot in 284). Weight 7¼ lbs., 42½" over-all. Calibers: 243 Win., 284 Win., (10" twist), 308 Win., (12" twist) **$139.50**
Extra 4-shot magazine **3.90**

E WINCHESTER 94 LEVER ACTION CARBINE
Solid frame, 6-shot tubular magazine. 20" bbl. Walnut straight grip stock and fore-end (12⅞"x1¾"x2½"). Bead front sight on ramp with removable cover; open rear. Tapped for receiver sights. Weight 6½ lbs., 37¾" over-all. Calibers: 30-30 and 32 Special **$84.95**

WINCHESTER 94 ANTIQUE CARBINE
Same as M94 except: color case-hardened and scrolled receiver, brass-plated loading gate and saddle ring. 30-30 only **$93.95**

F REMINGTON 760 GAMEMASTER SLIDE ACTION
Hammerless, solid frame, side ejection rifle. Rotary multiple-lug breechbolt locks into 22" bbl., fully encloses cartridge. Trigger must be released and action fully closed for each shot. Checkered walnut p.g. stock (13½"x1¾"x2¼") and fore-end; metal buttplate. Cross-bolt safety. Gold bead front sight on matted ramp, open sporting rear. Tapped for scope mounts. 4-shot detachable magazine. Wgt. 7½" lbs., 42" over-all. Cals: 223 (5.56mm), 280, 35 Rem., 270, 308 Win., 30-06. ..... **$129.95**
Sling strap and swivels (installed) **9.10**
Extra 4-shot clip **3.90**

REMINGTON 760 GAMEMASTER CARBINE
Same as M760 except has 18½" barrel. Wgt. 7¼ lbs., 38½" over-all. Cals: 35 Rem., 308 Win., and 30-06 ..... **$129.95**
Also in Peerless (D) and Premier (F) grades ..... **$575** and **1050**

G UNIVERSAL 440 VULCAN SLIDE ACTION
Hammerless 5-shot clip magazine carbine. 18¼" bbl. with 6-groove rifling. Walnut stock and fore-end. Ramp front sight with gold bead; semi-buckhorn rear adj. for w. and e. Cross lock safety in guard. Wgt. 6 lbs., 36⅞" over-all. Cal. 44 Magnum **$109.95**

Autoloading Rifles

D COLT AR-15 SPORTER CARBINE
Semi-automatic, gas-operated carbine, cal. 223. Barrel, bolt, recoil buffer unit and stock assembled as straight-line unit, minimizes barrel jump on recoil. Magazine blocked to 5 rounds. Over-all 39", bbl. 21", weight 6¾ lbs. Price includes two magazines, sling, flash suppressor, recoil pad, cleaning assembly and maintenance manual **$189.50**

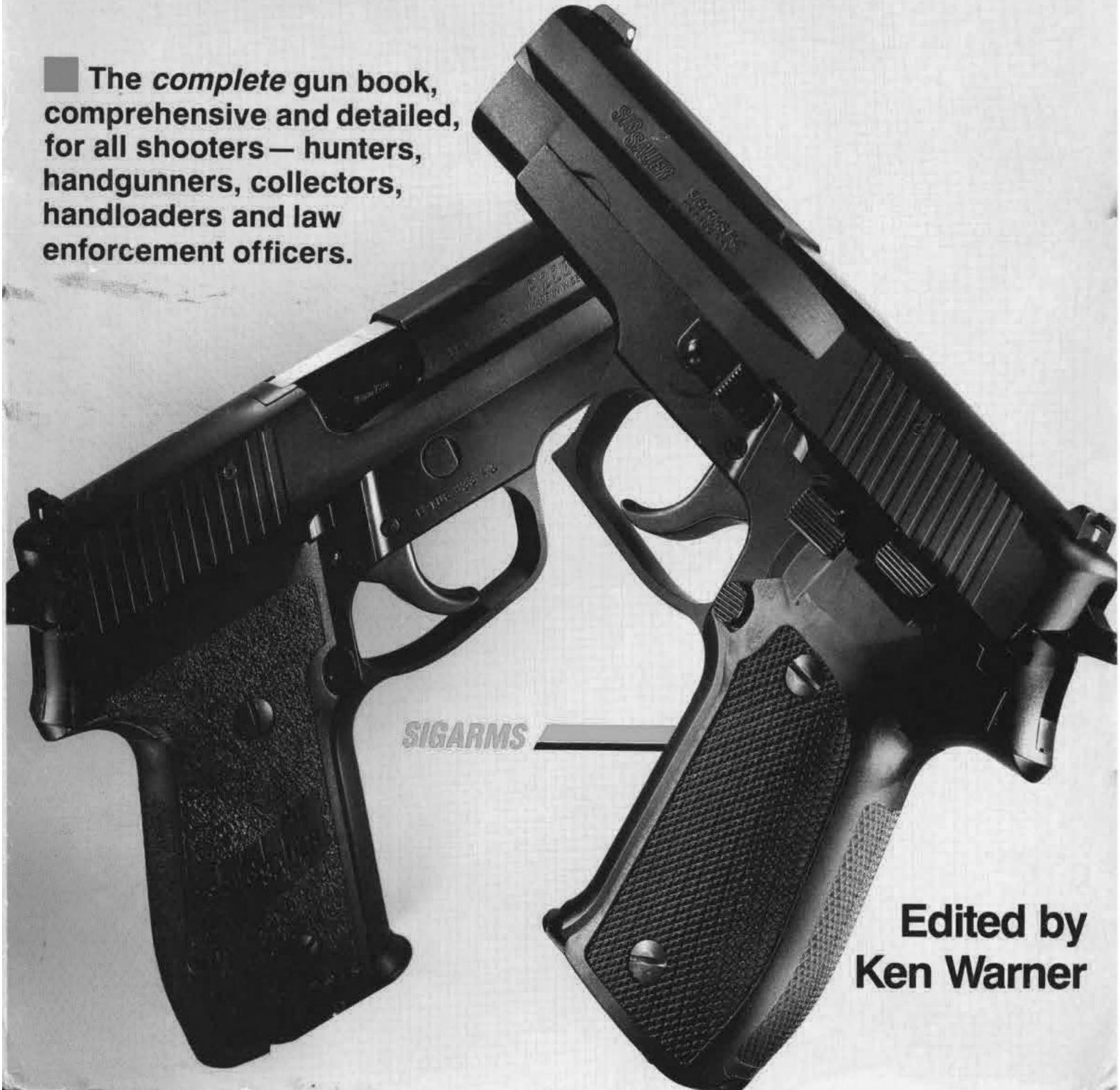
THE WORLD'S GREATEST GUN BOOK

$18.95 U.S.

Gun Digest®

1991/45th Annual Edition

The *complete* gun book, comprehensive and detailed, for all shooters— hunters, handgunners, collectors, handloaders and law enforcement officers.



Edited by
Ken Warner

Auto-Ordnance Thompson M1
Similar to the Model 27 A-1 except is in the M-1 configuration with side cocking knob, horizontal forend, smooth unfinned barrel, sling swivels on butt and forend. Matte black finish. Introduced 1985.
Price: **$712.50**


Barrett Model 82 A-1

BARRETT MODEL 90 BOLT-ACTION RIFLE
Caliber: 50 BMG, 5-shot magazine.
Barrel: 29".
Weight: 22 lbs. **Length:** 35" overall.
Stock: Sorbothane recoil pad.
Sights: Scope optional.
Features: Bolt-action, bullpup design. Disassembles without tools; extendable bipod legs; match-grade barrel; high efficiency muzzlebrake. Introduced 1990. From Barrett Firearms Mfg., Inc.
Price: From **$3,350.00**

AMAC LONG-RANGE RIFLE
Caliber: 50 BMG.
Barrel: 33", fully fluted, free-floating.
Weight: 30 lbs. **Length:** 55.5" overall.
Stocks: Composition. Adjustable drop and comb.
Sights: Comes with Leupold Ultra M1 20x scope.
Features: Bolt-action long-range rifle. Comes with Automatic Ranging Scope Base. Adjustable trigger. Rifle breaks down for transport, storage. From Iver Johnson.
Price: **$4,468.00**

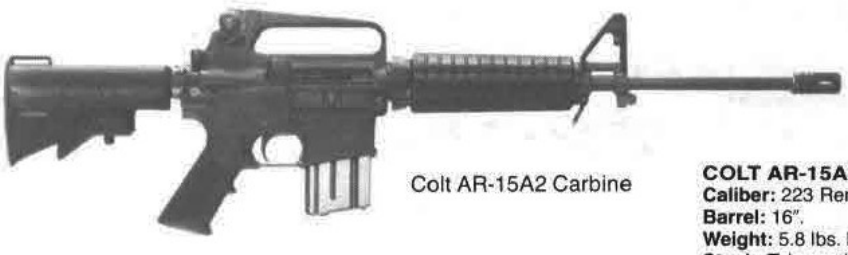
BARRETT LIGHT-FIFTY MODEL 82 A-1 AUTO
Caliber: 50 BMG, 10-shot detachable box magazine.
Barrel: 29".
Weight: 28.5 lbs. **Length:** 57" overall.
Stock: Composition with Sorbothane recoil pad.
Sights: Open, iron and 12x scope.
Features: Semi-automatic, recoil operated with recoiling barrel. Three-lug locking bolt; muzzlebrake. Self-leveling bipod. Fires same 50-cal. ammunition as the M2HB machinegun. Introduced 1985. From Barrett Firearms.
Price: From **$4,995.00**

Colt AR-15A2 H-BAR
Similar to the AR-15A2 Delta H-BAR except has heavy barrel, 800-meter M-16A2 rear sight adjustable for windage and elevation, case deflector for left-hand shooters, target-style nylon sling. Introduced 1986. **Law enforcement sales only.**
Price: **$899.95**


Colt AR-15A2 Rifle

Colt AR-15A2 Delta H-BAR Match
Similar to the AR-15A2 Government Model except has standard stock, heavy barrel, is refined and inspected by the Colt Custom Shop. Comes with a 3-9x rubber armored scope and removable cheekpiece, adjustable scope mount, black leather military-style sling, cleaning kit, and hard carrying case. Pistol grip has Delta medallion. Introduced 1987. **Law enforcement sales only.**
Price: **$1,424.95**

COLT AR-15A2 GOVERNMENT MODEL TARGET RIFLE
Caliber: 223 Rem., 5-shot magazine.
Barrel: 20".
Weight: 7.5 lbs. **Length:** 39" overall.
Stock: Composition stock, grip, forend.
Sights: Post front, aperture rear adjustable for windage and elevation.
Features: Five-round detachable box magazine, standard-weight barrel, flash suppressor, sling swivels. Has forward bolt assist. Military matte black finish. Model introduced 1989. **Law enforcement sales only.**
Price: **$859.95**


Colt AR-15A2 Carbine

COLT AR-15A2 GOVERNMENT MODEL CARBINE
Caliber: 223 Rem.
Barrel: 16".
Weight: 5.8 lbs. **Length:** 35" overall (extended).
Stock: Telescoping aluminum.
Sights: Post front, adjustable for elevation, flip-type rear for short, long range, windage.
Features: 5-round detachable box magazine, flash suppressor, sling swivels. Forward bolt assist included. Introduced 1985. **Law enforcement sales only.**
Price: **$879.95**