

Contemporary Issues in Gun Policy

Essays from the RAND Gun Policy in America
Project

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SOCIAL AND ECONOMIC WELL-BEING

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Published by the RAND Corporation, Santa Monica, Calif.

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Preface

Effective gun policies in the United States must balance Second Amendment rights and public interest in gun ownership with concerns about public health and safety. However, current efforts to craft legislation related to guns are hampered by a paucity of reliable information about the effects of such policies. To help address this problem, the RAND Corporation launched the Gun Policy in America initiative. Throughout RAND's more than 70-year history, in multiple projects, in many policy arenas, and on topics that are sensitive and controversial, researchers have conducted analyses, built tools, and developed resources to help policymakers and the public make effective decisions. The primary goal of the Gun Policy in America project is to create resources where policymakers and the general public can access unbiased information that facilitates the development of fair and effective firearm policies.¹

This initiative has yielded several research products, such as a state firearm law database, a survey of policy experts that identified where access to reliable data would be most useful in resolving policy debates, and two editions of a report that synthesizes available scientific data on the effects of 18 types of firearm policies on a variety of outcomes related to gun ownership. This report presents a collection of essays that also synthesize the available scientific data on topics pertinent to gun policy in the United States. Three of these essays (Chapters One, Two, and Three) are updates to essays that were originally published in a 2018 RAND report and on the Gun Policy in America website,² and two essays (Chapters Four and Five) are entirely new contributions.

The work should be of interest to policymakers and other stakeholders considering decisions related to firearm policy. Furthermore, this report may be of interest to the research community and to the general public.

Justice Policy Program

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¹ Although not all guns are firearms, in this report, we follow conventional use in U.S. policy discussions and treat the terms *gun* and *firearm* as interchangeable.

² See RAND Corporation, *The Science of Gun Policy: A Critical Synthesis of Research Evidence on the Effects of Gun Policies in the United States*, Santa Monica, Calif., RR-2088-RC, 2018; and www.rand.org/gunpolicy.

Funding

Funding for the Gun Policy in America initiative was originally provided through unrestricted gifts from RAND supporters and income from operations. Since June 2018, this initiative has been supported by a grant from Arnold Ventures.

To support RAND's efforts and enable initiatives like the Gun Policy in America project, contact our Office of Development at (310) 393-0411, ext. 6901 or giving@rand.org.

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Summary

This report presents five essays that synthesize the available scientific data on topics pertinent to gun policy in the United States. It is part of the RAND Corporation’s Gun Policy in America initiative, the goal of which is to create unbiased resources that facilitate the development of fair and effective firearm policies.

Chapter One, “Mass Shootings in the United States,” is an update to an essay that originally appeared in the first edition of *The Science of Gun Policy: A Critical Synthesis of Research Evidence on the Effects of Gun Policies in the United States* (RAND Corporation, 2018, Chapter Twenty-Two). The essay authors describe common characteristics of shooters and discuss variability in how mass shootings are defined, which leads to different assessments of how frequently mass shootings occur and whether they have increased over time. In addition, the authors discuss how the relative rarity of such events creates challenges for accurately identifying salient predictors of risk and limits statistical power for detecting which policies may be effective at reducing mass shooting incidence or lethality.

Chapter Two, “Firearm and Ammunition Taxes,” is also an update to an essay published in the 2018 *Science of Gun Policy* report (Chapter Eighteen). The author describes that, although taxation is a standard policy tool used to limit the harms associated with potentially dangerous goods, it has rarely been used to manage risks associated with gun violence; however, it has been used to generate revenue. There is little empirical evidence to indicate how taxation would influence firearm-related outcomes.

Chapter Three, “The Effects of the 1996 National Firearms Agreement in Australia on Suicide, Homicide, and Mass Shootings,” is another update to an essay published in the 2018 *Science of Gun Policy* report (Chapter Twenty-Four). The authors review the empirical evidence that has tested whether Australia’s 1996 National Firearms Agreement (NFA)—which banned several types of firearms and instituted a government-sponsored buyback of banned weapons—reduced homicides, suicides, and mass shootings. The strongest evidence is consistent with the claim that the NFA caused reductions in firearm suicides, mass shootings, and female homicide victimization. However, there is also evidence that raises questions about whether, for at least firearm suicides, those changes can be attributed to the NFA.

Chapter Four, “Is Mental Illness a Risk Factor for Gun Violence?,” is a new essay for the Gun Policy in America project. The authors describe the nuanced picture relating mental illness with gun violence. For example, suicide risk is elevated among people with certain mental illnesses, but suicide among those with such diagnoses is still rare. Homicide risk is also elevated among people with certain mental conditions (e.g., schizophrenia) and among people with co-occurring mental health conditions and substance use disorders, but these individuals still account for the minority of homicides and acts of mass violence in the United States. On the other hand, people with mental health conditions appear to be at increased risk for being victims of interpersonal violence.

Finally, Chapter Five, “Law Enforcement Approaches to Reduce Community Gun Violence,” describes the many ways in which law enforcement personnel enforce laws related to the ownership, transfer, and handling of firearms and respond to and investigate violent crimes committed with guns. However, the effects of such strategies need further research to determine their effectiveness. Community-based approaches that attempt to improve physical and social conditions in certain areas need more evaluative research. There is evidence that proactive approaches that law enforcement personnel use to prevent violent crimes (e.g., place-based, problem-oriented, and person-based approaches) work.

Acknowledgments

These essays benefited substantially from the comments of the peer reviewers:

- Chapters One and Two: Shawn Bushway and Grant Duwe
- Chapter Three: Melissa Labriola, Philip Alpers, and David Hemenway
- Chapter Four: Stephanie Holliday and Paul Nestadt
- Chapter Five: Philip J. Cook and Jessica Saunders.

We greatly appreciate their assistance.

Abbreviations

ARIMA	autoregressive integrated moving average
ATF	Bureau of Alcohol, Tobacco, Firearms and Explosives
BID	business improvement district
CAP	child-access prevention
CCTV	closed-circuit television
CGI	civil gang injunction
CI	confidence interval
FBI	Federal Bureau of Investigation
FFL	federal firearms licensee
IRR	incidence rate ratio
LCM	large-capacity magazine
NFA	National Firearms Agreement
NIBIN	National Integrated Ballistic Information Network
NIBRS	National Incident-Based Reporting System
NICS	National Instant Criminal Background Check System
n.s.	not significant
NVDRS	National Violent Death Reporting System
POP	problem-oriented policing
PSN	Project Safe Neighborhoods
SARA	Scanning, Analysis, Response, and Assessment
SHR	Supplementary Homicide Reports
sig.	significant

Mass Shootings in the United States

Rosanna Smart and Terry L. Schell

Summary

There is no standard definition of what constitutes a mass shooting, and different data sources—such as media outlets, academic researchers, and law enforcement agencies—frequently use different definitions when discussing and analyzing mass shootings. For instance, when various organizations measure and report on mass shootings, the criteria they use in counting such events might differ by the minimum threshold for the number of victims, whether the victim count includes those who were not fatally injured, where the shooting occurred, whether the shooting occurred in connection to another crime, and the relationship between the shooter and the victims. These inconsistencies lead to different assessments of how frequently mass shootings occur and whether they are more common now than they were a decade or two ago.

Data show that, regardless of how one defines mass shootings, perpetrators are likely to be men. But several other characteristics that are statistically predictive of perpetration are still uncommon among offenders on an absolute level. The rare nature of mass shootings creates challenges for accurately identifying salient predictors of risk and limits statistical power for detecting which policies may be effective in reducing mass shooting incidence or lethality. Implementing broader violence prevention strategies rather than focusing specifically on the most-extreme forms of such violence may be effective at reducing the occurrence and lethality of mass shootings.

Incidents of mass firearm violence galvanize public attention. There has been extensive media coverage of many incidents in the United States in which individuals have used firearms to kill large numbers of people. These mass public shootings are rare events—they constitute less than 15 percent of all mass killings in the United States and are responsible for less than 0.5 percent of all homicides (Duwe, 2020)—but they have far-reaching impacts on citizens’

mental health, anxiety, and perceptions of safety (Lowe and Galea, 2017).¹ Mass shootings also frequently generate extensive media coverage related to guns, prompt political discussions about legislative initiatives for how better to prevent gun violence, and may lead to substantial state gun policy changes (Schildkraut, Elsass, and Meredith, 2018; Newman and Hartman, 2019; Luca, Malhotra, and Poliquin, 2020).

In this essay, we first describe different approaches for defining a mass shooting and discuss how using different definitions can influence estimates of mass shooting levels and trends. We then summarize findings from the literature regarding the characteristics of mass shootings, including offender characteristics, types of firearm(s) used, and community-level correlates. We conclude with a brief discussion of the substantial methodological challenges for evaluating how gun policies affect mass shootings. Our discussion here is focused on mass shootings in the U.S. context, although, in Chapter Three, we discuss the evidence regarding the effects of Australia's National Firearms Agreement on mass shootings in that country.

What Is a Mass Shooting?

The U.S. government has never defined mass shooting as a separate category of crime, and there is not yet a broadly accepted definition of the term. In the 1980s, the Federal Bureau of Investigation (FBI) defined *mass murderer* as someone who “kills four or more people in a single incident (not including himself), typically in a single location” (Krouse and Richardson, 2015). In 2013, Congress defined *mass killing* as a single incident that leaves three or more people dead (Pub. L. 112-265, 2013). However, both definitions include many incidents that would not be considered mass shootings. Furthermore, neither definition was established for the purpose of data collection or statistical analyses. The FBI classification of mass murderer was established primarily with the aim of clarifying criminal profiling procedures (Ressler, Burgess, and Douglas, 1988), and the congressional definition was intended to clarify statutory authority for the provision of U.S. Department of Justice investigatory assistance requested by state and local agencies (Pub. L. 112-265, 2013). Thus, various news outlets, researchers, and law enforcement agencies often use different definitions when reporting on mass shootings, which can complicate our understanding of mass shooting trends and their relationship to gun policy.² Table 1.1 provides examples of the variation in the criteria set by some of the existing data sources on mass shootings in the United States. Depending on which data source is referenced, there were somewhere between six and 503 mass shootings and between 60 and 628 mass shooting fatalities in 2019.

¹ Various studies adopt different terminology for mass shooting events that occur in public locations and in which victims are selected indiscriminately. Because most of the studies described in this report use the term *mass public shooting* (as opposed to *public mass shooting*, for example), when referring to these types of events, we use that term.

² Similar definitional issues exist in the study of *school shootings*. For further discussion specific to school shootings, see Elsass, Schildkraut, and Stafford (2016) and Levine and McKnight (2020).

TABLE 1.1
Variation in How Mass Shootings Are Defined and Counted

Data Source	Casualty Threshold (for injuries or deaths by firearm)	Location of Incident	Motivation of Shooter	Number of Mass Shootings in 2019	Number of Mass Shooting Fatalities in 2019
<i>Mother Jones</i> (see Follman, Aronsen, and Pan, 2020)	Three people fatally injured (excluding shooter) ^a	Public	Indiscriminate (excludes crimes of armed robbery, gang violence, or domestic violence)	10	73
Gun Violence Archive (undated-a)	Four people fatally or nonfatally injured (excluding shooter)	Any	Any	418	465
Mass Shooter Database (The Violence Project, undated)	Four people fatally injured (excluding shooter)	Public	Indiscriminate (excludes crimes of armed robbery, gang violence, or domestic violence)	6	60
AP/USA TODAY/ Northeastern University Mass Killings database (see Associated Press and <i>USA Today</i> , 2019; Callahan, 2019)	Four people fatally injured (excluding shooter)	Any	Any	33	174
Everytown for Gun Safety Support Fund (2019)	Four people fatally injured (excluding shooter)	Any	Any	19 (in 2018) ^b	112 (in 2018) ^b
Mass Shooting Tracker (undated)	Four people fatally or nonfatally injured (including shooter)	Any	Any	503	628
Mass Shootings in America database (see Stanford Geospatial Center, undated)	Three people fatally or nonfatally injured (excluding shooter)	Any	Not identifiably related to gangs, drugs, or organized crime	62 (in 2015) ^c	202 (in 2015) ^c

^a Before January 2013, the casualty threshold for the *Mother Jones* data was four people fatally injured (excluding the shooter).

^b As of this writing, the Everytown for Gun Safety Support Fund's Mass Shootings in America website with interactive map was up to date as of April 28, 2020. However, the group's downloadable data included incidents through 2018 only.

^c Stanford's Mass Shootings in America database was permanently suspended in mid-2016. In this table, we provide incident and fatality counts for 2015, the last year of complete data collection. For archived data, see Stanford Geospatial Center, 2018.

Although there is no official standard for the casualty threshold that distinguishes a mass shooting from other violent crimes involving a firearm, a common approach in the literature is to set a casualty threshold of four fatalities by firearm, excluding the offender or offenders (Fox and Levin, 1998; Duwe, Kovandzic, and Moody, 2002; Gius, 2015c; Krouse and Richardson, 2015; Fox and Fridel, 2016). Using this criterion helps reduce measurement error in identifying mass shootings because fatalities are captured in administrative data and are frequently included in media reports (Duwe, 2000). However, this categorization is not without controversy. It does not capture incidents in which fewer than four victims were killed but additional victims were nonfatally injured, and it does not include multiple-victim homicides in which fewer than four fatalities resulted from gunshots but additional fatalities occurred by other means. Thus, many have chosen alternative definitions of casualty thresholds for mass shootings. For instance, Lott and Landes (2000) adopted the definition of two or more injured victims, Kleck (2016) used a six-victim casualty threshold, the Gun Violence Archive (undated-a) defined *mass shooting* as an incident in which four or more victims (excluding the shooter) are injured or killed, and the Mass Shooting Tracker (undated) set a criterion of four or more people injured or killed (including the shooter).

Another definitional disagreement is whether to include multiple-victim shooting incidents that occur in connection with some other crime or domestic dispute. Because mass shootings that stem from domestic and gang violence are contextually distinct from high-fatality indiscriminate killings in public venues, some analysts have argued that they should be treated separately. In their analyses of “mass public shootings,” Lott and Landes (2000) excluded any felony-related shooting, and Duwe, Kovandzic, and Moody (2002) excluded incidents where “both the victims and offender(s) were involved in unlawful activities, such as organized crime, gang activity, and drug deals” (p. 276). Similarly, other researchers (e.g., Gius, 2015c; Luca, Malhotra, and Poliquin, 2020) have restricted analyses to events that occurred in a relatively public area and in which victims appeared to have been selected randomly. However, others have claimed that this narrow definition ignores a substantial proportion of gun-related violence from family- or felony-related murder (Fox and Levin, 2015). Furthermore, determinants of whether victims were selected indiscriminately or whether the incidents were gang- or crime-related are, to some degree, subjective. Accurate information about the shooter’s motivations or connection to gangs may not have been included in police or news reports of the incidents. In contrast, the Mass Shooting Tracker and the Gun Violence Archive count as mass shootings all incidents that meet their designated casualty threshold, regardless of the circumstances that led to the event or the motivation of the shooter.

These definitions make a substantial difference in which incidents are counted.³ As noted earlier, depending on which data source is used, there were between six and 503 mass shoot-

³ There are other definitional issues around what constitutes a mass shooting incident that we do not discuss fully here. Namely, a mass shooting incident and its associated casualties are typically delineated as a shooting of multiple victims simultaneously or over a relatively short period of time and in close geographic proximity. However, in most existing data sets (Table 1.1), there is ambiguity over what constitutes a rela-

ings in the United States in 2019 (see Table 1.1); that amounts to a range of incident rates from approximately one incident per 50 million people in the United States to one incident per 1 million people. More-restrictive definitions (e.g., from *Mother Jones*) focus on the prevalence of higher-profile events motivated by mass murder, but they omit more-common incidents occurring in connection with domestic violence or criminal activity, which make up about 80 percent of mass shooting incidents with four or more fatally injured victims (Krouse and Richardson, 2015). Broader definitions (e.g., from the Gun Violence Archive) provide a more comprehensive depiction of the prevalence of gun violence, but they obscure the variety of circumstances in which these incidents take place and their associated policy implications. Furthermore, if the effects of a firearm policy are expected to affect only mass public shooting incidents, then analyses that include domestic violence mass shootings could obscure identification of the expected effects of the policy. Thus, there is value in having multiple measurements of mass shootings—but only if their definitions are clearly and precisely explained and they are used by researchers in a manner appropriate to the analysis.

Although researchers, policymakers, and reporters may rightly make different decisions about the criteria they wish to use to define what counts as a mass shooting, these decisions fundamentally shape the scope of incidents considered, as well as the potential for measurement error in their data. Data sets that use definitions based solely on objective criteria that are widely available across multiple sources (e.g., fatality counts) likely offer greater reliability compared with data sets that rely on objective criteria that may not be consistently reported across multiple sources (e.g., nonfatal shooting injury counts) or that may be difficult to operationalize (e.g., public location).⁴ Data sets that define mass shootings based on relatively subjective criteria (e.g., whether an incident was related to criminal activity or domestic violence) may be particularly difficult to reconcile because underlying sources may disagree or differently report on these factors. *Mother Jones*, the Mass Shooter Database, and the Mass Shootings in America database are examples of sources that use some subjective criteria. In the absence of a clear conceptual reason for restricting mass shooting incidents of interest based on subjective criteria, evaluations are likely to produce more-reliable and more-replicable results when using data sources that define mass shootings based only on fatality thresholds (see Table 1.1).

Another fundamental issue in documenting mass shootings, and in reconciling differences across data sets, is that the methods used to collect information on mass shootings also vary across sources. There is no comprehensive, administrative data source that captures

tively short period of time or close geographic proximity. Although the FBI has definitions to distinguish *mass murder* (one event, one location), *spree murder* (one event, two or more locations, without the offender “cooling off” emotionally between murders), and *serial murder* (separate events, with the offender “cooling off” emotionally between homicidal events), it is somewhat unclear the extent to which existing mass shooting databases differ in how they classify or count events based on time frame or geographic distance parameters. For further discussion, see Krouse and Richardson (2015).

⁴ As noted by Duwe (2020), some mass shooting incidents involve victims shot in both residential and public settings.

mass shootings; however, data from the FBI's Supplementary Homicide Reports (SHR) database provide information from 1976 onward on most homicides in the United States, typically including information on the weapon types, number of victims, and number of offenders involved, which can be used to identify which incidents meet specific definitional thresholds of fatalities (Puzzanchera, Chamberlin, and Kang, 2018).⁵ When such details are known, the SHR database also provides information on victim-offender relationships (e.g., husband or wife, stranger, neighbor)⁶ and incident circumstances (e.g., "gangland killing," "lovers' triangle," "brawl due to influence of alcohol"), which could be used as indicators of familicides and felony-related killings. However, the SHR database relies on voluntary submissions by thousands of separate law enforcement agencies. It does not capture all incidents (about 90 percent completeness), and this missingness is not random. Sometimes, entire states do not submit data for a year or for part of a year, and in most states and years, at least some law enforcement agencies do not submit complete data (Fox, 2004; Fox and Swatt, 2009). In addition to missingness by jurisdiction, there is a high degree of missingness for data elements, particularly in offender characteristics (e.g., the offender may not be known) and incident characteristics (e.g., circumstances or victim-offender relationship).⁷ Some analyses have also compared SHR variables with data in police incident reports in specific jurisdictions and found evidence of misclassification regarding victim-offender relationship and incident circumstances (Pizarro and Zeoli, 2013). Others have cross-referenced SHR incidents with historical news records and found issues of coding errors in the SHR database that could affect identification of mass shooting incidents (e.g., double counting of victims or incidents, misclassifying a nonfatal injury as a fatal injury) (Duwe, 2000). Although researchers have noted that these recording errors are relatively uncommon in the SHR, the errors are still important considerations for using the SHR to assess mass shootings (Duwe, 2000; Fox, 2006). Finally, the SHR

⁵ The National Incident-Based Reporting System (NIBRS), though not commonly used in mass shooting studies, also contains information that could be used to assess mass shooting incidents. The NIBRS data feed into the SHR data system but contain substantially more information on incident characteristics. However, NIBRS data are only available starting in 1991 and do not currently have complete coverage of the United States. The number of participating jurisdictions also varies greatly over time, from almost all agencies in only three states in 1991 (Reaves, 1993), to 7,283 agencies in 42 states and Washington, D.C., in 2018 (FBI, 2019e). For a comparison of mass murders as captured by SHR and NIBRS data, see Huff-Corzine et al. (2014).

⁶ A noted limitation of the victim-offender relationship item in the SHR is that the variable is coded with respect to only the first victim listed, and the same code is applied to all victims (i.e., the victim-offender relationship is linked to the offender data; the same is true of weapon used and circumstance codes) (Fox and Swatt, 2009; Huff-Corzine et al., 2014). Thus, an incident in which an offender killed three members of his or her family and one stranger might be classified as a familicide or a mass public shooting depending on who is listed as the first victim in the SHR.

⁷ Missingness by jurisdiction in the SHR is commonly handled through a weighting process using the ratio of homicide counts in the FBI's Uniform Crime Reports to reported homicide counts in the SHR database in order to produce national or state-level estimates (Fox and Swatt, 2009). Several methods for imputing missing item data in the SHR have been developed and are discussed in detail in Wadsworth and Roberts (2008) and Roberts, Roberts, and Wadsworth (2018).

provides relatively limited detail on offender or victim characteristics, firearm types, and incident setting.

Given these limitations, most data sources for mass shootings do not derive solely from the SHR. Some sources (e.g., the AP/USA TODAY/Northeastern University Mass Killings database) combine information from both news reports and the SHR, others (e.g., *Mother Jones*) rely on news reports alone, and some (e.g., the Mass Shooter Database) combine information from law enforcement records, social media, court transcripts, news accounts, and other primary and secondary sources to obtain detailed information on the characteristics of each incident and offender (see Table 1.2). Differences in data collection strategies, in large part, reflect differences in the mass shooting definitions employed (e.g., sources that count nonfatal shooting injuries in their criteria must rely on sources other than the SHR, which captures only fatal injuries), as well as differences in the proposed purpose of the database.

TABLE 1.2
Data Collection Methods and Data Elements Captured Across Mass Shooting Data Sources

Data Source and Year Established	Stated Purpose of the Data Set	Methods for Data Collection	Time Period ^a	Data Elements Captured ^b
<i>Mother Jones</i> Established 2012	To track the “distinct phenomenon” of indiscriminate shooting rampages in public places resulting in four or more victims killed (later, three or more victims killed)	Media reports	1982–present	City, state, latitude, and longitude; date; number of fatalities; number injured; setting; shooter gender, race, and age; prior signs of mental health problems for shooter; method of gun acquisition; gun type
Gun Violence Archive Established 2013	To provide data about gun violence in near real time	Automated queries and manual research of more than 7,500 sources (e.g., local and state police records, media, government reports, existing data aggregates) Each case involves secondary validation and de-duplication.	2014–present	City, state, latitude, and longitude; date; number of fatalities; number injured; victim name, age, and gender; suspect or offender name, age, and gender; incident resolution; summary of incident; weapons involved (gun type, whether stolen)

Table 1.2—Continued

Data Source and Year Established	Stated Purpose of the Data Set	Methods for Data Collection	Time Period ^a	Data Elements Captured ^b
Mass Shooter Database Established 2017	To study the life histories of mass shooters who shot and killed four or more people in a public place	Primary sources (e.g., social media, correspondence with perpetrators) and secondary sources (e.g., media, court transcripts, journal articles, autopsy reports, medical, school, and law enforcement records) Each case involves independent validation and de-duplication.	1966–2019	City, state; incident setting; perpetrator age and gender; number killed; 100 life-history variables for offender, including mental health history, trauma, interest in past shootings, and situational triggers
AP/USA TODAY/ Northeastern University Mass Killings database Established 2006	To provide a comprehensive repository on every mass murder (four or more people, excluding the killer, killed within a span of 24 hours)	Media reports and the SHR database Further details are not provided. Data are not currently publicly available.	2006–2019	City, state; date; number of victims; method (e.g., shooting); weapon type; incident summary
Everytown for Gun Safety Support Fund mass shootings database ^c Established 2013	To understand mass shootings (four or more killed) and help point lawmakers to strategies to prevent such events	Primarily media reports, supplemented with the SHR database and police and court records	2009–present	City, state; date; number killed (by sex); number injured (by sex); number under age 20 killed; number of law enforcement officer deaths and injuries; setting; gun types; shooter age, sex, prohibited possessor status, outcome; whether shooter displayed dangerous warning signs and had prior history of domestic violence; whether there was high-capacity magazine use; incident summary
Mass Shooting Tracker Established 2013	To track all mass shootings with more than three people shot in a single spree	Crowd-sourced data collection, unknown procedures	2013–present	City, state; number killed; number injured; brief incident name and summary (e.g., offender name, victims)

Table 1.2—Continued

Data Source and Year Established	Stated Purpose of the Data Set	Methods for Data Collection	Time Period ^a	Data Elements Captured ^b
Mass Shootings in America database Established 2012	To provide a curated set of spatial and temporal data about mass shootings in the United States, taken from online media sources, with the aim of facilitating research on gun violence in the United States	Online media resources In general, a minimum of three corroborating sources are required to add the full record into the data set.	1966–2016	City, state, latitude, and longitude; date, day of week; number of shooters; number of civilian deaths and injuries; number of law enforcement officer deaths and injuries; shooter age, name, sex, and outcome; number (and types) of guns; setting; motive; shooter history of mental illness; shooter military experience; incident summary

^a In this column, *present* means the beginning of 2021.

^b This column represents the data elements that the source attempts to capture; in many cases, these fields are missing information.

^c For this data set and reporting on it, see Everytown for Gun Safety Support Fund, 2019.

However, variation in the sources examined to identify incidents can result in varying degrees of completeness or reliability. Data sets that rely solely on news sources or crowd-sourcing (i.e., *Mother Jones*, the Mass Shooting Tracker, and the Mass Shootings in America database) may systematically miss lower-profile incidents and those involving fewer injuries or fatalities (Duwe, 2000; Schildkraut, Elsass, and Meredith, 2018). Systemic biases in the types of incidents that receive widespread media coverage affect the number of incidents that are counted but might also misrepresent the relative characteristics of offenders, victims, or communities involved (Silva and Capellan, 2019a, 2019b). For example, news reports may be less likely to include the perpetrator's race when he or she is White (Park, Holody, and Zhang, 2012) and may be more likely to include speculation about gang involvement when racial and ethnic minorities are involved (Entman and Gross, 2008). Given media sources' limited capacity to cover all current events, mass shootings that occur during other newsworthy events (e.g., presidential elections) may also be systematically missed, particularly in historical analysis relying on print or television media. Finally, the media landscape has changed dramatically over the past three decades; daily local newspapers have disappeared across much of the United States, and the extent to which news sources are searchable on the internet has also changed (Duwe, 2000).

Thus, any comparison over time in the number or characteristics of mass shootings necessarily involves comparisons across different media sources with different coverage areas, intended audiences, and editorial practices. Data sources that combine information across media reports and law enforcement administrative data—for example, the Gun Violence Archive, the Mass Shooter Database, the Everytown for Gun Safety Support Fund mass shootings database, and the AP/USA TODAY/Northeastern University Mass Killings database—are likely to be more complete, particularly in measuring incidents over a longer

historical time frame. However, it is a challenging effort to ensure that different sources of information about the same incident are properly linked (i.e., without a unique incident identifier, researchers must make linkages based on similarities in date, location, and incident information, which may not be identical across different reports of the same incident) so that multiple reports are not counted as separate incidents. Thus, data sets that triangulate across multiple underlying sources (e.g., the Mass Shooter Database and the Gun Violence Archive) require additional effort toward de-duplication and validation.

And even when data sources use the same definition of what constitutes a mass shooting, variation in data collection methods can result in different estimates of mass shooting prevalence. As an example of this issue, Duwe (2020) triangulated information from the SHR, online newspaper databases, and unpublished mass shooting data sets and found that the *Mother Jones* database missed more than 40 percent of mass shootings that met the source's own criteria between 1982 and 2013. Greater missingness occurred for incidents further back in time, likely because of greater challenges with accessing comprehensive news accounts prior to widespread use of digital media for news reporting. Comparing four data sources for mass shootings (the Everytown for Gun Safety Support Fund's mass shootings database, the Gun Violence Archive, the *Mother Jones* database, and the FBI's SHR database), and applying the same definition of mass shooting to each (four or more fatalities, excluding the shooter), Booty et al. (2019) found that estimates of the number of mass shootings in 2017 ranged from five (*Mother Jones*) to 24 (Gun Violence Archive). When triangulating across data sets, the researchers identified 32 unique mass shooting incidents, but only two incidents (6.3 percent) were common to all four data sources. For further discussion, see Booty et al. (2019), Duwe (2000, 2020), and Huff-Corzine and Corzine (2020), which contain a more comprehensive discussion of data collection efforts and their limitations.

Are Mass Shootings on the Rise?

In 2014, the FBI released a study showing that "active shooting incidents" had increased at an average annual rate of 16 percent between 2000 and 2013 (Blair and Schweit, 2014).⁸ In contrast to the varied definitions for mass shootings, there is an agreed-upon definition among government agencies for *active shooter*: "an individual actively engaged in killing or attempting to kill people in a confined and populated area; in most cases, active shooters use firearm(s) and there is no pattern or method to their selection of victims" (U.S. Department

⁸ The stated purpose of the FBI active shooter reports is to provide federal, state, and local law enforcement with data to better understand how to prevent, prepare for, respond to, and recover from active shooter incidents; data collection methods used to inform the reports are described in Blair and Schweit (2014). Data cover the United States and come from multiple sources, including FBI reporting, official law enforcement investigative data, publicly available sources (e.g., governmental agency reports, journal articles), a comprehensive list of incidents developed by the New York City Police Department, and a study of shooting incidents in the United States from 2000 to 2010 conducted by the Advanced Law Enforcement Rapid Response Training Center.

of Homeland Security, 2008, p. 2). Using a modified version of this definition to include incidents that had multiple offenders or occurred in confined spaces, Blair and Schweit (2014) found that active shootings had increased from only one incident in 2000 to 17 in 2013. The FBI active shooting reports, which are now produced annually, identified 20 active shooter incidents in 2016, 30 incidents in 2017, 27 incidents in 2018, and 28 incidents in 2019 (FBI, 2018g, 2019g, 2020).

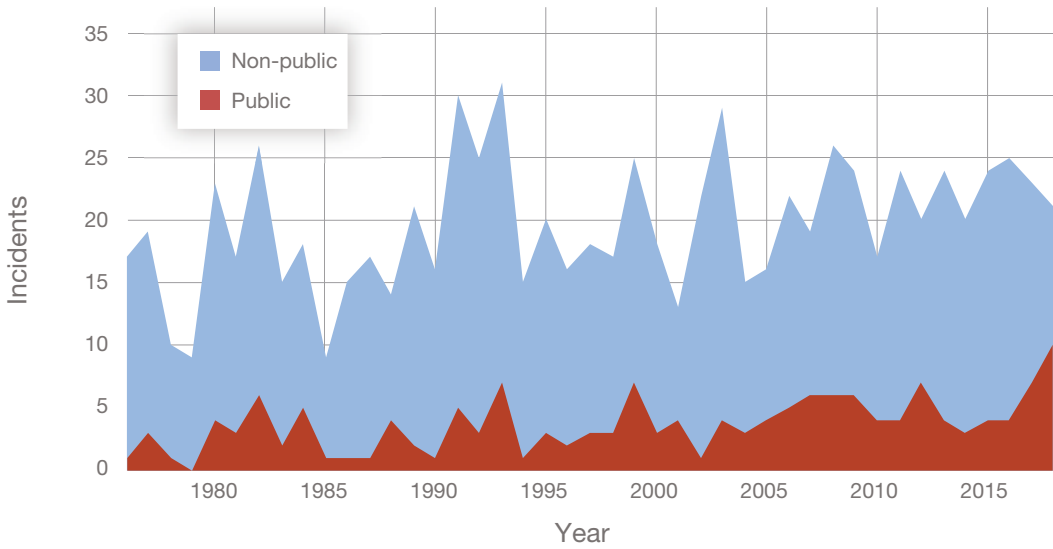
Although Blair and Schweit (2014) explicitly stated that their original FBI active shooter study was “not a study of mass killings or mass shootings” (p. 5), extensive media coverage cited the study as evidence of a sharp rise in mass shootings and mass shooting fatalities (Lott, 2015). However, Blair and Schweit (2014)’s definition of an active shooter incident includes some incidents that would be excluded under any of the commonly used criteria for mass public shootings (see Table 1.1) because it does not set any casualty threshold. For example, Blair and Schweit’s definition includes some incidents in which no people were injured or in which one person was killed and no others were wounded. Setting a threshold of zero victims increases the potential for measurement error, because shooting incidents with no casualties are more difficult to identify from police records and are less likely to receive media coverage (Duwe, Kovandzic, and Moody, 2002). Additionally, because it should be relatively easier to identify more-recent shootings with few fatalities, a low casualty threshold will tend to systematically bias estimates of the number of shootings upward over time.⁹ Even when using a higher-fatality threshold, mass shooting data sources that rely solely on news reports to identify cases also appear to systematically undercount incidents from earlier periods (see previous section and Duwe, 2020).

Even when a more restrictive casualty threshold of four or more fatally injured victims (excluding the shooter) is imposed, empirical evidence on trends in these incidents varies depending on whether the motivation of the shooter is included as a criterion for considering an event a mass shooting. In their analysis of mass shooting trends from 1999 to 2013, Krouse and Richardson (2015) distinguished among mass shootings occurring in public locations that are indiscriminate in nature (“mass public shootings”), mass shootings in which the majority of victims are members of the offender’s family and that are not attributable to other criminal activity (“familicide mass shootings”), and mass shootings that occur in connection to some other criminal activity (“other felony mass shootings”). Duwe (2020) adopted similar distinctions in his analysis of mass shootings over the longer time frame of 1976 to 2018.

Figures 1.1 and 1.2 show trends in mass shooting incidents and mass shooting fatalities, using the data provided by Duwe (2020), who created his own data set aggregating across

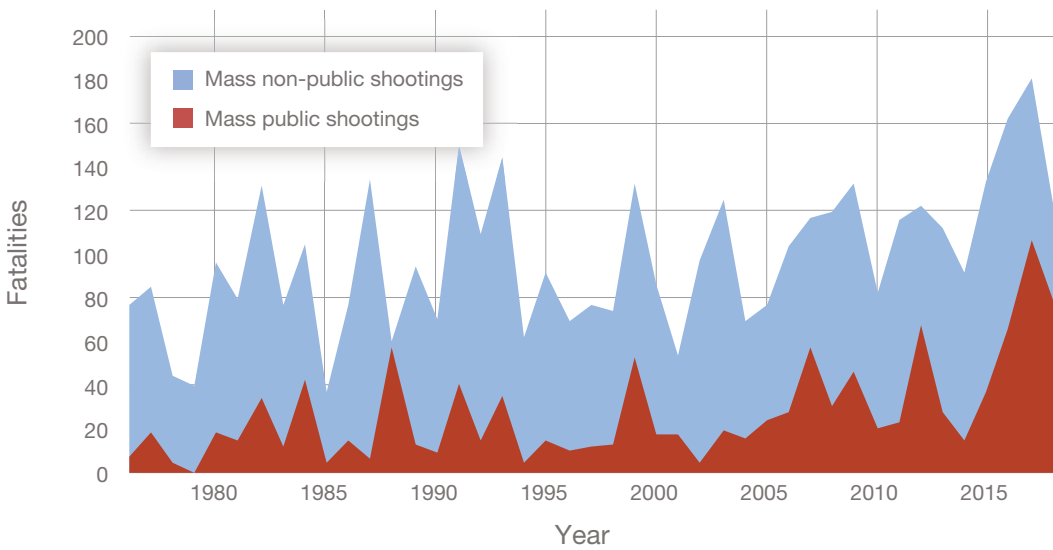
⁹ As an example of this issue, the discontinued Stanford Mass Shootings in America database, which relied solely on online media sources to identify mass shooting events, cautioned its users that information in the database spanned a period in which reporting shifted from traditional media to digital media, and thus annual incident counts partially reflect changes in data collection methodology (see Stanford Geospatial Center, undated). Thus, the more than threefold surge in mass shooting incidents from 2014 to 2015 shown in the Stanford data likely reflects increased online reporting and not necessarily a true increase in the rate of mass shootings.

FIGURE 1.1
Trends in Mass Shooting Incidents, 1976–2018



SOURCE: Author analysis of data from Duwe, 2020.

FIGURE 1.2
Trends in Mass Shooting Fatalities, 1976–2018



SOURCE: Author analysis of data from Duwe, 2020.

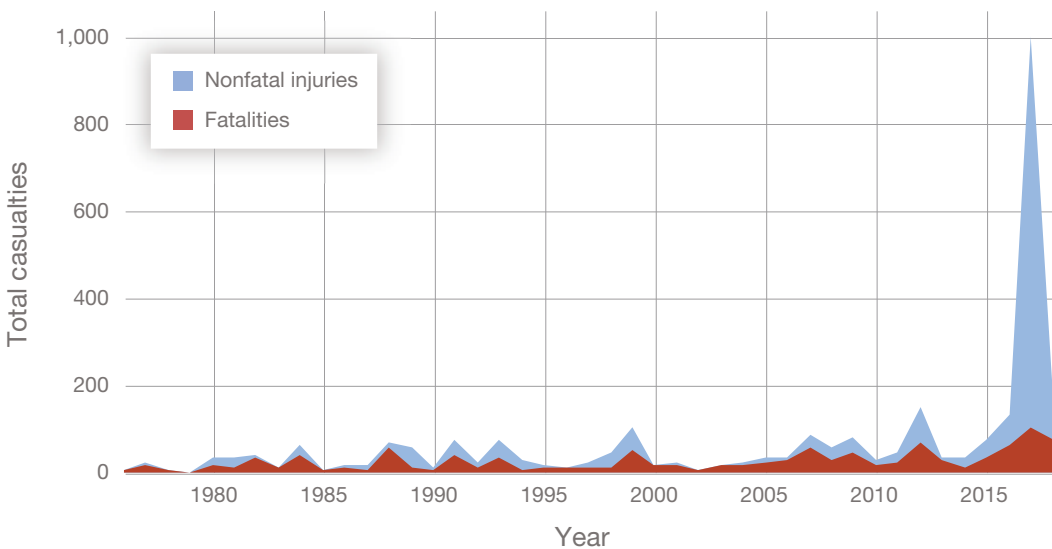
several of the sources described in this chapter. Using Krouse and Richardson (2015)'s definition of "mass public shootings," Duwe (2020) found that such events constituted about 19 percent of all mass shooting incidents and 27 percent of all mass shooting fatalities from 1976 to 2018. The data from multiple studies suggest a slight increase in the incidence rate of mass public shootings over the past four decades (Cohen, Azrael, and Miller, 2014; Krouse and Richardson, 2015; Duwe, 2020). From 2016 to 2018, the annual rate of mass public shooting incidents was about one incident per 50 million people in the United States (Duwe, 2020). Considering the number of fatalities in these shootings, this corresponds to approximately 0.4 percent of all homicides, or approximately 0.2 percent of all firearm deaths, over that period. However, using an expanded definition of mass shootings that includes domestic- or felony-related killings, there is little evidence to suggest that mass shooting incidents or fatalities have increased (Cohen, Azrael, and Miller, 2014; Krouse and Richardson, 2015; Fox and Fridel, 2016). Adjusted for changes in the size of the U.S. population, the incidence of all mass shootings (four or more fatally injured victims, excluding the offender, regardless of shooter motivation or circumstances) was highest in the late 1980s and early 1990s, averaging one incident per 10 million people from 1989 to 1993 (Duwe, 2020). More recently, between 2016 and 2018, the annual rate of all mass shooting incidents was about one incident per 14 million people (Duwe, 2020). Considering the number of fatalities in these mass shootings, this corresponds to approximately 0.8 percent of all homicides, or approximately 0.4 percent of all firearm deaths, over that period. Thus, different choices about how to define a mass shooting result in different findings for both the prevalence of these events at a given time and whether their frequency has changed over time.

Even if we set aside the facts that reliance on different data sources over time complicates measurement and that findings can depend on how mass shootings are defined, the relative rarity of mass shooting events makes analysis of trends particularly difficult. Chance variability in the annual number of mass shooting incidents makes it hard to discern a clear trend in the risk of such incidents, and trend estimates are sensitive to outliers and to the time frame chosen for analysis (Fox and DeLateur, 2014). For example, although Krouse and Richardson (2015) found evidence of an upward trend in mass public shootings from 1999 to 2013, they noted that the increase was driven largely by events in 2012, in which there was an unusually high number of mass public shooting incidents. Additionally, Lott (2015) suggested that the FBI study's estimate of a dramatic increase in active shooter incidents was largely driven by the choice of 2000 as the starting date, because that year had an unusually low number of shooting incidents. Conducting his own analysis to cover 1977 through 2014, and adjusting the data to exclude events with fewer than two fatalities, Lott (2015) found a much smaller and statistically insignificant increase (less than 1 percent annually) in mass shooting fatalities over time. However, when other researchers extended the time frame to cover more-recent years and used a four-fatality threshold for mass public shootings, their findings suggested a significant increase in the incidence and lethality of these events over time (Sanders and Lei, 2018; Duwe, 2020; Lankford and Silver, 2020).

The leverage of extreme incidents is even clearer when examining trends in the number of casualties from mass public shootings over time (Figure 1.3). The data on deaths and injuries from 2017 mass public shootings are particularly striking: Just one of the seven incidents that occurred (the Las Vegas shooting in October 2017) accounted for more than half of all mass public shooting fatalities and nonfatal injuries in that year.¹⁰ However, even when we exclude the Las Vegas incident, 2008 through 2018 saw the highest average rate of casualties from mass public shootings since the 1970s. In 2018, mass public shootings were responsible for approximately one death per 4 million people in the United States (Duwe, 2020), representing fewer than one of every 200 homicides in that year.

Although different choices about how to define a mass shooting and the period over which to calculate mass shooting trends have resulted in disagreement about whether the frequency of mass shootings has risen, there is clear evidence that the media's use of the term *mass shooting* has increased significantly in recent decades (Roeder, 2016). Unfortunately, the trends one finds in measuring mass shootings over time depend heavily on how the term is defined and the precise period over which the trend is observed, and these trends are likely to be biased by changes in the completeness of the underlying data sources over time. This ambiguity makes it difficult to draw firm conclusions about how these incidents have changed over time or how that information should be used as we try to understand the determinants, costs, and policy implications of mass shootings.

FIGURE 1.3
Trends in Mass Public Shooting Casualties, 1976–2018



SOURCE: Author analysis of data from Duwe, 2020.

¹⁰ To illustrate how simple linear trend models of mass shootings are influenced by outliers, the estimated slope from a linear trend model of mass public shooting fatalities from 1999 to 2017 is 2.3 (standard error = 0.93); excluding the Las Vegas shooting, this slope is reduced to 1.3 (standard error = 0.73).

Characteristics of Mass Public Shootings

Several studies, largely focused on mass public shootings, have sought to describe the characteristics of individuals who perpetrate mass shootings, evaluate characteristics of each mass shooting incident, and identify the behaviors and motivations that preceded each incident. Most of these studies are purely descriptive, not comparative, and thus should not be interpreted as providing evidence of whether specific individual-level or community-level characteristics are predictive of someone perpetrating a mass shooting.

According to this literature (see, for example, Capellan et al., 2019; Duwe, 2020), the perpetrators of mass public shootings in the United States have been overwhelmingly male (98 percent) and are most commonly non-Hispanic White (61 percent). In addition, they are most commonly younger than age 45 (82 percent); more specifically, 26 percent of mass public shooters from 1976 to 2018 were younger than age 25, 27 percent were aged 25 to 34, and 29 percent were aged 35 to 44. Relative to the overall U.S. population, mass public shooting offenders are much more likely to be male and are somewhat younger; relative to other homicide offenders, males and non-Hispanic Whites are overrepresented among mass public shooters, and mass public shooters are older. For comparison, of the overall U.S. population in 2019, approximately 49 percent was male, 60 percent was younger than age 45, and 60 percent was non-Hispanic White (U.S. Census Bureau, 2020). Of murderers in 2018 with known offender characteristics, 88 percent were men, 84 percent were younger than age 45 (38 percent younger than 25, 31 percent aged 25 to 34, and 16 percent aged 35 to 44), and 42 percent were White (Hispanic ethnicity information was not provided) (FBI, 2019f).

Media coverage often links mass public shootings with serious mental illness (McGinty et al., 2014, 2016), but estimates of the prevalence of mental illness among mass public shooting offenders vary widely depending on the types of incidents considered and the methods used to define and identify mental illness. Rates of formal diagnoses of psychotic disorders (including diagnoses made post-incident, which may be affected by the incident itself) among mass public shooters are estimated to be about 15 to 17 percent (Stone, 2015; Fox and Fridel, 2016).¹¹ Studies that use a broader definition of mental illness and consider informal evidence indicative of mental health problems (e.g., statements by law enforcement or family before or after the incident) have found prevalence rates ranging from 30 to 60 percent (Taylor, 2018; Capellan et al., 2019; Duwe, 2020). This informal evidence, which is often obtained subsequent to the incident, is invariably affected by the act of mass violence itself (Skeem and Mulvey, 2020). It does not suggest that mental illness is useful for predicting a subsequent mass shooting. Of note, a study of 106 perpetrators of mass public shootings in the United

¹¹ For comparison, general population studies tend to find the prevalence of diagnosable psychotic disorders (including schizophrenia, schizoaffective psychosis, bipolar disorder with accompanying delusion, substance-induced psychotic disorder, and delusional disorders) to be less than 1 percent, although the prevalence varies substantially as a function of the method of measurement and the population studied (see Moreno-Küstner, Martín, and Pastor, 2018). There are no benchmarks for prevalence that use the methods of post-incident diagnosis that are used with mass shooters.

States between 1990 and 2014 found that less than 5 percent of offenders ($n = 5$) had a history of involuntary commitment or adjudication of dangerousness that would have prohibited them from purchasing a firearm following the federal mental health background check (Silver, Fisher, and Horgan, 2018). Although most research supports that, overall, people with serious mental illness are overrepresented among mass public shooters (Duwe, 2020; Skeem and Mulvey, 2020), this does not imply that serious mental illness *causes* mass shootings, just as we cannot conclude that being a young man causes mass shootings.

Other researchers and analysts have noted that many mass shooters have a history of domestic violence. Using three mass shooting databases (whose underlying data sources include media reports, court records, and police records) and their own search of criminal records, Zeoli and Paruk (2020) analyzed 89 individuals who perpetrated a mass shooting (involving four or more fatalities, excluding the offender) between 2014 and 2017. Of the 89 individuals, 28 (31 percent) had a history of suspected domestic violence. The authors identified that, of those 28, 17 (61 percent) had prior interaction with the criminal justice system related to domestic violence, and six individuals had a felony or misdemeanor conviction for domestic violence. Using a different definition of mass shooting (involving four or more casualties, including the perpetrator, and excluding felony-related mass shootings), Gu (2020) found that 36 percent of mass shooting incidents from 2014 to 2019 involved an offender with a history of domestic violence or violence against women. Of note, both of these studies included mass shooting familicides, which represent the modal type of mass shooting. Given that intimate partner homicides are commonly preceded by prior incidents of nonfatal domestic violence (Campbell et al., 2007), it may be expected that perpetrators of mass shooting familicides commonly have prior histories of domestic violence. In a study of mass murders from 2006 to 2016 (74 percent of which were shootings), Fridel (2017) found that 30 percent of familicides, 7 percent of mass public killings, and 3 percent of felony-related killings involved an offender with a known history of domestic violence.¹² But because we do not know the rate of domestic violence in the general population based on comparable definitions and data sources, it is not clear the precise extent to which prior domestic violence represents a risk factor for perpetrating a mass shooting.

It is challenging to make broad generalizations about the individual-level motivations of mass shootings. When mass shootings are broadly defined to include familicides, felony-related killings, and mass public shootings, the events include heterogeneous incident types that vary in terms of victim, offender, and incident characteristics (Fridel, 2017; Taylor, 2018). Felony-related killings exhibit particular differences from familicides and mass public shootings. They are, by definition, criminally motivated (in contrast to familicides and mass public shootings, which are more commonly motivated by relationship problems, group grievances, or ideological extremist beliefs); result in significantly fewer deaths; and are significantly less

¹² The same study identified romantic or family issues (e.g., divorce, child custody dispute) as a potential contributing stressor or triggering event in 46 percent of familicides, 23 percent of mass public killings, and 4 percent of felony-related mass killings (Fridel, 2017).

likely to conclude with the death of the perpetrator (Fridel, 2017; Capellan et al., 2019).¹³ The etiology of felony-related mass shootings thus, unsurprisingly, bears a stronger resemblance to firearm homicides more broadly. In contrast, familicides and mass public shootings show stronger similarities in terms of offender characteristics and motivations (Fridel, 2017).

Even the subset of mass public shootings seems to encompass a variety of offender types, and some researchers have suggested that the relative prevalence of these offender typologies has changed over time (Capellan et al., 2019).¹⁴ When Capellan and colleagues considered incidents in which an offender used a firearm to kill or “attempt to kill” four or more victims in a public setting, they found that school shootings constituted the majority of mass public shooting incidents in the 1960s and 1970s, and workplace shootings became increasingly prevalent in the 1980s to 2000s (Capellan and Gomez, 2018; Capellan et al., 2019).¹⁵ The past decade has seen an increase in the percentage of mass public shootings that are posited to relate to fame-seeking on behalf of the individual or on behalf of a broader ideology (Capellan et al., 2019; Lankford and Silver, 2020). Some researchers have suggested that this rise in fame- and attention-seeking motivations among mass public shooters has contributed to an escalation in the lethality of these incidents (Langman, 2018; Lankford and Silver, 2020).

Although there are some noted differences across different types of mass public shootings (Capellan and Anisin, 2018; Capellan et al., 2019), an overarching commonality is that most incidents are preceded by some level of planning by the shooter. Among active shooting cases from 2000 to 2013 for which sufficient information was available, 62 percent of offenders planned the attack for more than one month, and 9 percent planned for more than one year (Silver, Simons, and Craun, 2018). Focusing on incidents involving eight or more fatally injured victims, Lankford and Silver (2020) found that at least half of the 18 high-fatality mass public shootings between 2010 and 2019 involved a planning period of one year or longer. About 40 percent of mass public shooters make some form of verbal or written threat (e.g., threats made in front of family or friends or posted to social media) prior to the incident (Duwe, 2020).

¹³ Compared with homicides overall and with felony-related mass shootings, familicide mass shootings and mass public shootings are significantly more likely to end with the death of the perpetrator by suicide. Although estimates vary depending on the period of analysis, data source, and definitions applied, approximately 40 to 60 percent of mass public shooters died by suicide (Duwe, 2004, 2020; Lankford, 2015; Fridel, 2017). Estimates are comparable for familicide mass shootings or mass killings but are far lower (less than 5 percent) for felony-related mass shootings or mass killings (Duwe, 2004; Fridel, 2017).

¹⁴ There is no official classification of mass public shooting or shooter typologies, but researchers have often distinguished between workplace violence (disgruntled employee violence), school shootings, ideological extremism, and rampage shootings (i.e., generally, the shootings that do not fall in the other categories) (Duwe, 2004; Lankford, 2013; Capellan et al., 2019).

¹⁵ As discussed previously, different definitions of mass public shootings result in different temporal patterns. If mass public shootings are defined more narrowly as incidents with four or more victims killed, school shootings were very rare prior to the 1990s and constituted 11 percent of all mass public shootings from 1976 to 2018 (Duwe, 2020). Under the broader definition used by Capellan et al. (2019), 25 percent of mass public shootings from 1966 to 2017 occurred in schools.

Another strand of research has described the types of firearms used in mass shooting incidents and the extent to which variation in weapon choice relates to the lethality of the incident. There are noted challenges to conducting such analyses, partly because of the absence of any official data source that provides complete information on the types of firearms or associated equipment (e.g., ammunition, magazines, scopes) used in shootings (for further discussion, see Koper, 2020). It is common for multiple firearms to be involved in public shootings: Various studies have indicated that multiple firearms were involved in an estimated 34 percent of active shooting incidents across 2000–2017 (de Jager et al., 2018), 42 percent of mass public shooting incidents across 1999–2013 (Krouse and Richardson, 2015), and 79 percent of mass public shooting incidents that resulted in eight or more fatalities across 1966–2019 (Lankford and Silver, 2020). In an analysis of mass public shootings in which shooters *attempted* to kill at least four individuals, Capellan and Jiao (2019) found that 80 percent of offenders had prior access to a firearm, although 41 percent of those individuals obtained additional firearms for the incident.

As shown in Table 1.3, handguns are the firearm most commonly involved in active shootings and mass shootings; semiautomatic rifles or “assault-style” weapons are used in an estimated 10 to 36 percent of active shootings and mass shootings.¹⁶ The use of large-capacity magazines (LCMs) is more common in mass public shootings and high-fatality mass shooting incidents than it is in firearm crimes overall. The estimated prevalence of LCM involvement in mass shootings ranges from 20 to 60 percent, or from 45 to 60 percent when restrict-

TABLE 1.3
Percentage of Mass Shooting Incidents Involving the Use of a Firearm with a Large-Capacity Magazine or the Use of a Semiautomatic Rifle or Assault Weapon

Data Source	Mass Shooting Definition	Period of Study and Number of incidents	Firearm with an LCM ^a (%)	Semiautomatic Rifle or Assault Weapon ^b (%)
Everytown for Gun Safety Support Fund (2018)	Four or more people fatally injured	2009–2017, <i>n</i> = 173	20–58	NR
Koper et al. (2018)	Four or more people fatally injured	2009–2015, <i>n</i> = 145	19–57	10–36
Krouse and Richardson (2015)	Four or more people fatally injured	1999–2013, <i>n</i> = 317	NR	10
Klarevas (2016)	Six or more people fatally injured	1966–2015, <i>n</i> = 111	47	26

¹⁶ The identification of “assault weapons” in these incidents is not straightforward, partly because the term *assault weapon* is controversial. In state and federal gun laws, the term generally refers to specific semi-automatic firearm models that are designed to fire a high volume of ammunition in a controlled way or that have specified design features, such as folding stocks or pistol grips. For further discussion, see Koper (2020) and Klarevas (2019).

Table 1.3—Continued

Data Source	Mass Shooting Definition	Period of Study and Number of incidents	Firearm with an LCM ^a (%)	Semiautomatic Rifle or Assault Weapon ^b (%)
Krouse and Richardson (2015)	Public, did not involve other crimes, four or more people fatally injured	1999–2013, <i>n</i> = 66	NR	27
Follman, Aronsen, and Pan (2020)	Public, did not involve other crimes, four or more people fatally injured	1982–Jan 2019, <i>n</i> = 92	45–61 (or higher)	NR
Capellan and Jiao (2019)	Public, did not involve other crimes, attempted to kill four or more people	1966–2017, <i>n</i> = 318	NR	10–34
Klarevas (2019)	Public, did not involve other crimes, four or more people fatally injured	1981–2017, <i>n</i> = 43	NR	30
Lankford and Silver (2020)	Public, did not involve other crimes, eight or more people fatally injured	1966–2019, <i>n</i> = 34	NR	44
de Jager et al. (2018)	Active shooting	2000–2017, <i>n</i> = 248	NR	25
Blau, Gorry, and Wade (2016) ^c	Mass shooting, spree shooting, or active shooting	1982–2014, <i>n</i> = 184	37	34

SOURCE: Information obtained from Blau, Gorry, and Wade (2016), de Jager et al. (2018), Capellan and Jiao (2019), Klarevas (2019), Koper (2020), and Lankford and Silver (2020).

NOTE: NR = not reported.

^a An LCM is considered to be an ammunition feeding device capable of holding more than ten rounds of ammunition. Koper et al. (2018) includes incidents that involved gun models commonly sold with an LCM, even if the magazine recovered was not reported.

^b There is no agreed-upon definition of assault weapon, and studies differed in how such rifles or weapons were defined. Most studies considered specific firearms based on federal definitions (Krouse and Richardson, 2015) or a combination of state and federal definitions (Klarevas, 2016, 2019; Koper et al., 2018); some studies (de Jager et al., 2018; Koper et al., 2018; Capellan and Jiao, 2019) considered upper bounds based on a broader definition to include all semiautomatic rifles. The exact definition used was unclear in some studies (Blau, Gorry, and Wade, 2016; Lankford and Silver, 2020).

^c The criteria for incident inclusion used by Blau, Gorry, and Wade (2016) are somewhat unclear, but the authors appear to consider mass public shootings with four or more fatalities, public spree shootings with two or more fatalities, and active shooter incidents identified by the FBI.

ing the denominator to mass public shootings or high-fatality mass shootings (Table 1.3). For comparison, LCM-equipped firearms are estimated to constitute 22 to 36 percent of crime guns recovered by police in most urban jurisdictions (Koper et al., 2018). The estimated prevalence of LCM-equipped firearms in the overall stock of civilian-owned firearms is about 15 to 20 percent, although these estimates come from survey data from 1994, and the prevalence has likely increased since then (Cook and Ludwig, 1996; Kleck, 2020).

Finally, a few 2018 and 2019 studies have described community-level characteristics associated with mass shooting incidence. County-level analyses of mass shootings (exclud-

ing felony-related mass shootings) from 1990 to 2015 show a higher incidence rate of mass shootings occurring in counties with higher levels of or increasing trends in income inequality (Cabrera and Kwon, 2018; Kwon and Cabrera, 2019a, 2019c), higher population density (Cabrera and Kwon, 2018; Kwon and Cabrera, 2019b, 2019c), higher levels of residential instability (Kwon and Cabrera, 2019b), and lower levels of civic engagement (Kwon and Cabrera, 2019b). However, these findings may simply reflect the fact that mass shootings are more likely to occur in more-populous urban areas where larger gatherings of people are likely to be found; these estimated associations do not clearly show a causal effect of economic or sociocultural conditions on mass shootings.

Research on Policies That Might Reduce Mass Shootings

The nature of mass shootings creates serious challenges for developing policies that will effectively prevent their occurrence. For instance, their rarity makes it difficult to extract generalizable information to identify useful predictors of risk. The low base rates of these events also ensure that policies targeting individuals based on risk factors would result in an extremely high rate of false positives; even the best available risk factors can identify only a subpopulation in which the risk of committing a mass shooting is on the order of one in a million. Finally, because individuals who perpetrate mass shootings often die by suicide (or expect to be killed by someone trying to stop the shooting), standard deterrence strategies used in crime prevention are unlikely to work; increasing the certainty or severity of punishments seems unlikely to be effective when the perpetrator already expects to die in the mass shooting.¹⁷

The relative rarity of mass shooting incidents, and particularly mass public shooting incidents, also makes it challenging to empirically assess whether existing policies are effective in preventing them. Since 2015, there has been an increase in published research that takes causal inference methods commonly used to evaluate policy effects on other forms of gun violence and applies these methods to study the effects of state firearm policies on mass shooting incidence or mass shooting fatalities.¹⁸ However, mass shootings are sufficiently rare that the statistical assumptions of these methods rarely hold, threatening the validity of the effect estimates and statistical inference and potentially resulting in spurious effects (Xue et al., 2017).¹⁹ In some cases, modeling rare outcome data with a large number of covariates can result in quasi- or complete separation, whereby one or more of the covariates perfectly

¹⁷ This likely does not apply to felony-related mass shootings, in which the death of the perpetrator is uncommon.

¹⁸ For recent examples, see Klarevas, Conner, and Hemenway (2019) and Webster et al. (2020).

¹⁹ The distributional characteristics of mass shooting incidents are such that standard assumptions of asymptotic consistency and normality for the parameter estimates may not hold, thus threatening the validity of effect estimates and associated statistical inferences.

predicts the outcome (Albert and Anderson, 1984).²⁰ Even if models do converge, the sparseness of these outcome data risk model overfitting and biased estimates. These issues are likely exacerbated in studies that adopt narrower definitions of mass shootings—for example, restricting the definition to mass public shootings or to mass public shootings involving a higher threshold of fatalities.

Even in studies that use models more appropriate for the distributional characteristics of mass shooting outcomes, the high degree of variability in mass shooting prevalence, injuries, and fatalities makes analyses of the effects of state policies on mass shooting outcomes subject to extremely low statistical power. Even if a state passed a policy that had large effects on mass public shootings (e.g., it cut the probability of such incidents in half), it is still unlikely that a study of that policy using appropriate statistical methods would find it to have a statistically significant effect. This occurs because most states already have zero mass public shootings in any given year, and, when the rate in the pre-period was already at, or very close to, zero, it is not possible to detect a decline in the risk of such shootings that is due to the policy—no matter how large that effect may be. This pervasive lack of statistical power can result in a published literature characterized by exaggerated effect sizes for any effects that are found to be statistically significant, and these significant estimates, in many cases, may misidentify the direction of the true effect (Gelman and Carlin, 2014).

Further complicating identification of the causal effects of policies on mass shootings is the potential issue of *reciprocal causation*; that is, high-profile mass shooting incidents may themselves prompt legislative changes. Luca, Malhotra, and Poliquin (2020) evaluated the association of mass public shooting occurrence in states with subsequent legislative activity related to firearms. Using data from 1989 to 2014, they found a 15-percent increase in the number of state firearm bills introduced in the year following a mass shooting; states with Democratic-controlled legislatures did not show significant effects of firearm laws enacted, while states with Republican-controlled legislatures were significantly more likely to enact more-permissive gun laws subsequent to a mass public shooting incident in the state. If mass public shootings are a cause rather than (or in addition to) a consequence of firearm policy, models that fail to appropriately account for this reciprocal relationship may produce biased and misleading estimates of the effects of laws on mass shootings.

Given statistical challenges with accurately estimating the causal effects of a policy on mass shootings, we may be able to learn more about the potential for effective prevention strategies through detailed analyses of the characteristics of mass shootings (ideally for both incidents that occurred and incidents that are believed to have been averted) or through detailed review of how specific policies are being implemented in an effort to prevent mass

²⁰ For instance, it is common for studies evaluating the effects of gun policies on the likelihood of a mass shooting occurring to use two-way fixed-effects models that control for year and state fixed effects. In conventional estimation of these models, states that do not experience an incident over the study time frame do not enter the log-likelihood. In some studies of high-fatality mass public shootings, this applies to nearly half of the states in the sample.

shootings. Descriptive evidence that mass shootings involving firearms equipped with LCMs result in significantly higher injury and fatality rates may suggest potential benefits of restricting access to LCMs (Koper, 2020), although it may be that the choice to use LCMs reflects more-lethal intentions of the shooter (Kleck, 2016).²¹ Similarly, evidence that many mass shooters have a history of domestic violence has led some to suggest potential benefits of stronger implementation of firearm prohibitions related to domestic violence (Zeoli and Paruk, 2020). Finally, although extreme risk protection orders are most commonly requested because of concerns about self-harm (Parker, 2015; Swanson et al., 2017, 2019), a detailed review of case records from 159 such orders issued in California found that 21 (13.2 percent) involved an individual who had access to or was planning to access firearms and expressed or exhibited behavior suggesting intent to perpetrate a mass shooting (Wintemute et al., 2019). These analyses do not directly assess the causal effect of policies on mass shooting outcomes, but they can still provide important insights for crafting and implementing policies.

Conclusions

It is difficult to make accurate generalizations about mass shootings. These challenges occur, in part, because (1) there are many different definitions for mass shootings, each of which may be useful for a somewhat different purpose; (2) we have incomplete data sources that do not track these events in a consistent manner over time, likely include a biased sample of incidents, and lack the full range of individual and incident characteristics researchers are interested in; and (3) there are statistical limitations inherent in trying to draw inferences from rare and idiosyncratic events. Using definitions that differ in their thresholds for the number and type of victims or the circumstances around the incident results in vastly different estimates of how often mass shooting events occur, how the rate has changed over time, and incident characteristics. Even across studies with a similar definition of a mass shooting, the different data sources (or combinations of data sources) used sometimes result in different findings. A comprehensive administrative data source that reliably captures mass shooting incidents with sufficient detail does not exist; relying on news reports alone is problematic because of well-established systemic bias in what gets reported. Although these issues create problems for understanding the prevalence and patterns of mass shootings at a given point in time, they are exacerbated when trying to understand how mass shootings have evolved over time; this is because of temporal variation in the completeness of underlying data sources that could be used to identify and classify incidents. There may be fewer concerns regarding incomplete or biased data when adopting a narrower definition of mass shootings that includes only the highest-profile incidents with multiple fatalities, but movement toward a more restrictive definition results in identifying a set of incidents that are

²¹ There has also been some debate about the extent to which rates of gunfire attained in incidents of LCM use could be similarly attained with use of non-LCM weapons. For a summary of this discussion, see Koper (2020), p. 165, note 19.

increasingly rare and idiosyncratic. Thus, the researcher makes a trade-off that mitigates the serious problems with the underlying data but creates additional statistical problems resulting from a much smaller sample size that will not support accurate generalizations to a broader population of mass shooters.

Greater consensus about the number of mass shootings and how their prevalence has changed over time could likely be achieved by adopting a mass shooting definition based on objective criteria for which data are widely available. Defining incidents based on a threshold of fatalities rather than of nonfatal injuries is likely to produce more-reliable and more-comparable estimates over time. However, even a definition that includes nonfatal injuries is arguably preferable to one that requires having accurate data on victim-offender relationship, incident circumstances, or perpetrator motivations. These features, though captured in some administrative data sources and potentially identifiable through reviews of news reports or court and police records, are often subjectively determined and are inconsistently available in the underlying data. Relative to the criterion of number of victims, assessment of whether a mass shooting incident was related to criminal activity or whether victims were selected randomly is more likely to be influenced by the perspective of the person reporting or recording the information. Depending on the purpose of the research, it may still be necessary to rely on these more-subjective characteristics. However, researchers may need to consider the extent to which they are studying the characteristics of the events themselves rather than, for instance, how the media covers these incidents.

Even if we did have definitive and complete data sources on the characteristics of all mass shooting incidents, it is still likely to be exceedingly difficult to identify useful predictors of mass shootings. With the exception of male sex, risk factors that appear to be overrepresented among mass shooters relative to the general population are often still uncommon among offenders on an absolute level. Thus, even if one could find a way to prevent individuals with a documented serious mental illness from committing a mass shooting—for example, developing and delivering effective treatments to more than 10 million Americans (Bose et al., 2018) or effectively preventing their access to firearms—most mass shootings would still occur because only a fraction of mass shootings are committed by individuals with a documented history of serious mental illness. Researchers are exploring novel machine learning approaches to using information on domestic violence dispatches or patterns of firearm acquisition for violence risk prediction (Berk and Sorenson, 2020; Laqueur and Wintemute, 2020), although the value of these approaches for predicting mass violence is still unknown. Other approaches focused on reducing the lethality of mass shootings may be effective in mitigating the harms of some incidents, even if the approaches do not prevent the occurrence of such incidents.

Finally, even if states and other jurisdictions developed and implemented policies that prevented mass shootings, there are several statistical challenges that make it unlikely that researchers will be able to demonstrate statistically significant benefits of the effective policies. The assumptions underlying many of the approaches commonly used to evaluate the effects of gun policies are likely not to be met when assessing effects on mass shooting inci-

dence or lethality. The rare nature of mass shootings, and particularly mass public shootings, seriously limits statistical power for detecting policy effects, and studies that find statistically significant associations of policies with mass shootings may greatly overestimate the magnitude of these effects.

However, these difficulties should not impede policymakers from trying to develop and implement better policies. Mass shootings are tragic, traumatic, and shocking events. Because of that, they attract media attention and galvanize public opinion. However, they represent a very small fraction of the homicides in the United States. Precisely because mass shootings are so rare and it is so difficult to predict exactly who will perpetrate them, the overall costs and benefits of any policy to address them are likely to be driven by the policy's effects on a broader set of far more-common outcomes, such as overall homicide, suicide, domestic violence, and population health. Improved treatment for mental health problems or suicidality might reduce certain types of mass shootings, but such policies may also reduce far more-common forms of homicide, suicide, and crime and may also improve economic productivity and social well-being. Similarly, policies aimed at reducing domestic violence or preventing crime are worth pursuing for those benefits, and they may also reduce the incidence of some types of mass shootings (i.e., familicides, felony-related killings). Focusing efforts on implementing public policies that reduce violence more broadly, rather than making policy decisions based only on the most-extreme forms of such violence, may not eliminate mass shootings but may reduce their occurrence and lethality and ultimately save more lives.

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Firearm and Ammunition Taxes

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Summary

Taxation has been a standard policy lever used to limit the harms associated with potentially dangerous goods (e.g., cigarettes, alcohol, and soda or sugary beverages). It has rarely been used to manage risks associated with gun violence, however. Although several states and localities have imposed special taxes on firearms and ammunition, these have typically been used to generate revenue, not as a strategy for reducing access to firearms or limiting gun crimes. Given limited variation in state and local firearm and ammunition taxes in recent history, as well as the absence of consistent data on firearm and ammunition prices over time and across geographies, there is little empirical evidence to indicate how taxation would influence firearm-related outcomes, such as violent crime, suicide, self-defense, or sales of firearms.

Taxation is a policy lever frequently used as a means to influence social welfare and well-being. For example, excise taxes on alcohol, gasoline, and cigarettes are intended to discourage consumption of these goods and subsequently reduce external harms associated with their consumption (e.g., injury, pollution, health care costs) (Hines, 2007). Taxation is also a revenue-generating mechanism, whereby revenues can be used to fund programs aligned with the purpose of the tax (e.g., earmarking tobacco tax revenues to support anti-tobacco education efforts), to cover costs related to the taxed activity (e.g., using gasoline tax revenues to maintain transportation infrastructure), to offset burdens generated by the tax (e.g., reducing taxes elsewhere), or to support other public aims (Marron and Morris, 2016). A wide body of research has found that taxation can serve as an effective policy lever for reducing consumption and consumption-related harms.¹ However, whether taxes change consumption varies

¹ For systematic reviews of the effects of taxes on alcohol, tobacco, and unhealthy food or beverages, see Elder et al. (2010); Hoffman and Tan (2015); and Wright, Smith, and Hellowell (2017), respectively. For studies of the effects of gasoline taxes, see Li, Linn, and Muehlegger (2014) and Knittel and Sandler (2018). For overviews of U.S. consumption-based tax policy, see Hines (2007) and National Conference of State Legislatures, Fiscal Affairs Program (2010).

and depends on the product being taxed (Wagenaar, Salois, and Komro, 2009), consumer characteristics (e.g., age, income, level of consumption) (Chaloupka, Yurekli, and Fong, 2012; Nelson, 2014), the visibility of the tax (i.e., tax salience) (Chetty, Looney, and Kroft, 2009; Finkelstein, 2009), and the availability of similar products not subject to the tax (Chaloupka, Powell, and Warner, 2019). Raising commodity taxes in various markets has been shown to reduce consumption and increase revenue (Chaloupka, Powell, and Warner, 2019), but uneven application of taxes across jurisdictions can result in tax avoidance (e.g., cross-border shopping) or tax evasion (e.g., interstate smuggling) behaviors that partially undermine the goals of the policy and may promote illicit manufacturing and trade (Joossens and Raw, 2012; Bate, Kallen, and Mathur, 2020).² There are also equity considerations: Uniform application of a commodity tax tends to be regressive, whereby lower-income individuals are disproportionately burdened by the tax (Hines, 2007; Allcott, Lockwood, and Taubinsky, 2019).

This essay synthesizes the limited research that has been conducted on firearm and ammunition taxes in the United States. It first discusses some of the conceptual considerations in the role of taxation as gun violence prevention policy. It then briefly describes some of the existing variation in firearm and ammunition taxes in the United States. The essay concludes with a discussion of existing empirical evidence relevant for understanding the potential effects of firearm and ammunition taxes.

Conceptual Considerations

Conceptually, the societal effects of increasing taxes on firearms or ammunition will hinge on how consumers respond to the tax, which depends on the magnitude and salience of the tax, how changes in tax translate to changes in price (i.e., the tax pass-through rate), how responsive gun purchasers are to changes in price (i.e., demand elasticity), and how this varies for different types of purchasers (e.g., those using firearms for recreational, self-protection, self-harm, or criminal purposes). In addition, because firearm and ammunition transactions occur through both formal and informal channels, there is a need to understand price linkages between the formal and informal markets.³

If the goal of the tax is to reduce societal harms of gun violence, an optimal policy design would impose differential taxes across firearm or ammunition types based on their probable use or lethality (similar to how alcohol taxes may differ for spirits, wine, or beer) (Gehrsitz, Saffer, and Grossman, 2020) and across individuals based on their propensity to misuse a firearm (Cook and Leitzel, 1996). For the former, differential tax rates could be applied based

² A large literature has found high rates of tax avoidance and tax evasion in response to cigarette tax differentials (see, for example, Stehr, 2005; Goolsbee, Lovenheim, and Slemrod, 2010; DeCicca, Kenkel, and Liu, 2013). A smaller literature suggests more-modest prevalence of cross-border shopping in response to alcohol price or tax differentials in the United States (see, for example, Beard, Gant, and Saba, 1997; Stehr, 2007).

³ The *informal market* is defined here as comprising legal but unrecorded private transactions (i.e., secondary markets), as well as illegal trade in firearms (i.e., black markets), following Cook and Leitzel (1996).

on caliber, magazine size supported, or concealability (Cook and Leitzel, 1996), although the effectiveness of the policy will depend on the extent to which these distinctions map onto risk of harm, including self-harm, as well as the availability of comparable products subject to lower tax rates. For the latter, given that it is highly unlikely that differential taxation by individual risk could be effectively implemented,⁴ a uniformly applied tax would tend to overtax lower-risk purchasers and under-tax higher-risk purchasers (Diamond, 1973; Knittel and Sandler, 2018). But even these categories are problematic; for instance, the risk of suicide among gun purchasers is elevated even one year after the purchase (Wintemute et al., 1999; Studdert et al., 2020), suggesting that some high-risk purchasers may not be high risk at the time of purchase. If those who use firearms for nonviolent or legal, protective purposes are more responsive to changes in price than are those whose use engenders harm to themselves or others, this would mitigate the effectiveness of the tax as a means for gun violence prevention. Tax implications are further complicated if demands for different types of purchasers are interrelated (e.g., if reduced purchasing of guns for self-defense changes demand among those who seek to use guns for criminal purposes) (for theoretical models of these dynamics, see McDonald, 1999; Ehrlich and Saito, 2010). Furthermore, if individuals who use firearms for violent, non-legal purposes are most likely to obtain weapons or ammunition from illegal (untaxed) sources, the proximate burden of a tax would largely fall on those whose use is less related to harms. However, given connections between formal and informal firearm and ammunition markets, a tax imposed on the formal market would still be expected to increase prices in informal markets (Cook and Leitzel, 1996).

The existence of multiple channels for acquiring firearms or ammunition, each of which may be differentially exposed to a given tax policy, also creates the need to consider potential tax avoidance behavior. For example, some have voiced concern that increased local taxes will push legal consumers and suppliers to conduct business outside city limits (Beekman, 2015). In addition, others have noted the potential for taxes levied on federal firearms licenses (FFLs) to shift sales from FFLs to private sellers (McClelland, 2018), which in some states do not require background checks at the point of transfer (for more, see Smart et al., 2020, Chapter Eight). Finally, if substantial state variation in taxes results in large price differentials, this may create incentives for interstate trafficking of firearms or ammunition. Some studies have shown evidence that crime guns flow from states with more-permissive firearm policies to states with more-restrictive policies (Kahane, 2013, 2020; Knight, 2013; Collins et al., 2018), which suggests that markets for firearms used for criminal purposes respond to cross-state cost differentials. However, these studies evaluated firearm policies (e.g., background checks, firearm purchase prohibitions) that impose nonmonetary access costs, and it is unclear the extent to which similar responses may occur in the existence of cross-state differences in monetary costs of firearms and ammunition.

⁴ For further discussion related to firearm taxes, see Cook and Leitzel (1996), Rangappa (2013), Fleischer (2015), and Stevenson (2019).

The discussion in this section largely considers conceptual implications that would apply to taxing both firearms and ammunition. However, because guns are durable goods (i.e., they tend to last for a long time), the consequences of policies affecting the price of firearms may be different from the consequences of policies affecting the price of ammunition.⁵ Given the large existing stock of privately owned firearms in the United States, estimated to be between 265 million and 390 million (Cook and Goss, 2014; Azrael et al., 2017; Karp, 2018), a tax on firearms may take far longer to have a meaningful impact on firearm use relative to a tax on ammunition.⁶ If a change in tax policy is announced with some lag prior to implementation, individuals may find it easier to shift the timing of their firearm purchases to precede the tax than to foresee future ammunition needs (Kremer and Willis, 2016). However, given that regulations for ammunition are relatively less stringent than those for firearms are (e.g., at the federal level, ammunition sellers do not need to be licensed, and ammunition purchasers are not subject to background checks) (Tita et al., 2006), there may be greater challenges to preventing tax avoidance or evasion for ammunition purchases. There are also potential differences in the effects of firearm versus ammunition taxes because of variation in how they influence, for example, the distribution of tax incidence across different purchaser types (e.g., sport shooters may purchase fewer firearms but high volumes of ammunition), purchasing and re-trade decisions, and availability and prices in informal markets.

Current Policy

Understanding the potential consequences of higher taxes on guns and ammunition is important both for considering policies moving forward and for assessing laws that increase the effective price of legal gun purchases. For example, permit-to-purchase laws do not increase the price of firearms themselves, but there is a cost associated with obtaining a permit, which is a requirement for legal purchase (Cook and Leitzel, 1996). However, there is very little historic precedent for using taxation to manage harms associated with gun violence to inform these issues. A federal excise tax of 10–11 percent on the import and production of firearms and ammunition has been in place since 1919, but the rate has not been changed since it was first instituted. The National Firearms Act of 1934 imposed a \$200 tax on manufacturers for the transfer of certain firearms, but the tax applied to a very narrow set of weapons and has not been changed since initial enactment. Revenues from federal excise taxes fund matching grants to states and territories to support wildlife conservation efforts and education programs for hunters; receipts from the National Firearms Act taxes are put into the General Fund of the Treasury (Crafton, Gravelle, and Krouse, 2018).

⁵ Ammunition may also be considered durable in that it generally has a minimum shelf life of ten years if stored properly (Johnston, 2019). However, unlike firearms, ammunition is typically consumed after one use, although previously fired cartridge cases or shells can be reloaded and reused (Cave, 2019).

⁶ Estimates of the existing stock of ammunition in the United States were not available.

Few states impose special taxes on guns and ammunition over the standard sales tax.⁷ Pennsylvania adds a \$3 surcharge on firearms subject to the sales tax, and revenues are deposited into the state background check system (Pinho and Rappa, 2013). Tennessee imposed a \$0.10 special privilege tax for use, possession, and sales of shotgun shells of metallic cartridges, but this tax was repealed, effective July 1, 2019.

Local jurisdictions have recently taken action to directly influence the prices of guns and ammunition. In January 2016, Seattle, Washington, began collecting taxes of \$25 at the point of sale for each firearm and \$0.02 to \$0.05 for each round of ammunition sold within city limits. Cook County, Illinois, which passed a \$25 tax on firearms in 2013, implemented a similar tax increase on ammunition of \$0.01 to \$0.05 per cartridge in June 2016.

Although these local tax increases were primarily intended as revenue-generating mechanisms to fund public safety or gun violence prevention, larger tax hikes have occasionally been proposed as a preventive mechanism to reduce new purchases of firearms or ammunition and limit gun violence. Most proposed state and local measures to this effect have not passed, but in April 2016, the Northern Mariana Islands (a U.S. territory) passed a provision imposing a \$1,000 tax on pistols; later that year, a federal judge struck down the excise tax as imposing undue burden on individuals' ability to exercise their constitutional rights.⁸

Empirical Evidence

Several factors complicate evaluating firearm taxation policy and the price sensitivity of demand for guns or ammunition. First, although several studies have examined the theoretical consequences of increasing the price of firearms (see, for example, Cook and Leitzel, 1996; Chaudri and Geanakoplos, 1998; McDonald, 1999; Ehrlich and Saito, 2010), because few policy changes have occurred over time or across jurisdictions to change the price of firearms or ammunition, research has faced insufficient variation to empirically estimate the price responsiveness of participants in gun markets. Second, in the absence of exogenous price shocks (i.e., in which the price of firearms or ammunition changes as a result of external factors, such as the cost of material used to manufacture firearms), researchers cannot disentangle changes in consumer demand that are driven by changes in price from changes in price that are driven by changes in consumer demand (e.g., increases in sales that occur after high-profile mass public shootings) (Levine and McKnight, 2017; Studdert et al., 2017; Liu and Wiebe, 2019). And third, the market for firearms is highly differentiated, and there are no publicly available gun or ammunition price data over a sufficient period to support policy analysis (National Research Council, 2004). A few data sources provide information

⁷ State taxes on the manufacture, sale, possession, carrying, and use of firearms appear to have been more common in the late 1800s and early 1900s. See Spitzer (2017) and Shearer and Anderman (2018) for discussion of the early history of firearm taxation policies.

⁸ *Murphy v. Guerrero*, 2016 U.S. Dist. Northern Mariana Islands, 9th Circuit, September 28, 2016.

on national average prices of guns and ammunition,⁹ but these averages obscure notable price variation across jurisdictions and offer only a rough approximation of the retail prices that consumers face. Thus, these data have generally been used to evaluate how demand shocks influence prices and not to estimate how responsive consumers are to changes in prices (Koper and Roth, 2002).

The few data sources that exist also apply solely to the formal market and provide little insight into linkages between the formal and informal markets, which limits analysis of how price changes in the formal market would affect criminal markets for firearms or ammunition. Theoretically, price changes in the primary market should affect informal markets; for example, significant price increases in formal markets may increase demand in informal markets. One study of street gun prices paid by members of criminal markets in Boston found a strong positive correlation between street gun price and the gun's legal market price (measured by *Blue Book* values), with street prices substantially marked up over the legal price, although the relationship weakened for guns with *Blue Book* prices above \$350 (Hureau and Braga, 2018).

However, some evidence suggests that the informal market for firearms operates quite differently from the formal market. For instance, qualitative interviews with adult male detainees in Cook County Jail in Chicago found that 40 percent of inmate respondents acquired firearms through means other than purchase or trade (Cook, Parker, and Pollack, 2015), most commonly through borrowing or sharing arrangements. The importance of social networks in illegal gun markets has been found in other studies (Sheley and Wright, 1993; Kennedy, Piehl, and Braga, 1996; Cook et al., 2007; Vittes, Vernick, and Webster, 2012; Chesnut et al., 2017). Though less well-studied, illegal markets for ammunition also appear to be distinct. An ethnographic study of participants in underground gun markets in Chicago found that individuals faced long wait times for obtaining ammunition through illegal markets, and street prices were marked up considerably relative to legal prices (Cook et al., 2007). Yet, in a more recent survey of male inmates from Chicago who had a criminal history involving a gun offense (Cook, Pollack, and White, 2018), most respondents reported that it was easier to obtain ammunition than to obtain firearms, although several respondents commented on the need to conserve ammunition. Overall, this research provides some evidence about how criminal markets for firearms and ammunition function, but there exist no reliable estimates of the price elasticity of demand for guns or ammunition by criminal organizations or individuals intending to use firearms for acts of violence (Cook and Pollack, 2017). As research grows in this area and examines underground gun markets across different jurisdictions, researchers may gain a better understanding of whether taxation can serve as an effective measure to prevent criminal acquisition and use of firearms or ammunition.

In contrast to the lack of evidence on how violent or criminal offenders respond to changes in price, there does exist some empirical evidence on how responsive hunters are to such

⁹ See, for example, Fjestad (2017) and Firearms News (undated). WikiArms (undated), a relatively new website, provides web-scraped data on ammunition prices.

changes. Several articles that exploited variation in hunting license fees have found hunting demand to be relatively unrelated to changes in license fees (Teisl, Boyle, and Record, 1999; Sun, van Kooten, and Voss, 2005; Poudyal, Cho, and Bowker, 2008; Schorr, Lukacs, and Gude, 2014). Although this research suggests that moderate tax increases on guns or ammunition would do little to disrupt hunting or recreational gun use, the evidence is based on changes in hunting license fees (which are a very small fraction of the total cost of hunting) and may not be congruent with the actual response to significant increases in the price of firearms or ammunition.

Understanding the responsiveness of firearm and ammunition demand to changes in price is also key to determining potential government revenues that could result from a tax. The use of these revenues for gun violence prevention efforts serves as another mechanism through which taxation may influence firearm-related death and injury, akin to how gasoline taxes are used to make roads safer for driving. If gun or ammunition tax revenues are used to support the implementation of effective gun violence prevention strategies, taxation could reduce gun deaths and injury even in the absence of changes in demand for firearms. This is one of the stated goals of H.R. 5717, the Gun Violence Prevention and Community Safety Act of 2020, which was introduced in the U.S. House of Representatives in January 2020 but did not receive a vote. The legislation would increase the federal excise tax to 30 percent on firearms and 50 percent on shells and cartridges and proposes partial allocation of tax revenues to support research and interventions focused on gun violence prevention (U.S. House of Representatives, 2020). Researchers currently have little evidence to suggest whether this strategy will be effective in reducing gun deaths and injuries, and effects will depend on the amount of revenue collected and how that revenue is targeted. Seattle's tax yielded \$93,000 in 2017, substantially less than the projected annual revenues of \$300,000 to \$500,000 (Beekman, 2018).

Conclusions

Overall, researchers currently have little empirical evidence indicating how taxation would influence firearm-related outcomes, such as violent crime or suicides, or establishing how taxing firearms or ammunition would affect firearm prices, the supply of firearms, or defensive gun use. Marginal increases in price associated with hunting licenses offer little evidence to suggest how taxes would influence recreational gun use. Given that taxation has been a standard policy lever for other potentially harmful goods (e.g., cigarettes, alcohol, and soda or sugary beverages), researchers may be able to derive insights from policy changes in these markets, but there are significant differences in making these comparisons (e.g., firearms are durable goods relative to these other products). Furthermore, one needs to consider the varied purposes for which individuals acquire and retain firearms or ammunition and the relationship between various market sources for guns and ammunition. Empirically, understanding the costs and benefits of taxation in gun markets requires exogenous variation in the price of firearms over time or jurisdiction, which requires imposing price regulations in a market for which regulations are already highly contentious.

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The Effects of the 1996 National Firearms Agreement in Australia on Suicide, Homicide, and Mass Shootings

Rajeev Ramchand and Jessica Saunders

Summary

Australia's 1996 National Firearms Agreement (NFA) banned several types of firearms and resulted in the government buying hundreds of thousands of the banned weapons from their owners. Studies examining the effect of removing so many weapons from the community have found that homicides, suicides, and mass shootings were less common after the NFA was implemented, although such incidents were declining prior to 1996. The strongest evidence is consistent with the claim that the NFA caused reductions in firearm suicides, mass shootings, and female homicide victimization. However, there is also evidence that raises questions about whether, for at least firearm suicides, those changes can be attributed to the NFA or to other factors that influenced rates of these outcomes around the time the NFA was implemented.

Following a 1996 mass shooting in which 35 people in Tasmania, Australia, were killed, Australian states and territories reached the National Firearms Agreement (NFA) to adopt “a consistent set of firearm management principles into their own legislation and regulation” (McPhedran, 2016, p. 65). RAND's Gun Policy in America initiative has primarily focused on evidence from the U.S. experience, with the exception that the essay “The Relationship Between Firearm Availability and Suicide” includes some evidence from Switzerland and Israel (RAND Corporation, 2018, Chapter Sixteen). This essay is the other exception. We include it primarily because Australia's NFA is often cited in news media as an effective policy intervention with applicability to the United States (see, for example, Beauchamp, 2018). However, this review also illustrates the complexities of evaluating a multi-component, nationwide effort intended to reduce firearm mortality and morbidity.

The principle features of the NFA, as described in a study on the regulatory reform (Ozanne-Smith et al., 2004, pp. 282–283), were as follows:

- Ban on importation, ownership, sale, resale, transfer, possession, manufacture, or use of all self-loading center rifles, all self-loading and pump action shotguns, and all self-loading rimfire rifles (some exemptions allowable to primary producers and clay target shooters)
- Compensatory buyback scheme through which firearm owners would be paid the market value for prohibited firearms handed in during a 12-month amnesty
- Registration of all firearms as part of integrated shooter licensing scheme
- Shooter licensing based on requirement to prove “genuine reason” for owning a firearm, including occupational use, demonstrated membership of an authorized target shooting club, or hunting (with proof of permission from a rural landowner)
- Licensing scheme based on five categories of firearms, minimum age of 18 years, and criteria for a “fit and proper person”
- New license applicant required to undertake accredited training course in firearm safety
- As well as license to own a firearm, separate permit required for each purchase of a firearm subject to a 28-day waiting period
- Uniform and strict firearm storage requirements
- Firearms sales to be conducted only through licensed firearm dealers and all records of sale to be provided to the police
- Sale of ammunition only for firearms for which purchaser is licensed and limitations on quantities purchased within time period.

Effects on Firearm Ownership

The federal 12-month amnesty (the compensatory buyback scheme) occurred between October 1, 1996, and September 30, 1997, but four states (New South Wales, Victoria, South Australia, and Tasmania) extended the amnesty longer. As of August 2001, Australia had purchased back 659,940 newly prohibited firearms (i.e., semiautomatic and pump action rifles and shotguns), and during a second buyback in 2003, 68,727 handguns were destroyed (Chapman, Alpers, and Jones, 2016).¹ A 2003 study (Reuter and Mouzos, 2003) estimated that approximately 20 percent of Australia’s firearms were retrieved during the buyback; data on the type of firearms returned are lacking, but for one state (Victoria), nearly half of those turned in were rimfires (pea rifles), and the rest were almost all shotguns. Only 204, or about one in 1,000 of the returned firearms, were automatic weapons. Although the authors of that study acknowledged that shotguns accounted for the majority of firearm suicides in Australia

¹ The National Handgun Buyback Bill of 2003 prohibited handguns with (1) a barrel length of less than 100 mm for revolvers and 120 mm for semiautomatics, (2) a caliber in excess of .38 (except for specially accredited events), and (3) a shot capacity in excess of ten rounds.

in 1998, shotguns did not account for a significant share of the homicides or violent crimes prior to that year.

Reducing overall firearm ownership was not an explicit goal of the NFA, but that result appears to have followed. According to the International Crime Victim Survey (van Dijk, van Kesteren, and Smit, 2007, p. 279), the household firearm ownership rate around the time of the legislation (1995–1998) was 15.3 percent, which decreased to 8.7 percent in 1999–2003 and 6.2 percent in 2004–2005. The decrease in handgun ownership specifically over this period was more dramatic. The rate was 8.1 percent in 1995–1998 but then fell to 1.1 percent in 1999–2003 and 0.3 percent in 2004–2005. Alpers and Picard (2020) provide additional data compiled from multiple sources and show that the percentage of Australian residents who were licensed firearm owners decreased from 6.52 percent in 1997 to 3.55 percent in 2016 and that the percentage of registered firearms per population decreased from 17.59 percent in 1996 to 12.57 percent in 2016. The number of registered firearms decreased from 3.2 million in 1996 to 2.2 million in 2001 before rising again in 2017 when it was estimated to again be 3.2 million.

Effects on Suicide and Homicide Mortality in Australia

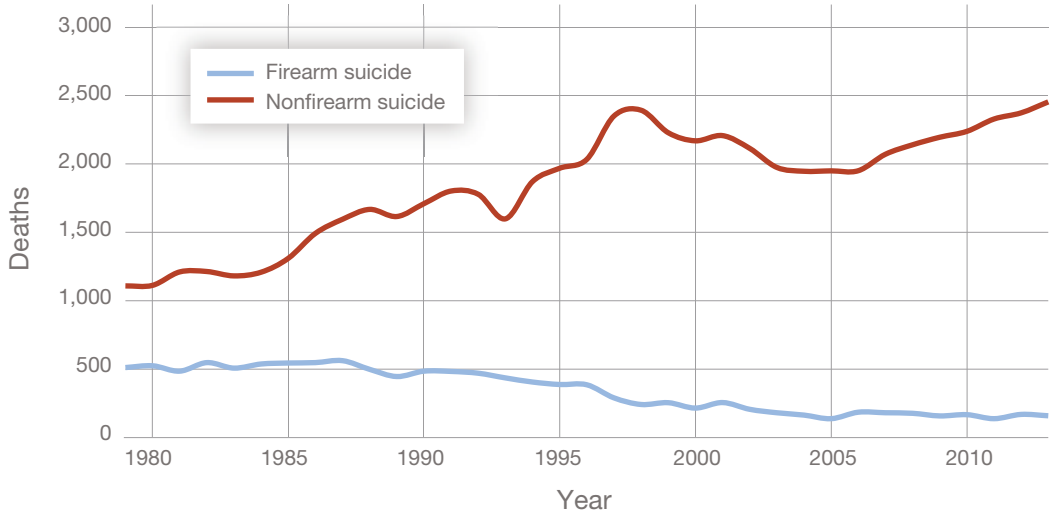
The data used for most of the empirical research seeking to establish a causal effect of the NFA on homicide and suicide in Australia are summarized in Figures 3.1 through 3.3, although, in some cases, researchers have stratified the data even further (e.g., by gender, age, or type of nonfirearm suicide or homicide).

Between 1979 and 2013, there were 76,870 total suicide deaths and 10,144 total homicide deaths in Australia (Chapman, Alpers, and Jones, 2016). For suicides, annual counts ranged from a low of 1,628 deaths in 1979 to a maximum of 2,647 deaths in 1997. For homicides, the range was from 165 deaths in 2004 to 377 deaths in 1990; however, the low number may be due to changes in data collection.² The percentage of total suicides using a firearm ranged from 6 percent in 2011 and 2013 to 32 percent in 1979 and 1980 (Figures 3.1 and 3.2); the percentage of total homicides committed by a firearm ranged from 10 percent in 2005 and 2008 to 41 percent in 1980.

Trends in the rate of firearm and nonfirearm suicide and homicide in Australia prior to and after the 1996 agreement are displayed in Figure 3.3, with rates (the y-axis) presented on the logarithmic scale. Using this scale, the distance between points on the y-axis represents percentage change; thus, a decrease in rate from 2.6 to 1.3 per 100,000 (a 50-percent reduction) looks comparable to a change from 0.4 to 0.2 per 100,000, even though the first set of numbers differs by a magnitude of 1.3 and the second by 0.2. When examining changes in

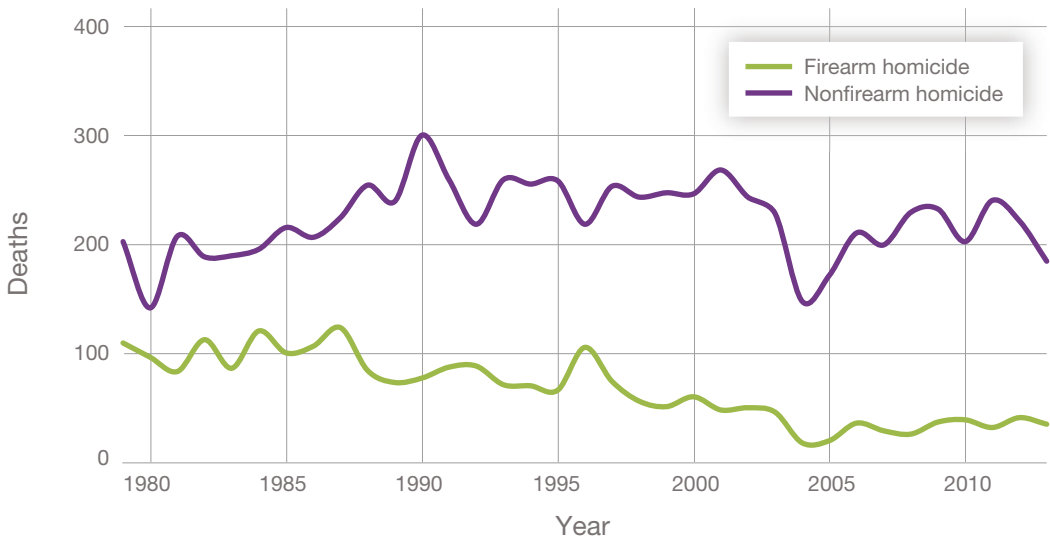
² As Chapman, Alpers, and Jones (2016, p. 295) explain, “The dip in case numbers in the 3 years before 2006 is largely due to a change in data collection method, which resulted in some cases being coded to other categories, mostly accidental injury due to firearms.”

FIGURE 3.1
Firearm and Nonfirearm Suicides in Australia, 1979–2013



SOURCE: Author analysis of Chapman, Alpers, and Jones, 2016, Table 2.

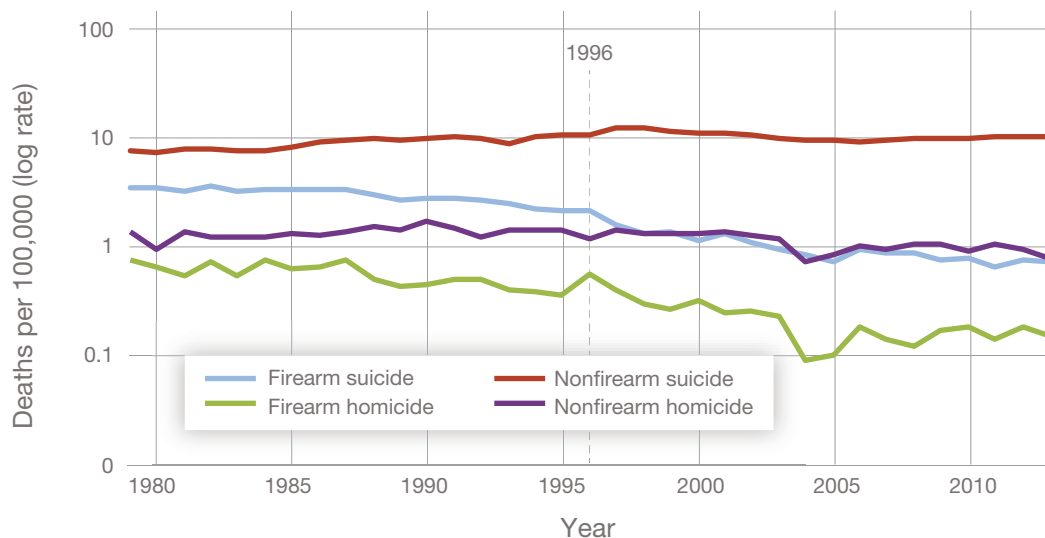
FIGURE 3.2
Firearm and Nonfirearm Homicides in Australia, 1979–2013



SOURCE: Author analysis of Chapman, Alpers, and Jones, 2016, Table 2.

NOTE: Data do not include mass firearm homicide.

FIGURE 3.3
Homicides and Suicides in Australia, 1979–2013, Logarithmic Scale



SOURCE: Author analysis of Chapman, Alpers, and Jones, 2016, Table 2.

NOTE: Data do not include mass firearm homicide.

rates over time, we are often interested in the percentage change as much as we are in the absolute change, which is why we present the data this way.

Because the figure shows that the rates of firearm suicide and homicide dropped after 1996, the pattern is often interpreted as demonstrating the effectiveness of the NFA. For example, the firearm suicide rate fell from 2.6 per 100,000 in 1996 to 1.3 per 100,000 in 1998; similarly, the firearm homicide rate fell from 0.4 to 0.3. This essay focuses on reviewing research that has sought to attribute these reductions to the NFA. However, the figure also shows that rates of firearm suicide and homicide were decreasing prior to 1996: In 1979, the rate of firearm suicide was 3.55 per 100,000 and in 1996 was 2.14 per 100,000 (a 40-percent reduction); the rate of firearm homicide was 0.75 per 100,000 in 1979 and 0.40 in 1996 (a 47-percent reduction). However, rates of nonfirearm suicide and homicide did not show similar trends. The rate of nonfirearm suicide rose from 7.66 in 1979 to 11.1 in 1996, while rates of nonfirearm homicide generally remained constant (1.39 in 1979 to 1.19 in 1996). After 1996, rates of firearm suicide, firearm homicide, and nonfirearm homicide all decreased (in 2013, rates were 0.72, 0.15, and 0.80, respectively). However, the trend for nonfirearm suicide was more sporadic, increasing to 12.8 in 1998, dropping to 9.54 in 2006, and again trending upward to 10.62 in 1993.

Establishing a Causal Effect

There are at least three challenges for estimating the causal effect of the NFA on firearm and total suicides and homicides in Australia:

1. **There is an existing, decreasing trend.** Prior to the NFA, there was an existing, decreasing trend for both suicide and homicide rates. Researchers can estimate one or two disruptions to the trend, depending on their theories about how the policy affects outcomes. First, researchers can estimate a “step function” in which there is a sudden vertical drop between one period and the next. Second, they can estimate an inflection point in which the rate of decrease (i.e., slope) changes, by either decreasing more (i.e., steeper) or less (i.e., flatter) rapidly. Estimating step function changes is relatively straightforward statistically, but identifying inflection points is more challenging. It requires that researchers make assumptions about the underlying process that produces a trend and the amount that future trends depend on past trends. Once they have rationalized their assumptions, researchers can estimate whether the actual, observed trend deviates from what might be expected, based on their assumptions. Researchers who use time-series statistical models to estimate whether observed trends after the NFA deviate from expected trends rarely test their assumptions about such underlying processes. In addition, almost all of the inflection points tested occur in a single year (1996, when the law went into effect). But because the law was passed in the middle of the year and its various components may not have occurred immediately (e.g., as mentioned earlier, the gun buyback provision occurred over a yearlong period), a single year inflection point may be too restrictive for examining the policy’s effect.
2. **Interpreting changes in nonfirearm deaths based on a law intended to affect firearm deaths is difficult.** The NFA focused on firearms specifically, but most researchers have evaluated the effects of the policy on both firearm and nonfirearm outcomes. Many researchers have argued that the causal effect of a policy intended to reduce firearm-related outcomes should be questioned if a similar trend is observed in non-firearm outcomes, because the policy was not intended to influence that outcome. However, there may be reasons why a policy that was intended to reduce firearm-related suicide has an ancillary effect in reducing nonfirearm suicides. For example, there may be fewer imitative suicides (both firearm and nonfirearm) if there is a reduction in firearm suicides. But existing research suggests that clustering in Australia accounts for 5.6 percent of youth suicides and 2.3 percent of adult suicides (Robinson et al., 2016), suggesting that the spillover effect of the NFA on nonfirearm suicides due to contagion is likely to be relatively small.
3. **There is no suitable control condition.** Australia is its own country and an island without any adjacent nations. Thus, it lacks a suitable control condition for comparative purposes, as most ecological studies do. Thus, the counterfactual (i.e., what would have happened in Australia had it not passed the NFA), typically achieved through

randomization in randomized control trials, is difficult to estimate. Some researchers have tried to solve for this by comparing the experience in Australia with that in New Zealand (see, for example, McPhedran and Baker, 2011) or by comparing Australia with a synthetic control group that blends data from multiple countries (Bartos et al., 2020). However, these comparisons are also limited. For example, New Zealand is much smaller and has different firearm legislation (specific differences are explained in McPhedran and Baker, 2011), whereas research with synthetic controls requires a series of statistical assumptions (see McClelland and Gault, 2017), which results in significant uncertainty regarding the policy's causal effect.

Methods

We reviewed the available evidence of the effect of the NFA on mass shootings, homicides, and suicides. Because NFA principles were applied universally throughout Australia, researchers are generally unable to conduct case-control analyses, such as comparing outcomes in one Australian state that enacted a law with outcomes in another state that did not (Chapman et al., 2006; McPhedran, 2016). As a result, most researchers exploited changes over time to assess the effects of the law.

Studies that we included had to meet the following criteria:

- Contain original quantitative data analysis (i.e., we excluded summaries, representations, or replications of previously published work; letters to the editor; opinion pieces; literature reviews; legal analyses; media analyses; and the like).
- Focus specifically on firearm-related suicide or homicide, or mass shootings, in Australia.
- Include time-series data.
- Use formal statistical methods to detect legislative impacts or change over time.

We began by updating a review of the NFA's effect on homicide from McPhedran (2016) that included five studies. In our first version of this essay (see RAND Corporation, 2018, Chapter Twenty-Four), we identified two additional studies related to homicide. In this update (conducted in 2020), we identified three new studies.

McPhedran (2016)'s review was limited to homicide, but the five studies that were included in the review also examined suicide. Thus, our initial review of the NFA's effect on suicide included all five of those studies, plus another four studies. In this update, we identified two additional studies that examined the effect on suicide. In our 2018 review, we included two studies that examined mass shooting outcomes, and we are aware of no empirical studies on that topic published since. In addition, this review benefits from research that does not test the causal effect of the law but instead critiques existing approaches or offers different interpretations of published results.

Research Synthesis Findings

Evaluation Approaches

Across the studies we identified, most examined differences before and after 1996 in trends of suicide or homicide with no comparison condition. To do this, some researchers compared rate-of-change before and after 1996 (Chapman et al., 2006; Chapman, Alpers, and Jones, 2016; Gilmour, Wattanakamolkul, and Sugai, 2018), whereas others used time-series analyses to examine deviations from the “expected trend” given the past trend (Baker and McPhedran, 2007, 2015; McPhedran, 2018). Some of these same studies also tested for a step function (i.e., a sudden, vertical change) in 1996 (Chapman, Alpers, and Jones, 2016; McPhedran, 2018). Two studies examined changes in the time-series structure, looking for structural breaks in trends versus testing for a hypothesized break at a given time point (Lee and Suardi, 2010; McPhedran and Baker, 2012). Across studies, no rationale was provided for why the study authors assumed that the policy would immediately alter the rate of change, and none of the authors explained why the policy might result in an immediate reduction. However, the assumption underlying all these approaches is that the impact of the law would be immediate, with affects observed in the year the NFA was adopted.

Some studies did employ comparison conditions in their analytic approach. Bartos et al. (2020) used a synthetic control approach to compare trends in Australia pre- and post-NFA with trends from 28 other countries similar to Australia that were aggregated and weighted to create a counterfactual condition. Another examined the relationship between the number of firearms turned in during the buyback period in a state and associated rates of firearm homicide and suicide, an approach that specifically tests the buyback aspect of the NFA (Leigh and Neill, 2010). However, we found no other studies that looked at any other specific element of the NFA (e.g., new licensing or registration requirements), although one study (McPhedran, 2018) examined female homicide victimization because of the NFA’s provisions denying firearm licenses to people subject to a domestic violence order. Klieve, Barnes, and De Leo (2009) examined trends in the state of Queensland relative to the rest of Australia and argued that mortality data from Queensland were of better quality. The state of Victoria tightened restrictions on semiautomatic long arms in 1988; thus, Ozanne-Smith et al. (2004) examined firearm-related deaths for Victoria and separately for the rest of Australia in three periods: 1979 to 1986, 1988 to 1995, and 1997 to 2000.

In addition to examining firearm suicides and homicides, most studies examined non-firearm suicides and homicides. One study focused on different types of hangings versus other nonfirearm suicides (McPhedran and Baker, 2012), and another examined drowning, gas, hanging, and poisoning (Gilmour, Wattanakamolkul, and Sugai, 2018). Some researchers examined outcomes among specific groups. Two studies (Gilmour, Wattanakamolkul, and Sugai, 2018; McPhedran, 2018) focused on gender differences in outcomes. McPhedran (2018) hypothesized that the NFA may uniquely affect female homicide victimization because the NFA has provisions that deny firearm licenses to persons subject to a domestic violence order. Gilmour, Wattanakamolkul, and Sugai (2018, p. 1513) argued that “men and women

have different patterns of suicide and assault mortality and use different suicide methods.” McPhedran and Baker (2012) also examined trends in suicide rates among different age groups (15–24, 25–34, and 35–44), acknowledging research suggesting that approaches to preventing suicide may vary by targeted age group.

Suicide

McPhedran (2016) produced an evidence table for studies on the NFA’s impact on homicide, and we created a modified version of it that focuses on suicide (Table 3.1). Most studies have found statistically significant evidence that firearm suicide rates declined more rapidly after implementation of the NFA in 1996 than before (Ozanne-Smith et al., 2004; Chapman et al., 2006; Baker and McPhedran, 2007, 2015; Klieve, Barnes, and De Leo, 2009; Chapman, Alpers, and Jones, 2016; Gilmour, Wattanakamolkul and Sugai, 2018).

It could be argued, however, that a one-time gun buyback should affect the suicide rate’s level rather than its slope. That is, the abrupt change in household gun ownership might be expected to reduce firearm suicides, but it is not clear why it might be expected to have a progressive effect on those reductions over time. In keeping with this hypothesis, Leigh and Neill (2010) found that Australian states with the highest per capita rates of turning in banned guns also had greater declines in firearm suicides.³ These findings are consistent with the claim that the NFA reduced suicides in Australia. On the other hand, Bartos et al. (2020) found that, relative to a counterfactual condition comprising weighted data aggregated from 28 other countries, there was no evidence of a reduction in total (firearm plus nonfirearm) suicides after the NFA.

There has been debate in the literature about the causal interpretation of this effect; some researchers have critiqued the methods used to detect such effects and demonstrated that the models can be highly sensitive to model specifications. The earlier critiques include Lee and Suardi (2010) and McPhedran and Baker (2012). These studies used statistical approaches to identify break points in time series that included 1996 and at least eight years thereafter, but without specifying a priori when such breaks occurred. Analyses with suicide as an outcome failed to find evidence of a break at the time of the NFA, with one exception: McPhedran and Baker (2012) examined trends in population subgroups and found some evidence of a break in 1997 in firearm suicide trends among those aged 35–44, but the evidence was not robust across statistical tests.

³ There is an ecological relationship between firearm prevalence and firearm suicide. Studies in the United States and Switzerland have indicated that changes in regional firearm prevalence were associated with decreases in regional suicide; for a review of that research, see RAND Corporation, 2018, Chapter Sixteen, on the relationship between firearm availability and suicide. The findings from these studies, combined with the earlier discussion about the change in firearm prevalence from 15.3 percent in 1995–1998 to 8.7 percent in 1999–2003, are consistent with the claim that the changes in firearm prevalence brought about by the NFA may have contributed to the reduction in firearm suicides in Australia.

More recently, two studies tested whether analyses using the types of methods used to evaluate the impact of the NFA would find evidence of changes in firearm outcomes in years when no such hypothesized change should occur. Ukert, Andreyeva, and Branas (2018) used the same methods as Chapman, Alpers, and Jones (2016) and applied them to data from 1979 to 1996. The authors demonstrated that one could find significant intervention effects (when no such intervention occurred) on total firearm mortality and firearm suicide in multiple years between 1991 and 1994, although such effects were not apparent in autoregressive integrated moving average (ARIMA) models that can control for stochastic trends. Similarly, Linden and Yarnold (2018) found evidence of a structural break in the firearm suicide time series in 1997, the year after the NFA, but also in 1987, leading them to question whether the magnitude of effect of the NFA claimed by Leigh and Neill (2010) was inflated.

Perhaps more importantly, four studies that did find reductions in firearm suicides also found statistically significant reductions in nonfirearm suicides (Chapman et al., 2006; Baker and McPhedran, 2015; Chapman, Alpers, and Jones, 2016; Gilmour, Wattanakamolkul, and Sugai, 2018). McPhedran and Baker (2012) also found significant breaks in the time series of hanging suicides in 1997 among those aged 15–24 and 25–34, and in 1998 among those aged 35–44. Although it is possible that the NFA caused reductions in both firearm and nonfirearm suicides, the mechanism by which it may have had an effect on nonfirearm suicides was not obvious, and most public health experts would not predict such an effect. An alternative explanation for these findings is that factors other than the NFA, such as the national youth suicide strategy, led to changes in nonfirearm suicide rates around 1996. Thus, although there is some evidence that the 1996 agreement reduced firearm suicides in Australia, studies also found significant reductions in nonfirearm suicides at the same time, calling into question whether it was the NFA or some other concurrent events that led to reductions in both firearm and nonfirearm suicides.

Overall conclusion: Suicide rates, and particularly firearm suicide rates, decreased more rapidly after the NFA and the 2003 handgun buyback program compared with before passage of the law. This finding, along with the finding that firearm suicide rates declined more in regions where more guns were turned in, is consistent with the hypothesis that the NFA caused suicide rates to decline. However, these effects took place during a time of generally declining suicide rates in Australia. The fact that the observed reductions in suicide do not appear to be limited to firearm-related suicides raises questions about whether declines in suicides are primarily attributable to the NFA or whether other social forces, such as those contributing to pre-NFA declines, account for these changes.

TABLE 3.1
Summary of Studies Examining the Effects of the National Firearms Agreement on Suicide in Australia

Study	Geographic Coverage	Statistical Methods	Research Focus	Period	Available Statistical Information and Main Findings			Summary of Findings
					Firearm Suicide	Nonfirearm Suicide	Total Suicide	
Ozanne-Smith et al., 2004	Focus on one Australian state (Victoria); comparisons performed against the rest of Australia	Poisson regression	Did trends differ between the different periods?	1979–2000	<ul style="list-style-type: none"> • 31.7-percent reduction between 1979–1987 and 1988–1996 ($p = 0.008$) • No statistical information provided for 1988–1996 and 1997–2000 or for 1979–1987 and 1997–2000 	Not available	Not available	Evidence of significant reductions in firearm suicides in Victoria and all of Australia
Chapman et al., 2006	Whole of Australia	Negative binomial regression	Did trends differ before and after 1997?	1979–2003	<ul style="list-style-type: none"> • Trend before 1997: IRR = 0.970 (95% CI: 0.964, 0.977) • Trend after 1997: IRR = 0.926 (95% CI: 0.892, 0.961) • Ratio of slopes: IRR = 0.954 (95% CI: 0.922, 0.987); $p = 0.007$ (sig.) 	<ul style="list-style-type: none"> • Trend before 1997: IRR = 1.023 (95% CI: 1.018, 1.029) • Trend after 1997: IRR = 0.959 (95% CI: 0.951, 0.968) • Ratio of slopes: IRR = 0.938 (95% CI: 0.920, 0.956); $p < 0.001$ (sig.) 	<ul style="list-style-type: none"> • Trend before 1997: IRR 1.010 (95% CI: 1.005, 1.015) • Trend after 1997: IRR = 0.956 (95% CI: 0.948, 0.964) • Ratio of slopes: IRR = 0.946 (95% CI: 0.930, 0.963); $p < 0.001$ (sig.) 	Evidence of a difference in trends for both firearm and nonfirearm suicide

Table 3.1—Continued

Study	Geographic Coverage	Statistical Methods	Research Focus	Period	Available Statistical Information and Main Findings			Summary of Findings
					Firearm Suicide	Nonfirearm Suicide	Total Suicide	
Baker and McPhedran, 2007	Whole of Australia	ARIMA, paired sample <i>t</i> -tests	Did trends differ before and after 1996?	1979–2004	<ul style="list-style-type: none"> • Mean predicted rate (per 100,000) after 1996: 1.85 • Mean observed rate (per 100,000) after 1996: 1.22 <p>$p < 0.001$ (sig.)</p>	<ul style="list-style-type: none"> • Mean predicted rate (per 100,000) after 1996: 11.82 • Mean observed rate (per 100,000) after 1996: 11.31 <p>$p = 0.21$ (n.s.)</p>	Not available	Evidence of a change in trend for firearm suicides
Klieve, Barnes, and De Leo, 2009	Queensland	Negative binomial regression	Did trends differ before and after 1996?	1988–2004	<ul style="list-style-type: none"> • Queensland ratio of trends (1990–2004): 1.0072; $p = 0.7794$ (n.s.) • Australia ratio of trends: 0.9672; $p = 0.0102$ (sig.) 	Not available	Not available	Evidence of a difference in trends in Australia but not Queensland
Lee and Suardi, 2010	Whole of Australia	ARIMA, Quandt (Chow), Bai and Peron	Were there changes in the time-series structure?	1915–2004	<ul style="list-style-type: none"> • Quandt: no sig. break • Bai and Perron: <ul style="list-style-type: none"> – UDMax = 10.45, critical value = 8.88 ($p < 0.05$) – WDMax = 10.68, critical value = 9.91 ($p < 0.05$) • Estimated break date: 1987 (90% CI: 1978, 2001) 	<ul style="list-style-type: none"> • Quandt: no sig. break • Bai and Perron: <ul style="list-style-type: none"> – UDMax = 3.97, critical value = 8.88 (n.s.) – WDMax = 4.72, critical value = 9.91 (n.s.) 	Not available	No strong evidence of structural breaks in the time series at the time of the NFA

Table 3.1—Continued

Study	Geographic Coverage	Statistical Methods	Research Focus	Period	Available Statistical Information and Main Findings			Summary of Findings
					Firearm Suicide	Nonfirearm Suicide	Total Suicide	
Leigh and Neill, 2010	Whole of Australia, based on jurisdiction-level data	Linear regression Difference between averages for 1990–1995 and 1998–2003	What was the estimated effect of the number of guns handed in on firearm, nonfirearm, and total suicides?	1990–2003	<ul style="list-style-type: none"> 1990–1995 average death rate (per million) = 2.55 Implied change in death rate 1998–2003 (per million) = –1.9 (95% CI: –2.9, –0.8); $p = 0.004$ (sig.) 	<ul style="list-style-type: none"> 1990–1995 average death rate (per million) = 10.2 Implied change in death rate 1998–2003 (per million) = 1.7 (95% CI: –4.7, 8.2); $p = 0.532$ (n.s.) 	<ul style="list-style-type: none"> 1990–1995 average death rate (per million) = 12.7 Implied change in death rate 1998–2003 (per million) = –0.01 (95% CI: –6.2, 5.9); $p = 0.956$ (n.s.) 	Volume of guns returned inversely correlated with firearm suicide death rate

Table 3.1—Continued

Study	Geographic Coverage	Statistical Methods	Research Focus	Period	Available Statistical Information and Main Findings			Summary of Findings
					Firearm Suicide	Nonfirearm Suicide	Total Suicide	
McPhedran and Baker, 2012	Whole of Australia	Zivot-Andrews, Quandt	Were there changes in the time-series structure?	1907–2007	<p>Zivot-Andrews:</p> <ul style="list-style-type: none"> • Estimated break date, ages 25–34: <ul style="list-style-type: none"> – 1994 (intercept only, 1979–2007; $p < 0.05$) – 1994 (intercept and trend, 1979–2007; $p < 0.05$) • Estimated break date, ages 35–44: <ul style="list-style-type: none"> – 1993 (intercept only, 1979–2007; $p < 0.05$) – 1997 (intercept and trend, 1979–2007; $p < 0.05$) <p>Quandt:</p> <ul style="list-style-type: none"> • Estimated break date 1997, ages 35–44 (1979–2007): Max F statistic = 3.90 (n.s.) 	<p>Results for suicide by hanging:</p> <p>Zivot-Andrews:</p> <ul style="list-style-type: none"> • Estimated break date, ages 15–24: <ul style="list-style-type: none"> – 1987 (intercept only, 1907–2007; $p < 0.05$) – 1997 (intercept and trend, 1979–2007; $p < 0.10$) • Estimated break date, ages 25–34: 1998 (intercept and trend, 1979–2007; $p < 0.01$) • Estimated break date, ages 35–44: 1998 (intercept and trend, 1979–2007; $p < 0.05$) <p>Quandt:</p> <ul style="list-style-type: none"> • Estimated break date 1987, ages 15–24 (1907–2007): Max F statistic = 176.38; $p < 0.01$ • Estimated break date 1987, ages 15–24 (1979–2007): Max F statistic = 63.20; $p < 0.01$ • Estimated break date 1987, ages 25–34 (1979–2007): Max F statistic = 54.90; $p < 0.01$ • Estimated break date 1988, ages 25–34 (1979–2007): Max F statistic = 14.20; $p < 0.01$ 	Not available	No strong evidence of structural breaks in the time series at the time of the NFA

Table 3.1—Continued

Study	Geographic Coverage	Statistical Methods	Research Focus	Period	Available Statistical Information and Main Findings			Summary of Findings
					Firearm Suicide	Nonfirearm Suicide	Total Suicide	
Baker and McPhedran, 2015	Whole of Australia	ARIMA	Did trends differ before and after 1996?	1979–2010	<ul style="list-style-type: none"> • Mean predicted rate (per 100,000) after 1996: 1.50 • Mean observed rate (per 100,000) after 1996: 1.05 <p>$p < 0.001$ (sig.)</p>	<ul style="list-style-type: none"> • Mean predicted rate (per 100,000) after 1996: 12.35 • Mean observed rate (per 100,000) after 1996: 10.64 <p>$p < 0.01$ (sig.)</p>	Not available	Evidence of a change in trends of firearm and nonfirearm suicides
Chapman, Alpers, and Jones, 2016	Whole of Australia	Negative binomial regression	Did trends differ before and after 1996?	1979–2013	<ul style="list-style-type: none"> • Ratio of trends = 0.981 (95% CI: 0.970, 0.993); $p = 0.001$ (sig.) • Step change = 0.652 (95% CI: 0.582, 0.731); $p < 0.001$ (sig.) 	<ul style="list-style-type: none"> • Ratio of trends = 0.981 (95% CI: 0.958, 0.973); $p < 0.001$ (sig.) • Step change = 1.070 (95% CI: 0.988, 1.159); $p = 0.10$ (n.s.) 	<ul style="list-style-type: none"> • Ratio of trends = 0.975 (95% CI: 0.968, 0.982); $p < 0.001$ (sig.) • Step change = 1.004 (95% CI: 0.931, 1.083); $p = 0.90$ (n.s.) 	Evidence of a step-change in firearm suicides and a difference in trends in firearm and nonfirearm suicides

Table 3.1—Continued

Study	Geographic Coverage	Statistical Methods	Research Focus	Period	Available Statistical Information and Main Findings			Summary of Findings
					Firearm Suicide	Nonfirearm Suicide	Total Suicide	
Gilmour, Wattanaka-molkul, and Sugai, 2018	Whole of Australia	Poisson difference-in-difference regression	Did trends across gender and cause of death differ after 1996?	1978–2015			<ul style="list-style-type: none"> • Women: Rate ratio interaction term between firearm and nonfirearm suicide mortality = 0.974 (95% CI: 0.955, 1.004); $p = 0.09$ (n.s.) • Men: Rate ratio interaction term between firearm and nonfirearm assault suicide mortality = 1.027 (95% CI: 1.019, 1.036); $p < 0.001$ (sig.) 	No evidence of an effect on women, and a larger effect on nonfirearm suicides than firearm suicides among men
Bartos et al., 2020	Whole of Australia compared with other nations	Synthetic control	Did the trend differ before and after 1996 compared with trends in the synthetic control?	1967–2007	Not available	Not available	<ul style="list-style-type: none"> • Results are based primarily on comparing expected and actual trends in the post-intervention period 	No evidence of a difference in trends between Australia and the synthetic control

NOTE: CI = confidence interval; IRR = incidence rate ratio; sig. = significant; n.s. = not significant.

Homicide

As reviewed by McPhedran (2016) and is true for subsequently published studies, the research on the NFA's effect on violent crime has largely investigated whether the rate at which homicides were declining changed after the NFA was implemented (Ozanne-Smith et al., 2004; Chapman et al., 2006; Baker and McPhedran, 2007; Baker and McPhedran, 2015; Chapman, Alpers, and Jones, 2016; Gilmour, Wattanakamolkul, and Sugai, 2018; McPhedran, 2018; Bartos et al., 2020). Other analyses have examined the relationship between the number of firearms turned in during the buyback period and firearm homicides (Leigh and Neill, 2010), the presence of any structural breaks in the rate of firearm homicides (Lee and Suardi, 2010; McPhedran, 2018), whether the rate of homicide decline in Australia was steeper than declines in other nations (Bartos et al., 2020), and whether the impact of the NFA might be gender-specific (Gilmour, Wattanakamolkul, and Sugai, 2018; McPhedran, 2018). See Table 3.2, in which we review studies published since 2015 and thus not covered in McPhedran (2016).

None of the studies reviewed in McPhedran (2016) found statistically significant evidence that trends in firearm-related homicide changed after the NFA. Since then, two additional studies failed to find an effect (Baker and McPhedran, 2015; Gilmour, Wattanakamolkul, and Sugai, 2018), but three other studies have produced mixed results. Chapman, Alpers, and Jones (2016) found evidence that the decline in total and nonfirearm homicides after the NFA was steeper than prior to the NFA, but the authors found no evidence of either a step change or a change in slopes for firearm homicides. The greater declines in nonfirearm homicides led the authors to doubt whether any changes can be attributed to the NFA. In the synthetic control approach that compared the overall homicide trends in Australia pre- and post-NFA with trends from 28 other countries aggregated and weighted to create a counterfactual condition, Bartos et al. (2020) found that the reduction in overall homicide experienced by Australia was about 50 percent larger than would have been expected had Australia not enacted the NFA, although the greatest decline (and deviation in total homicide rates between Australia and the synthetic control) occurred not in 1996 but in 2002, which coincides with the passage of the National Handgun Control Agreement in Australia. McPhedran (2018) found that, although the NFA did not appear to be associated with a decrease in male firearm homicide victimization, there was evidence of a step change in female firearm homicide victimization in 1998, but she also found that the rate of decrease in female homicides was actually slower after 1998 than in the years prior.

Overall conclusion: Only one study (McPhedran, 2018) provides convincing statistically significant evidence that firearm homicides changed after implementation of the NFA—specifically, that there was an absolute reduction in female firearm homicide victimization.

TABLE 3.2

Summary of Studies Examining the Effects of the National Firearms Agreement on Homicide in Australia

Study	Geographic Coverage	Statistical Methods	Research Focus	Period	Available Statistical Information and Main Findings			Summary of Findings
					Firearm Homicide	Nonfirearm Homicide	Total Homicide	
Baker and McPhedran, 2015	Whole of Australia	ARIMA	Did trends differ before and after 1996?	1979–2010	<ul style="list-style-type: none"> • Mean predicted rate (per 100,000) after 1996: 0.24 • Mean observed rate (per 100,000) after 1996: 0.22 <p>$p = 0.07$ (n.s.)</p>	<ul style="list-style-type: none"> • Mean predicted rate (per 100,000) after 1996: 1.48 • Mean observed rate (per 100,000) after 1996: 1.10 <p>$p < 0.01$ (sig.)</p>	Not available	No evidence of an effect
Chapman, Alpers, and Jones, 2016	Whole of Australia	Negative binomial regression	Did trends differ before and after 1996?	1979–2013	<ul style="list-style-type: none"> • Ratio of trends = 0.975 (95% CI: 0.949, 1.001); $p = 0.06$ (n.s.) • Step change = 0.769 (95% CI: 0.590, 1.004); $p = 0.05$ (sig.) 	<ul style="list-style-type: none"> • Ratio of trends = 0.965 (95% CI: 0.950, 0.981); $p < 0.001$ (sig.) • Step change = 0.769 (0.590, 1.004); $p = 0.05$ (sig.) 	<ul style="list-style-type: none"> • Ratio of trends = 0.972 (95% CI: 0.958, 0.986); $p < 0.001$ (sig.) • Step change = 0.908 (95% CI: 0.784, 1.050); $p = 0.20$ (n.s.) 	No evidence of an effect
Gilmour, Wattanakamolkul, and Sugai, 2018	Whole of Australia	Poisson difference-in-difference regression	Did trends across gender and cause of death differ after 1996?	1978–2015	Not available	Not available	<ul style="list-style-type: none"> • Women: Rate ratio interaction term between firearm and nonfirearm assault mortality = 0.967 (95% CI: 0.963, 0.999) (n.s.) • Men: Rate ratio interaction term between firearm and nonfirearm assault mortality = 0.997 (95% CI: 0.977, 1.018) (n.s.) 	No evidence that trends differed for firearm and nonfirearm assault mortality for men or women

Table 3.2—Continued

Study	Geographic Coverage	Statistical Methods	Research Focus	Period	Available Statistical Information and Main Findings			Summary of Findings
					Firearm Homicide	Nonfirearm Homicide	Total Homicide	
McPhedran, 2018	Whole of Australia	ARIMA and Zivot-Andrews	Did female homicide trends differ after 1996?	1980–2013			<p>ARIMA:</p> <ul style="list-style-type: none"> • Male homicide: mean predicted after 1996 (per 1,000,000) = 0.32, mean observed = 0.30, $t = 0.91$, $p = 0.38$ (n.s.) • Female homicide post-1996: mean predicted = 0.18, mean observed = 0.11, $t = 5.99$, $p < 0.01$ (sig.) <p>Zivot-Andrews:</p> <ul style="list-style-type: none"> • Male homicide break points: 2004 (trend and intercept), 2008 (trend only and intercept only) • Female homicide break points: 1998 (intercept only, and trend and intercept) and 2006 (trend only) 	Mean female victimization after 1996 was lower than prior trends; evidence suggested a sudden drop and then a deceleration in slope

Table 3.2—Continued

Study	Geographic Coverage	Statistical Methods	Research Focus	Period	Available Statistical Information and Main Findings			Summary of Findings
					Firearm Homicide	Nonfirearm Homicide	Total Homicide	
Bartos et al., 2020	Whole of Australia compared to other nations	Synthetic control	Did trend differ before and after 1996 compared with trends in synthetic control?	1967–2007	Not available	Not available	<ul style="list-style-type: none"> Results were based primarily on comparing expected and actual trends in the post-intervention period 	Observed homicide rate was 25% lower than expected in the synthetic control

NOTE: This table reviews studies that were not included in McPhedran (2016)'s review.

Mass Shootings

Between 1987 and 2019, there were 15 mass shootings in Australia (defined as four victims killed); five involved a semiautomatic rifle, six involved a shotgun, and four involved a rifle. None since 1997 involved a semiautomatic rifle (Alpers, 2019). There are a small handful of studies that examined the impact of the NFA on mass shootings. All such studies indicated that there were mass shootings in Australia prior to enactment of the law, but there were none thereafter; of note, all reviewed studies were published prior to the June 2019 shooting in Darwin, Northern Territory, Australia, in which four people were killed in a spree shooting. Reuter and Mouzos (2003) found no evidence of a decline in homicides, violent crime, or total suicides after the buyback but noted that, between the NFA and the end of the study period (five years), there had been “no mass murders committed with a firearm in Australia” and “three mass murders in five years, a statistically insignificantly lower rate than pre-1996” (p. 141).

Chapman, Alpers, and Jones (2016) defined *mass shootings* as those in which five or more people, excluding the shooter, were killed by gunshot. Under this definition, the authors identified 13 mass shooting incidents in Australia between 1979 and the NFA’s implementation in 1996 but none between 1997 and May 2016. Using the broader definition of four or more people killed in an incident, McPhedran and Baker (2011) reported that there were 12 such incidents in Australia from 1980 to 1996 and none between 1997 and 2009. McPhedran and Baker (2011) also reported that, even though New Zealand did not introduce a similar ban on certain firearms, there had been no mass shootings in New Zealand since 1997 (although there were three between 1980 and 1996 and one in February 1997 while the gun buyback provisions of the NFA were being implemented in Australia).⁴ On the basis of this analysis, the authors and others (i.e., Kleck, 2018a) have suggested that reductions in mass shootings in Australia are not likely to be attributable to the NFA, because similar reductions were seen elsewhere without laws similar to the NFA. However, New Zealand did pass a law in 1992 (though not in 1996) tightening its regulation of guns. In other words, mass shootings in New Zealand declined from four in the years prior to and during implementation of the NFA in Australia to zero for a long period thereafter, and that reduction occurred shortly after imposing stricter gun legislation in New Zealand. Therefore, we do not view the McPhedran and Baker (2011) results as offering a strong refutation of the possibility that the NFA caused a reduction in mass shootings in Australia. Subsequently, Chapman et al. (2018) used a rare-events model to demonstrate that the likelihood that Australia’s reduction in mass shootings between July 1996 and February 2018 happened by chance is one in 20,000.

Overall conclusion: There is evidence suggesting that the NFA may have contributed to a complete reduction in mass shootings that lasted for 23 years, although low numbers of such events, coupled with challenges inherent in studying a nationwide policy on national outcomes, limit strong conclusions and raise skepticism by critics.

⁴ Since that publication, a lone gunman killed 51 people on March 15, 2019, during two consecutive mass shootings at mosques in Christchurch, New Zealand (Pérez-Peña, 2019).

Conclusion

The 1996 NFA in Australia was established in response to a mass shooting and included multiple components that banned certain types of firearms (and created a buyback program for households to turn in banned firearms), limited who could have a firearm, and imposed requirements (e.g., licensing, training, storage) for acquiring firearms. Only one study (Leigh and Neill, 2010) examined a single component of the legislation by examining the relationship between the number of guns returned across an Australian state and the rates of suicides and homicides in the state, and the authors found a negative relationship for firearm suicide and a negative, though not statistically significant, relationship with firearm homicide.

Most other studies have examined the NFA in its entirety and have examined changes in the trend of outcomes and whether the NFA caused a change in the trend. From these studies, it is difficult to estimate a causal effect of the law. This is because, from a design perspective, there is no adequate comparison group to serve as a proxy counterfactual; that is, what would have happened had Australia not adopted the NFA? In addition, a decreasing trend in some of the outcomes prior to the NFA requires evaluators to identify inflection points where trends may change in rate and to interpret changes in nonfirearm outcomes that were not intended to be affected by the NFA. These features require strong assumptions about, for example, why and how past trends should influence the future trends, whether the policy has an immediate or delayed effect, and how such outcomes as firearm and nonfirearm suicides are related, all of which could be challenged by critics.

The strongest evidence is consistent with the claim that the NFA caused reductions in mass shootings, because no mass shootings occurred in Australia for 23 years after it was adopted (until the 2019 Darwin shooting). There is also consistent evidence that rates of firearm suicides decreased after the NFA and that suicide reductions were greater in regions where more guns were turned in. However, some researchers have shown that the statistical tests used to examine trends in suicides over time are sensitive to model specifications (e.g., the years observed). Furthermore, many studies observe similar changes in nonfirearm suicides, which the NFA did not intend to affect, leading some to question whether another, ancillary effort (such as a youth suicide prevention campaign) was responsible for the reduction in both firearm and nonfirearm suicides. Although, in total, evidence is weak for an effect of the NFA on firearm homicides, there is new evidence to suggest that female homicide victimizations declined after the NFA was adopted.

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Is Mental Illness a Risk Factor for Gun Violence?

Rajeev Ramchand and Lynsay Ayer

Summary

Although many Americans believe that people with mental disorders pose a danger to themselves or others, the science reveals a more nuanced picture. Suicide risk is indeed elevated among people with certain mental illnesses (e.g., schizophrenia, depression, borderline personality disorder, bipolar disorder, and anxiety disorders), but suicide among those with such diagnoses is still rare. Similarly, homicide risk is elevated among people with certain mental conditions (e.g., schizophrenia) and people with co-occurring mental health and substance use disorders, but these individuals still account for a minority of homicides and acts of mass violence in the United States. On the other hand, people with mental health conditions appear to be at increased risk for being victims of interpersonal violence. A major limitation to researching mental health and violence is that only approximately half of those with a mental illness have a formal diagnosis. As a result, it is difficult to ascertain mental health *prior* to self-directed or interpersonal violent events, particularly when the perpetrator also dies (i.e., by killing him or herself or being killed by legal intervention).

In the aftermath of acts of gun violence, questions often arise about whether the assailant had a history of one or more mental health conditions. For example, after two mass shootings in a single weekend in Texas in August 2019, then-President Donald Trump stated, “Mental illness and hatred pulls the trigger” (Abutaleb and Wan, 2019). In 2018, more than 50 percent of Americans believed that people with schizophrenia and alcohol use disorders posed a danger to others, and 30 percent believed that people with depression posed such a threat (Pescosolido, Manago, and Monahan, 2019). In this essay, we summarize the scientific research about whether and how mental illness and gun violence, including self-directed and interpersonal violence, are related.

Mental health conditions are diverse in both symptoms and severity, and these factors affect the likelihood that someone with a given condition has received a formal diagnosis and received treatment. In 2018, 65 percent of adults with a major depressive episode in the past year received treatment for depression (Lipari and Park-Lee, 2019). Among adults with *any* mental illness, only 43 percent received mental health services. Among those with *serious mental illness*—defined as a “diagnosable mental, behavioral, or emotional disorder, other than a developmental or substance use disorder, that substantially interfered with or limited one or more major life activities”—only 64 percent received treatment (Lipari and Park-Lee, 2019, pp. 33–34). Thus, diagnoses and treatment for mental health conditions should be considered imperfect markers of mental illness. This is a major limitation of much of the research that has sought to examine the relationship between mental illness and suicide or firearm violence.

Mental Illness and Suicide

In 2018, 48,344 people died by suicide in the United States, 24,432 (51 percent) of whom used a firearm to end their life (Centers for Disease Control and Prevention, 2020). A meta-review (a review of systematic reviews) found evidence that people with schizophrenia, borderline personality disorder, bipolar disorder, or depression have higher rates of suicide than the general population does (standardized mortality ratios = 12.9, 45.1, 17.1, 19.7, respectively), and those with anxiety disorders (odds ratio = 3.3) and posttraumatic stress disorder (odds ratio = 2.5) specifically have elevated risk of dying by suicide relative to those without these conditions (Chesney, Goodwin, and Fazel, 2014).¹ However, elevated mortality rates or risk associated with specific mental health conditions do not necessarily indicate that these conditions can usefully predict future suicide, because suicide still remains relatively rare among those with the mental health conditions. For example, meta-analyses suggest that 5 percent of those diagnosed with schizophrenia die by suicide (Palmer, Pankratz, and Bostwick, 2005), and Danish registry data indicate that, among those who have received psychiatric care after age 15, 2.1 percent of women and 4.3 percent of men died by suicide (Nordentoft, Mortensen, and Pedersen, 2011). A 2017 review confirmed that knowing that a person had a mental health problem did little to improve the prediction of suicide beyond random guessing (Franklin et al., 2017).

Retrospective analyses have found that between 45 and 90 percent of people who die by suicide have mental health or substance use disorders. Generally speaking, lower estimates derive from studies that rely on diagnostic markers of mental illness. For example, in a study of 5,894 suicides across 11 health care systems between 2000 and 2010, 45 percent of individ-

¹ Standardized mortality ratios compare the mortality rate of those with a mental health condition and the mortality rate of the general population, which includes those with mental illness. In contrast, meta-analyses that present odds ratios compare suicide rates among those with the mental health condition and suicide rates among those without the mental health condition.

uals received a mental health diagnosis in the year before death and 24 percent had a health care visit coded with a mental health diagnosis in the four weeks before death (Ahmedani et al., 2014). These numbers are elevated if one includes visits that were coded with alcohol and drug dependency diagnoses (to 57 and 26 percent, respectively). Postmortem studies of suicide decedents, however, result in larger estimates of mental illness. In a random sample of 600 suicides between 2003 and 2011 from 17 states in the National Violent Death Reporting System (NVDRS), 75 percent of those who died had mental health or substance use problems, and 35 percent had received treatment for mental health or substance abuse (Stone et al., 2016). In the NVDRS, data on mental health problems and treatment come from postmortem reports based on medical records or brief interviews with family and friends, when available (Blair et al., 2016). This method of postmortem inquiry is elaborated upon in psychological autopsy studies, in which researchers attempt to make mental health diagnoses postmortem via “a combination of interviews of those closest to the deceased and an examination of corroborating evidence from sources such as hospital and general practice case-notes, social work reports and criminal records” (Cavanagh et al., 2003, p. 395). In a review of 154 psychological autopsy studies, an average of 90 percent of those who died by suicide had a mental health disorder (Cavanagh et al., 2003). There are two limitations of this approach. First, there is attribution bias, in which coroners or medical examiners are more likely to indicate mental health disorders in suicide cases. Second, in an attempt to find an explanation for the event, family and friends who are interviewed after the suicide often recall symptoms or behaviors in the decedent that may not have actually been present (Cavanagh et al., 2003). For these reasons, studies that use the NVDRS and those based on psychological autopsies may overestimate the prevalence of mental health disorders among those who die by suicide.

There is some evidence to suggest that the prevalence of mental health disorders differs between firearm suicide decedents and nonfirearm suicide decedents. Data from the NVDRS indicate that men who used a firearm to take their own life were less likely to have had a past mental health diagnosis or to have received mental health treatment than were men who did not use a firearm (Kaplan, McFarland, and Huguet, 2009; Kaplan et al., 2012). However, investigations into the deaths of those who use a firearm during suicide may be less likely to uncover underlying mental health symptoms than are the investigations into the deaths of those who die by other means (because less time and resources are typically spent during an investigation when the cause of death is clear). Among men aged 65 or older who took their own lives by some means other than a firearm, 46 percent had a mental health diagnosis relative to 28 percent of those aged 65 or older who did use a firearm (Kaplan et al., 2012). On the other hand, a study of suicides and suicide attempts in Chicago between 1990 and 1997 found that those who used a gun were *more* likely to have a diagnosis of depression or psychosis (Shenassa, Catlin, and Buka, 2000).

If people with mental health disorders are less likely to use a firearm to attempt suicide, it may be because the families of those with mental health diagnoses, or the individuals with these diagnoses themselves, have been advised not to have a firearm in the home as a safety precaution. However, the evidence does not bear this out: People with a history of a mental

health disorder were just as likely to live in a home with guns available as were those without a history of mental illness, with exceptions (adults with a history of bipolar disorder and adults with a past suicide attempt may have more-limited access to firearms) (Ilgen et al., 2008; Simonetti et al., 2015). Thus, the relationship between mental illness and the method used to end one's life remains unclear.

In conclusion, at least half of those who die by suicide have a mental health or substance use disorder, but these disorders are often unrecognized or undiagnosed. Among those with a mental health diagnosis, fewer than 5 percent are likely to die by suicide, but this percentage depends on the specific mental health condition. Prevalence of mental illness may be lower among those who use a firearm to end their lives.

Mental Illness and Firearm Interpersonal Violence

In 2018, 18,830 people died by homicide in the United States, 13,958 (74 percent) of whom died by firearm (Centers for Disease Control and Prevention, 2020). A review by Skeem and Mulvey (2020) examined the evidence base on mental illness and interpersonal violence, including gun violence and mass shootings. The authors highlighted data from the MacArthur Violence Risk Assessment Study, which followed patients discharged from one of three acute, civil inpatient psychiatric facilities in the United States (see Steadman et al., 1998). That study was particularly significant because it measured acts of violence perpetration from official records and respondents' own self-reports, whereas many other studies relied exclusively on official records. Steadman et al. (2015) found that, among 951 patients in the study sample who completed at least one follow-up interview within one year of discharge from a psychiatric facility, there were 67 acts of interpersonal gun violence perpetrated by 23 people. Among those same 951 people, 19 acts of gun violence committed by nine people involved a stranger as a victim. Thus, within one year, 2 percent of those who were discharged committed an act of violence with a gun, and 1 percent committed an act of violence with a gun in which a stranger was the victim (Steadman et al., 2015). This is arguably the strongest evidence in the United States to date suggesting that few people with mental illness are violent with firearms against strangers.

There is also evidence that people with mental illnesses commit certain types of violent offenses at higher rates than those without mental health conditions do, at least for specific diagnoses. For example, Fazel et al. (2009) performed a meta-analysis and found that the risk of homicide among those with schizophrenia was 0.3 percent relative to 0.02 percent among those without a diagnosed mental illness. However, the risk of homicide among those with substance abuse was also 0.3 percent, implying that individuals with either diagnosis (schizophrenia or substance abuse) had a higher risk of committing homicide than did those without a mental illness diagnosis. Although the risk of committing homicide is elevated among those with schizophrenia, studies that have examined the percentage of violent crimes committed by people with evidence of schizophrenia or related psychoses found that these individuals account for less than 10 percent of violent crimes (Fazel et al., 2009), a finding largely

explained by the relatively low prevalence (less than 1 percent) of these conditions among the general population (Kessler et al., 2005; Wu et al., 2006).

Approximately 20 percent of all people with mood or anxiety disorders have co-occurring substance use disorders (Grant et al., 2004), and the prevalence of substance use disorders may be higher among people with psychoses, such as schizophrenia (Dixon, 1999). Among people with co-occurring mental health and substance use disorders, many abuse alcohol or drugs as a maladaptive coping mechanism to distract from mental distress or psychosis (Khantzian, 1997). The link between mental illness and interpersonal violence is often attributed to co-occurring substance abuse or dependence. For example, the meta-analysis of schizophrenia and interpersonal violence by Fazel et al. (2009) found a significantly elevated effect of interpersonal violence among those with co-occurring substance abuse (random effects odds ratio = 8.9) relative to those with schizophrenia alone (random effects odds ratio = 2.1). Researchers who used data from population-based epidemiologic studies also found greater rates of interpersonal violence among people with substance use disorders (relative to those with mental health conditions) or co-occurring mental health and substance use disorders (relative to those without mental health conditions or without co-occurring disorders) (see, for example, Swanson et al., 1990; Elbogen and Johnson, 2009). This has led some (e.g., Fazel et al., 2009) to call for interpersonal violence prevention strategies that focus specifically on addressing substance use disorders rather than mental illness per se.

With respect to mass violence, Skeem and Mulvey (2020) concluded in their review that approximately 20 percent of mass violence is committed by a person with a mental health disorder. As with their examination of suicides, the authors also cautioned about biases inherent in making diagnoses after the event and the tautological quality of such diagnoses. In Skeem and Mulvey's words, such diagnoses have a circular quality: "Why did this man do this terrible thing? *Because he is mentally ill.* 'And how do you know he is mentally ill?' *Because he did this terrible thing*" (Skeem and Mulvey, 2020, p. 86). Also similar to suicide, mass violence is a relatively rare event, so it is challenging to conduct rigorous, fully powered studies to identify risk factors (see Chapter One of this report and Smart et al., 2020). Skeem and Mulvey (2020, p. 92) describe that, "In studies that define mental illness expansively and include untrained 'diagnoses' made in the wake of the rampage . . . , estimates of the proportion of mass shooters with confirmed or suspected mental health problems" ranged from 30 to 60 percent; in contrast, in studies that focused on formal diagnoses (e.g., from a health care provider), post-event diagnoses of a mental illness ranged from 13 to 15 percent.

In addition to the research examining the connection between having a mental illness and perpetrating interpersonal violence, there is research suggesting that people with mental health conditions are at increased risk for being victims of interpersonal violence. For instance, in a survey of people with severe mental illness who were receiving mental health services in Chicago, 25 percent had been the victim of a violent crime; comparatively, 3 percent of the general population had been the victim of a violent crime (Teplin et al., 2005). A 2014 study of homicide victims from England and Wales painted a more nuanced and complicated picture: Rodway et al. (2014) found that, between 2003 and 2005, there were nearly

1,500 homicide victims, of whom 90 (6 percent) had received mental health services in the 12 months prior to their death. This resulted in an increased risk estimate of victimization relative to the general population (the estimated homicide victimization rate was 2.34 per 100,000 mental health service users versus 0.91 per 100,000 in the general population). On the other hand, 213 individuals with mental illness were convicted of homicide in the same three-year study period. Among the 90 homicide victims with mental health diagnoses, 29 were killed by a perpetrator who also had a mental health diagnosis; in 23 cases, the two knew each other, and in 21 cases, both individuals were receiving treatment at the same facility.

In conclusion, people with certain mental illnesses, notably schizophrenia and related psychoses, have a higher risk of committing violent crime than people without such illnesses do, but less than 1 percent are likely to commit a firearm-related offense. In addition, data show that, because these mental health conditions are uncommon, individuals with these conditions commit less than 10 percent of violent crimes. For people with mental illness, having a co-occurring substance use disorder appears to increase risk for perpetrating violent acts, comparable to those with substance use disorders independent of a co-occurring mental illness. Although the evidence base is weak, people with mental illness may be over-represented among those who commit acts of mass violence, but they still account for less than one-fourth of these events. On the other hand, victimization among people with mental illness appears elevated relative to the general population.

Summary and Conclusions

Studying the relationship between mental illness and suicide or firearm violence (both self-directed and interpersonal) is challenging because mental illness is often undiagnosed and undetected by the health care system. Furthermore, postmortem (for suicide) or post-event (for violent crime) diagnoses may be biased. It is likely that there is evidence of a mental illness among one-half or more of those who die by suicide. On the other hand, although violence is elevated among people with schizophrenia or related psychoses, these individuals still account for a relatively small share of violent acts overall. And the relationship between schizophrenia and violence may be more pronounced among those with co-occurring substance use disorders. However, having a mental illness or a co-occurring substance use disorder (or both) is a poor predictor of dying by suicide or committing an act of interpersonal violence; the majority of people with these conditions do not exhibit these outcomes. In fact, people with mental illness are much more likely than those in the general population to be victims of interpersonal violence.

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Law Enforcement Approaches to Reduce Community Gun Violence

Samuel Peterson and Shawn Bushway

Summary

When considering whether a new or existing gun policy will affect gun violence, it is important to consider the current or potential enforcement of the policy in question. Local, state, and federal law enforcement personnel engage in a variety of activities to enforce laws related to the ownership, transfer, and handling of firearms. They also engage in a variety of activities to respond to and investigate violent crimes committed with guns. More research is needed to understand the extent to which these activities reduce the number of violent crimes committed with guns.

Law enforcement personnel also use several proactive approaches to prevent violent crimes committed with guns. These include place-based, problem-oriented, and person-based approaches. There is evidence that these approaches may be able to affect violent crimes committed with guns. This is particularly true for some forms of person-based approaches, such as focused deterrence, but more-rigorous research is needed to strengthen the research base. Community-based approaches to reducing violent crimes committed with guns use minimal or no law enforcement involvement. These efforts attempt to improve the physical and social conditions in certain areas and thereby reduce some of the circumstances often associated with violent crime. Much more research is needed on these approaches.

Furthermore, law enforcement agencies engage in several critical activities to regulate firearm commerce; control the criminal misuse of guns; and respond to, investigate, and prevent violent crimes committed with guns. We must not overlook these efforts and the limitations therein when considering policy or legislative initiatives focused on reducing violent crimes committed with guns.

The national policy discourse on ways to further reduce gun violence focuses on either enhancing existing laws or passing new laws that could prevent violent crimes committed with guns (e.g., homicides, assaults, robberies) or other forms of gun violence (e.g., fatal and nonfatal firearm suicides, gun accidents). Such policies include universal background checks, bans on

assault weapons and high-capacity magazines, extreme risk protection orders, concealed-carry laws, waiting periods, child-access prevention (CAP) laws, minimum age requirements, prohibitions associated with domestic violence, licensing and permitting requirements, and a host of other laws and policies covered elsewhere in RAND's Gun Policy in America project.

Debate about new policies rarely includes explicit discussion of what law enforcement is currently doing, under existing laws, to reduce violent crimes committed with guns. However, the rate at which violent crimes are committed with guns has declined substantially over the past 30 years. For example, the homicide rate, which is dominated by crimes that involve firearms, has dropped by 50 percent since 1980, with a large portion of that drop occurring from 1993 to 2014 (James, 2018). Although it can be hard to empirically prove that law enforcement actions caused the decline, most commentators conclude that at least some of this drop was caused by the response of law enforcement (Uggen and McElrath, 2013).

In this essay, we review the range of law enforcement activities focused on enforcing laws that govern the criminal misuse of guns (e.g., illegal possession) and violent crimes committed with guns (e.g., homicides, assaults, and robberies committed with firearms). We also comment on the existing research evidence.¹

A convenient way to structure our tour of law enforcement activities is to divide our attention between standard (or traditional) law enforcement activities and proactive strategies. Standard law enforcement approaches involve monitoring and reacting to law violations when they occur;² proactive approaches involve a range of activities that seek to stop crimes before they occur. Both approaches aim to prevent crime in general. We first review standard law enforcement approaches, including enforcement of existing firearm laws and regulations and the response to individual crimes involving guns (e.g., the investigation and prosecution of such crimes). We then review proactive violent crime reduction and prevention interventions, which occasionally focus on violent crimes committed with guns.³

¹ We omit discussion of the potential impact of law enforcement activity on other types of gun violence (e.g., suicides, accidents) or specific types of violent crime (e.g., gang crime, domestic violence). We do note where research evidence suggests that a particular law enforcement approach is empirically associated with reductions in violent crimes that are not specific to violent crimes committed with guns. According to the U.S. Bureau of Justice Statistics, firearms were involved in 70 percent of all homicides from 1993 to 2011, but less than 10 percent of all nonfatal violent crime involved a firearm (Planty and Truman, 2013). As a result, the exact impact of a given policy on the prevalence of violent crimes committed with guns is uncertain in some cases. Finally, although our goal is to comment on the existing state of the research evidence, several of the approaches that we discuss are part of complex systems and are inherently difficult to evaluate even with the most-rigorous research designs (e.g., randomized controlled designs). In addition, some of the approaches discussed here are still relatively new, and research tends to accumulate slowly. Therefore, to say that an approach needs more evaluation does not necessarily mean that it does not play a useful role or that it does not affect outcomes.

² This form of law enforcement replaces the private pursuit of justice (i.e., vigilantism) with the public or societal pursuit of justice.

³ Many of these approaches have been the subject of systematic reviews or meta-analyses elsewhere. Where that is the case, we consulted those sources. Where that is not the case, we used a targeted search of the literature to describe the approach and provide examples to illustrate the application of the approach. We also

Standard Law Enforcement Approaches

The standard model of policing emphasizes random patrols, rapid response to 911 calls, and investigations of reported crimes (with the arrest of the perpetrator as the likely outcome). Enforcing firearm possession laws and responding to, investigating, and prosecuting gun crimes fit under this standard model. In this approach, increasing the number of law enforcement officers is the primary way to increase performance or enforcement (Weisburd and Eck, 2004). Both local and federal law enforcement have important, but differing, roles within the standard approach in enforcing gun laws and investigating gun crimes (see Table 5.1).

Regulatory and Criminal Enforcement of Ownership and Sales

Some law enforcement responsibilities listed in Table 5.1 include regulatory activities for limiting the criminal misuse of guns.⁴ At the federal level, two agencies—the Federal Bureau of Investigation (FBI) and the Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF)—engage in a variety of activities related to guns and gun crime, largely in the form of enforcing regulations and performing investigations. On the regulatory side, the FBI oversees the National Instant Criminal Background Check System (NICS), and the ATF regulates federal firearms licensees (FFLs) by processing licenses, conducting inspections, and

TABLE 5.1
Standard Law Enforcement Approaches to Address Criminal Gun Misuse and Violent Crimes Committed with Guns

Law Enforcement Group	Approaches
Local and state law enforcement approaches	<ul style="list-style-type: none"> • Responding to crimes involving firearms • Investigating crimes involving firearms • Enforcing laws pertaining to the transfer and handling of firearms
Federal law enforcement approaches	<ul style="list-style-type: none"> • Handling licensing, inspections, and commerce • Tracing crime guns • Prosecuting crimes committed with guns • Investigating trafficking, terrorism, and mass violence • Running the National Integrated Ballistic Information Network (NIBIN) • Running the NICS

rely on many of the judgments and much of the framework used in a report on proactive policing by the National Academies of Sciences, Engineering, and Medicine (2018).

⁴ Regulatory activities might be considered proactive, in the sense that they do not usually respond to a reported crime or infraction. We consider regulatory activities as standard law enforcement because these activities are often more akin to a random patrol approach to uncover ongoing crime, and there does not seem to be a strategic decision to emphasize prevention. For example, even though random patrols are not focused on being proactive or preventing crime, the presence of officers on patrol does provide a general level of deterrence and may occasionally result in the discovery of a crime or violation that has not been reported. Regulatory activity is more analogous to this than to the proactive approaches we discuss later.

tracking national firearm commerce. The NICS is a national resource that helps ensure that people legally excluded from purchasing a firearm are detected during a background check. In 2018 alone, more than 25 million background checks were conducted through the NICS. Meanwhile, the ATF is tasked with inspecting the 130,000 FFLs in the United States. It inspects roughly 8 percent of these FFLs per year, which results in a license revocation or surrender for roughly 1 percent of the FFLs inspected. In 2018, 42 percent of inspected FFLs were found to have no violations, 18 percent had a violation reported, 11 percent received a warning letter, and nearly 4 percent participated in a warning conference (ATF, 2019a). Local and state law enforcement agencies also engage in such state-specific regulatory activities as issuing concealed-carry permits or firearm purchase permits; they also may conduct background checks themselves.

A related function is the enforcement of criminal gun possession and trafficking laws on illegal firearm transfers, prohibited possessors, and prohibited locations. This includes ensuring that firearms are sold and handled appropriately and are owned legally. Firearms may be obtained illegally or by prohibited possessors through a variety of mechanisms; however, a firearm can go through several transactions (some of them legal) before ending up in the hands of a prohibited possessor. In surveys of offenders who committed crimes with a gun, friends and family were the most common source of the gun involved. The next most common sources were illicit sources (e.g., middlemen for stolen goods, sometimes called *fences*; street connections; drug dealers) and unlicensed gun stores or pawn shops (Cook, Parker, and Pollack, 2015).

At the federal level, enforcement can include investigating FFLs suspected of engaging in criminal activity, investigating interstate gun trafficking, and supporting local investigations of intrastate trafficking. At the local level, this might involve enforcing laws associated with firearm storage or arresting prohibited possessors. This local enforcement of criminal gun possession laws tends to vary dramatically across jurisdictions. In a survey of urban police agencies, 38 percent of police departments reported that their locality requires background checks for all firearm transfers; of those departments, 28 percent reported frequently or regularly investigating illegal firearm transfers, and 32 percent never investigated potentially illegal transfers (Koper, Woods, and Kubu, 2013). One-third of agencies reported receiving information about individuals prohibited from purchasing firearms who nevertheless attempted to buy one (potentially a felony). Of those departments, 45 percent reported regular follow-up on those cases, and 47 percent reported occasional follow-up. The effects of this enforcement of criminal gun possession and trafficking are unclear, because there is no research that examines how violent crimes committed with guns might be reduced through more-proactive enforcement and prosecution of gun law violations (Cook, Pollack, and White, 2019).

Random Patrol

The more-common aspects of the standard police response—specifically, the random patrol and arrest functions—are unlikely to contribute to substantial reductions in crimes com-

mitted with guns. The weakness of the standard policing model for reducing crime was evident in the mid-1970s (e.g., see the results of the Kansas City Preventive Patrol Experiment; Kelling et al., 1974). While patrol is a necessary function of policing, it is now commonly recognized that patrol strategies should be systematic and data-driven (Koper, 1995). Much of this realization came from research in the late 1980s and early 1990s showing that most calls for service and criminal incidents occur at a small number of locations within a city and that these “hot spots” of crime tend to be stable over time (Sherman, Gartin, and Buerger, 1989; Weisburd et al., 2004).

Responding to and Investigating Violent Crimes Committed with Guns

Federal and local law enforcement agencies respond to violent crimes committed with guns in several ways. The FBI and the ATF are involved in investigations of gun trafficking, terrorism, and mass violence. The ATF also supports investigations by tracing the ownership of firearms involved in crimes (through the National Tracing Center) and by maintaining the NIBIN, which helps link guns to offenders or to multiple crimes. Gun tracing is useful for understanding the impact of laws on the source of guns (Collins et al., 2018), as well as for identifying common features or sources involved in the time-to-crime life cycle of guns. Occasionally, traces lead back to FFL dealers who are engaged in illegal or negligent activity or to straw purchases associated with gun crimes.⁵ The ATF successfully traced 254,700 firearms in 2018. The use of both the NIBIN and the National Tracing Center has generally increased over time, but we do not know whether the use of these federal resources has significantly improved investigation success rates or led to reductions in violent crimes committed with guns. However, enhanced federal prosecution of violent offenders who commit crimes with guns is potentially effective, as we discuss later.

Importantly, the enforcement and prosecution of gun crimes may affect rates of violent crimes committed with guns. Police departments that arrest those engaging in violent crimes involving a gun might be expected to reduce community gun violence by incapacitating offenders at high risk of reoffending and by deterring future offenders. Moreover, as Cook and Ludwig (2018) argue, low clearance rates may encourage vigilante justice: “Arresting less than 10 percent of shooters (as is currently the case in Chicago) may not assuage the instinct of survivors, their families, and their gangs to avenge their victimization.”⁶ Although national estimates may not be exact, roughly 60 percent of homicides are cleared in any given

⁵ A *straw purchase* is when someone goes through the gun purchasing process (including the background check) and gives the gun to another person upon receipt.

⁶ *Clearance by arrest* occurs when at least one person is arrested for a crime, charged, and turned over to the court for prosecution; *clearance by exceptional means* occurs when an agency has identified at least one person, gathered enough evidence for an arrest, identified the person or people’s location(s)—but then encountered an obstacle that prevented arrest (FBI, 2012).

year through arrest or other circumstances; this percentage appears to be decreasing over time (Murder Accountability Project, 2019). Similarly, national estimates of nonfatal shootings and nonfatal shooting clearances are lacking, but most indicators suggest that the frequency of nonfatal shootings is much higher than that of fatal shootings, and that clearance of nonfatal shootings is much lower than clearance of homicides (performed with guns or other weapons).

Some recent research evidence suggests that a key reason for this gap in homicide clearance compared with nonfatal shooting clearance is the amount of resources dedicated to the initial response to and sustained investigation of homicides (Cook et al., 2019). Not surprisingly, in this analysis of homicides and nonfatal shootings in one city, increased resources devoted to homicide investigations produced more on-scene and postscene evidence collection, including witnesses interviewed, forensic evidence collected, and existing records reviewed (e.g., existing search warrants). The collection of more evidence is generally associated with increased clearance. Additional resources, better on-scene evidence collection, and more postscene evidence collection or forensic testing for homicide investigations are also associated with improved outcomes (Braga, Turchan, and Barao, 2019). With wide variability in clearance rates across localities (e.g., some clear more than 80 percent of homicides; Carter, 2013), cross-jurisdictional comparisons may be insightful. Much more research is needed in this area.

Many of the standard law enforcement approaches are important activities in their own regard and logically affect crime through deterrence and incapacitation. However, the extent to which certain elements of standard policing practices—such as the consistent enforcement of gun laws, improvements in violent crime investigations and clearance rates, or an increase in the role of federal enforcement activities—are related to violent crimes committed with guns is in need of further research.

Proactive Law Enforcement Approaches

During the peak violent crime years of the 1980s, law enforcement agencies started to experiment with more-proactive ways to reduce crime using methods that better focused limited resources. We now consider proactive policing strategies that have been designed to prevent or reduce crime and note where their effects on violent crimes or violent crimes committed with guns have been evaluated empirically. Many evaluations of these strategies do not differentiate violent crimes from violent crimes involving a gun. Although guns are very likely to be involved in violent crimes (e.g., homicides, armed robberies), without specified data, we cannot detect any specific effects on crimes committed with firearms. Therefore, we know considerably less about how some of the strategies discussed in this section affect violent crime involving a gun as opposed to violent crime in general.

For our discussion of proactive law enforcement approaches, we follow the general framework adopted for a recent consensus panel report by the National Academies of Sciences,

Engineering, and Medicine (2018) on proactive policing. This important report categorizes and describes four approaches to proactive policing:

- **place-based:** focuses on the places where the most violent crimes committed with guns occur
- **problem-solving:** addresses the underlying cause(s) of violent crimes committed with guns
- **person-focused:** focuses on individuals at high risk of being perpetrators or victims of violent crimes committed with guns
- **community-based:** uses community resources (and social connections) to counter violent crimes committed with guns and narratives supportive of such crimes.

Each of these proactive approaches has unique implementation considerations and varies with regard to the existing research evidence. Many proactive approaches overlap and can be placed in more than one of the categories. Therefore, we categorize the proactive approaches discussed in the following sections where they seem to fit best, but ours should not be considered a rigid classification.

Place-Based Approaches

Place-based approaches are predicated on the fact that crime concentrates in small geographic areas. Likewise, violent crime is not evenly distributed across communities and their populations. Typically, a large share of violent crime is associated with a small group of locations. Whether those are measured as “hot spots,” street segments, or neighborhoods, a small proportion of locations typically account for a majority of the violent crime that occurs within a city (Wilcox and Eck, 2011; Corsaro, 2018). Many violent crime prevention strategies in policing take advantage of this clustering by intervening with the subgroup of people responsible for a large share of the violence, with the locations where violent crime is most prevalent (i.e., hot spots), or with both.

Hot spot policing approaches focus on high-risk locations; many of the earliest versions of hot spot policing attempted to reduce violent crimes committed with guns through traditional law enforcement responses. These versions consist largely of stops and arrests in identified hot spots. Strategies include directed patrols, crackdowns on illegal weapon-carrying, and a focus on known offenders in hot spot locations.

In directed patrols, or “putting cops on dots,” patrol officers are assigned specific periods during which they must patrol a known high crime location (e.g., street corner, street block). Generally, this involves practicing the “Koper curve”—conducting random, 10- to 15-minute patrols in hot spots every two hours, instead of focusing only on stops and misdemeanor arrests or staying in a particular spot for long periods of time (Koper, 1995). More-recent evidence suggests that frequency of patrols, rather than duration, might be more important (Mitchell, 2017), but the overall evidence suggests that directed patrols can reduce violent

crimes and violent crimes committed with guns, depending on the focus of the hot spot intervention (Braga, Papachristos, and Hureau, 2014).

Like directed patrols, crackdowns emphasize stops, searches, and arrests in hot spots, but they usually occur on a large scale and typically focus on specific problems in those areas (e.g., drug dealing, weapon-carrying). A review of hot spot crackdowns on illegal weapon-carrying found that this approach is generally associated with modest reductions in gun crimes, violent crimes committed with guns, and 911 calls for shots fired (Koper and Mayo-Wilson, 2006; see also Koper, Mayo-Wilson, and Smith, 2012). The long-term effects of these types of efforts are not well understood, but there is evidence that their effects might be short-lived (Sherman, 1990; Koper, Mayo-Wilson, and Smith, 2012; Rosenfeld and Fornango, 2014); more importantly, such efforts often contribute to police-community tensions when enacted too broadly, for too long, or without providing explanation to the community (Tyler, Fagan, and Geller, 2014). Indeed, community frustration with stop-and-frisk practices resulted in a federal judge finding the New York City Police Department liable for a pattern and practice of racial profiling and unconstitutional stops in 2013.

Another common type of place-based intervention focuses on offenders who live or gather in violent crime hot spots. As part of the Philadelphia Policing Tactics Experiment, the Philadelphia Police Department used crime analysts to identify repeat violent offenders who were living in or committing crime in violent crime hot spots. Officers then patrolled these areas and stopped and questioned repeat violent offenders. The nature of these contacts ranged from having informal conversations to serving arrest warrants. The results of a randomized controlled trial indicated that there was a 42-percent reduction in violent crimes (but not specifically in those committed with guns) and a 50-percent reduction in violent felonies relative to the control areas, which received random patrols (Groff et al., 2015).

Other place-based approaches reflect recent technological innovations. Closed-circuit television (CCTV), acoustic gunshot detection technology, and predictive policing are increasingly used to surveil and predict high crime locations. There is a substantial amount of research examining the effect of CCTV for preventing crime, and it is indicative of modest reductions in crime in general (Welsh and Farrington, 2009). The effect of CCTV on violent crimes and violent crimes committed with guns, however, is less clear. Acoustic gunshot detection technology can be used in conjunction with CCTV to detect and respond to shootings or criminal discharges of a firearm. Acoustic sensors are strategically placed in areas with high levels of shootings or violent crimes committed with guns, and advanced software is used to distinguish gunshots from other environmental noise. When gunshots are detected, an automatic alert is sent to law enforcement. The intention is to allow quicker response times to shootings in certain areas, but gunshot detection systems are typically associated with an increase in workload (which may be caused by false positives; Ratcliffe et al., 2019) and only slight improvements in response times (Mazerolle et al., 1998). There is little evidence that this method improves investigations or reduces violent crimes committed with guns (Mares and Blackburn, 2012).

Predictive policing uses historical crime data to identify locations and times in which particular crimes are most likely to occur. These predictions are then used to conduct hot spot patrols or inform other strategies. The research on predictive policing is limited, and the evidence that it reduces violent crimes is lacking. CCTV, acoustic gunshot detection, and predictive policing may lack effectiveness as stand-alone strategies, and they likely need to be used in conjunction with other strategies to effectively reduce violent crimes (Piza et al., 2015; Saunders, Hunt, and Hollywood, 2016).

One issue with place-based approaches to reducing violent crimes committed with guns is that it is difficult to know who to intervene with in target areas or hot spots (with the possible exception of offender-focused hot spot policing). This can lead to overenforcement or a “whack-a-mole” strategy, in which prioritizing certain areas leads to underenforcement of other problematic areas (Wang, Liu, and Eck, 2014). These issues, as well as intervention intensity, are particularly relevant when thinking about large-scale implementation of these kinds of approaches (Blattman et al., 2019; Collazos et al., 2020). In addition, place-based approaches that use traditional law enforcement tactics like those discussed earlier (e.g., arrest) tend to ignore the conditions that support crime at a particular location. For example, there are plenty of factors (e.g., the presence of payday lending facilities, alcohol outlets, motels, public high schools, or abandoned buildings) that have been shown to contribute to violent crimes that are not typically within the purview of police (Wilcox and Eck, 2011). Traditional policing responses within a place-based approach may be useful for targeting crimes at the worst-affected locations, but the underlying problems contributing to those crimes may go unaddressed. (Law enforcement and other elements of the criminal justice system are generally unable to effect change in the structural causes of crime and violence, such as poverty, joblessness, and concentrated disadvantage.) Addressing the criminogenic factors that police can affect (e.g., access control, lack of place management, lack of surveillance) could, in theory, lead to long-term crime prevention and eliminate the need for intensive police patrols and high arrest rates.

Problem-Solving Approaches

Problem-solving approaches address critiques of place-based policing by attempting to fix the conditions that contribute to crime in an area through a structured problem-solving process. One of the most popular problem-solving approaches is the Scanning, Analysis, Response, and Assessment (SARA) model (Eck and Spelman, 1987). The model is supposed to support an active and ongoing process that involves identifying problems (Scanning), understanding the nature of a problem through data and diverse perspectives (Analysis), developing and implementing solutions (Response), and evaluating whether the solutions were effective (Assessment). Problem-oriented policing (POP) and third-party policing are commonly used problem-solving strategies that may result from a structured problem-solving process, and they often complement one another. The main difference is that third-party policing includes

the involvement of a non-law enforcement entity (e.g., property managers, parents, inspectors, civil ordinances) to exert social control and to prevent crime.

Reviews of POP in eight cities suggest that it is modestly successful at reducing crime (corresponding to a reduction of crime to 77 percent of preintervention levels, $n = 11$), with some evidence of reductions in violent crimes (corresponding to a reduction of violent crimes, but not specifically those committed with guns, to 81 percent of preintervention levels, $n = 7$) (Braga, Papachristos, and Hureau, 2014). Although there is the potential for different solutions to be implemented within the same POP strategy (one program evaluation noted 400 unique strategies; Braga, Hureau, and Papachristos, 2012), POP solutions associated with violent crime reductions seem to generally involve innovative approaches to addressing disorder and engaging the community in hot spots. The solutions often use a combination of enforcement, prevention, and other city services. Part of the appeal of problem-oriented approaches is that they often use police power to do something other than arrest people. For example, consider Operation Cul-de-Sac, which was implemented in Los Angeles in 1990. Law enforcement recognized that a substantial proportion of gang violence was happening in one cluster of neighborhoods, largely in the form of drive-by shootings. Hot spot policing would have stopped here, sending officers to the identified areas to patrol or arrest gun offenders. In this case, however, further geospatial analysis showed that many such locations were on the periphery of a neighborhood near a main thoroughfare—ideal for both drug dealing and quickly leaving the scene of a crime. Using a nontraditional response, the Los Angeles Police Department had traffic barriers installed in specific locations to block drive-through traffic. This is a good example of the complementary nature of problem-oriented and third-party approaches, where the police used what essentially amounts to traffic control and employed external resources to add a level of permanence to that control. An evaluation indicated that gang crime, drive-by shootings, and predatory crime were significantly reduced after the start of the program; crime reduction effects diminished after the barriers were eventually withdrawn (Lasley, 1996).

Examples of POP using leverage from noncriminal regulations to create third-party solutions include getting owners to remediate blighted buildings; removing litter, graffiti, and trash from the area; abating nuisances; and improving street lighting. Given the local nature of crime, nuisance abatement can be an effective solution if high crime properties are identified with problem tenants or poor management. For example, after identifying that several motels were associated with high rates of drug and violent crime calls for service, the Chula Vista Police Department identified that poor property management may have been a source of these problems (Bichler, Schmerler, and Enriquez, 2013). The department engaged property owners by providing information and support, used code enforcement and inspection as necessary, and developed a permit ordinance focused on safety standards. Other property management solutions have focused on problematic bars that have high levels of violent crimes, encouraging management to take steps to curb overconsumption, improving security staff training, and setting clear standards for behavior (Madensen and Eck, 2008; Roncek and Maier, 1991; Warburton and Shepherd, 2006).

The POP approach has also been used to disrupt illegal gun markets (Braga and Pierce, 2005). In their analysis of recovered guns, the Boston Police Department, the ATF, and researchers identified that the illegal diversion of handguns from retail outlets was a key source of firearms used in crimes. This resulted in a strategy that involved increased resources and attention to the traffickers providing the makes and calibers most frequently recovered from gang members, increased attention to handguns recovered shortly after being sold, the restoration of obliterated serial numbers, debriefs with arrestees to understand firearm pathways and develop leads, and communication about successful interventions of traffickers. Straw purchasers and unlicensed dealers made up the bulk of those investigated for trafficking. This market interruption strategy significantly reduced the number of recovered firearms that had recently been purchased (i.e., were less than three years old).

POP is a promising strategy for crime reduction and can be used as part of a place-based approach to reduce violent crimes and violent crimes committed with guns. A key benefit of POP is that it adds new and sometimes effective crime prevention tools to traditional law enforcement responses, often through bringing attention to problems that can be remedied through third parties, such as other government and community resources (e.g., removing blight). However, there are two open questions regarding the implementation of POP to address violent crimes committed with guns.

First, the approach is open-ended, often resulting in law enforcement attempting multiple interventions in their problem-solving response formulations. This makes it difficult to identify which solutions work better than others, especially because systematic data collection on problem-solving activities tends to be limited (Maguire, Uchida, and Hassell, 2015). Second, there is some research indicating that problem-solving processes (e.g., SARA) are frequently superficial when implemented in the field (Sidebottom and Tilley, 2011). That is, patrol officers may not conduct thorough analysis of identified problems or may not conduct any assessment at all (Cordner and Biebel, 2005). Engaging in these activities, presumably, is critical for engaging in an iterative problem-solving process. In addition, and possibly as a result of superficial analysis and response generation, officers pursuing POP strategies may still rely more on standard law enforcement responses than on those designed to produce lasting change (Schnobrich-Davis, Block, and Lupacchino, 2018). More research and more-rigorous research are still needed to understand which POP responses are most effective, particularly for reducing violent crimes committed with guns.

Performing homicide and shooting reviews is a problem-solving strategy that has also been used to reduce homicides and shootings, either alone or in conjunction with a focused deterrence strategy, which is discussed in the next section. For instance, the strategy adopted by Milwaukee's Homicide Review Commission was associated with a 52-percent reduction in homicides in the targeted area compared with a 9-percent reduction in the comparison area (Azrael, Braga, and O'Brien, 2013). The first step in the Milwaukee Homicide Review Commission's strategy involves immediate responses to homicide incidents, including increased patrols, and social services for victims and victims' families. The next component is a review of homicide (and usually shooting) cases using a multiagency working group,

including police, probation officers, the district attorney, the city attorney, a U.S. attorney, public schools, the housing authority, the medical examiner, the department of corrections, the U.S. Marshals, the Drug Enforcement Administration, the FBI, the Milwaukee High Intensity Drug Trafficking Area, and the ATF. These reviews focus on describing the incidents using any pertinent information provided by the working group to strengthen investigations and increase clearance rates. Later, closed cases are reviewed by community service agencies and discussed in community reviews to identify community factors that are involved in homicides and shootings. These reviews led to interventions to address disorderly taverns and other nuisance properties, as well as enhanced supervision of high-risk offenders (15 percent of victims and 25 percent of suspects had been on supervision at the time of the homicide; close to half had been on probation at some point). This enhanced supervision reportedly included a focused deterrence approach (also known as a “pulling levers” approach), which communicates a clear deterrent message of an enhanced law enforcement response (i.e., “pulling every lever”) for specified behaviors.

Homicide and shooting reviews are recommended tools to improve intelligence-gathering, problem-solving, and information-sharing (Hipple et al., 2017). They may help law enforcement better understand the factors present in homicide and shooting incidents, such as gang member involvement, or location features, such as gang territory or nuisance locations (e.g., hourly motels, problematic bars). Although guidance exists for conducting these reviews (e.g., Braga, Hureau, and Grossman, 2014), more-rigorous research is needed to demonstrate their value and mechanisms of impact, whether through increases in case clearance or as part of a planned intervention to reduce violent crimes committed with guns.

Person-Focused Approaches

Person-focused approaches are used because violent crimes tend to cluster among a small group of people. For example, research underpinning Boston’s Operation Ceasefire revealed that 1 percent of Boston’s youth population was responsible for 60 percent of youth homicides in the city (Braga et al., 2001). Similar patterns exist in other cities with violent crime problems as well (Papachristos, Wildeman, and Roberto, 2015). Proactive policing policies that target people rather than places are another general approach that is closely associated with federal efforts to reduce violent crimes and violent crimes committed with guns.

Civil Gang Injunctions and Hot Lists

One person-focused approach that focuses specifically on gang members and has been in use since the late 1980s is the civil gang injunction (CGI). CGIs prohibit gang members from engaging in a variety of legal and illegal behaviors, including associating with other gang members in public. Much like the approach of nuisance abatement, CGIs allow for civil penalties against individuals engaged in prohibited behavior, which often includes possessing any firearms, ammunition, or illegal weapons or being around others with such weapons. Prosecutors and law enforcement work to map safety zones wherein these behaviors are ille-

gal and identify individuals and gangs included in the CGI. CGIs are indefinite, but individuals are able to petition to have their names removed from the list. The effects of CGIs on violent crime appear to be mixed, with their effects being short-lived (Grogger, 2002; Maxson, Hennigan, and Sloane, 2005) or even increasing gang violence (Bichler et al., 2019), although CGIs may be useful as part of a broader strategy (Hennigan and Sloane, 2013). The mixed findings, however, prompt questions about CGIs' usefulness, in addition to questions about the substantial restrictions they place on individual liberty (Caldwell, 2009).

A somewhat less intrusive approach to focusing on high-risk individuals is to use intelligence-gathering or actuarial risk assessments to generate lists of individuals who are at high risk of being involved in violent crimes (i.e., "hot lists"). Sometimes, these lists are created and amended based on officer knowledge, but the recent trend involves using police data (e.g., arrests, field contact cards, or stops) and occasionally nonpolice data to generate a numeric indication of risk. This calculation is often based on an individual's police records, as well as those of his or her associates. Because involvement in violent crime is rare, being a victim or perpetrator of violent crime or being connected to a victim or perpetrator of violent crime substantially increases individual risk. Individuals with scores above a certain threshold are targeted for intervention. A review of Chicago's predictive policing hot list suggests that much more research is needed to improve the accuracy of actuarial risk in the context of involvement in violent crimes committed with guns and that the use of such approaches should be part of a coherent violent crime reduction strategy (Saunders et al., 2016). There are also serious concerns about the potential for bias in actuarial assessments of risk, especially because some of the predictive algorithms are proprietary and not subject to public scrutiny (Degeling and Berendt, 2018).

Enhanced Prosecution of Felony Possession

One formative approach to reduce violent crimes committed with guns that set the stage for later approaches is Project Exile. Project Exile and similar programs specifically focus on enhanced prosecution, particularly federal prosecution, for felons in possession of firearms. Federal prosecution is often considered a valuable deterrent because federal court can sometimes impose longer prison sentences than state courts can. Lengthy sentences are often presented as achieving two aims in addressing gun crimes: (1) incapacitating incarcerated gun users for longer periods, preventing them from committing new gun crimes, and (2) deterring would-be violent criminals. The research evidence regarding the effectiveness of this approach is mixed, with only some studies finding support (Raphael and Ludwig, 2003; Rosenfeld, Fornango, and Baumer, 2005). Moreover, even the potential deterrent effect of this approach has been questioned by new criminological deterrence research that shows that many crime-prone populations, such as young men, do not consider consequences very far into the future (Doob and Webster, 2003; Durlauf and Nagin, 2011; Nagin, 2013; Paternoster, 1987). From this perspective, policies that increase the certainty of punishment are likely to be more salient than policies that increase already lengthy sentences. Because of this research, newer person-focused programs typically focus less on enhanced prosecution penalties.

Project Safe Neighborhoods

The largest person-focused brand name program, known as Project Safe Neighborhoods (PSN), has received more than \$1.5 billion in federal funding since 2001 and is currently active (McGarrell et al., 2010; McGarrell, 2018). Because related programs operate through the U.S. Department of Justice, the U.S. District Attorney's office is either responsible for or expected to be involved in the grant activities. Therefore, an oft-stated program element for many PSN programs is enhanced federal prosecution of violent gun offenders. The hallmarks of any PSN program are interagency law enforcement partnerships (i.e., task forces), data-driven processes, deterrence-based messaging, and focused enforcement and accountability (usually on gun offenders) (McGarrell, 2018). PSN programs can use a variety of collaborative strategies, including enhanced federal prosecution, enhanced state and local prosecution, law enforcement (e.g., directed patrol), parole and probation integration, community programs, gun trafficking interventions, and gang or criminal organization interventions.

The research evidence examining the effectiveness of PSN comes from multisite evaluations that use weak quasi-experimental designs, such as those comparing sites receiving the intervention with other sites that are not matched in terms of crime trends, demographics, or other factors relevant to violent crime risk. Thus, the evidence concerning PSN interventions is necessarily weak. Nevertheless, an analysis of PSN across 82 cities from 2001 to 2006 revealed an associated 13.1-percent reduction in violent crimes and a 10.5-percent reduction in firearm homicides, but only for "high dosage" sites (McGarrell et al., 2010). Although "dosage" (a combination of collaborative implementation, research integration into strategic planning, and enhanced federal prosecution) was found to be an important element of success, this study did not assess whether certain PSN strategies were associated with larger reductions in crime than others. Therefore, it is unclear whether focused deterrence or enhanced prosecution (and offender incapacitation) alone might be effective in reducing violent crimes.

Focused Deterrence

Currently, the most promising person-focused approach for reducing violent crimes committed with guns is "pulling levers," or focused deterrence, which is included in the PSN suite. This strategy has been implemented in many cities across the United States, and it is associated with favorable evaluation evidence overall. Focused deterrence can be considered a form of POP (Tillyer and Kennedy, 2008) because it requires a strong understanding of the problem with ongoing analysis; develops a tailored intervention based on the nature of the problem and the local resources (e.g., intervening with youth versus adults, considering probation issues); and requires an ongoing assessment of outputs, ideally with an appropriate outcome evaluation design.

Key features of the focused deterrence approach include a direct intervention with individuals who (1) are well-known to police, (2) commit a disproportionate share of crime, (3) are likely under criminal justice supervision, and (4) frequently operate in groups that influence and could thus hypothetically change group member behavior (Kennedy, 1996). In addition,

focused deterrence programs address specific behaviors. Thus, there is a focus on *specific individuals* committing *specific crimes* (e.g., homicide, open-air drug dealing).

The intervention involves direct police communication with identified high-risk individuals about the consequences should they engage in specific proscribed behaviors. These communications usually occur through offender notification meetings or call-ins. The law enforcement message for a group-based focused deterrence call-in includes the following steps:

1. informing an individual that he or she has been identified as at high risk for engaging in or being the victim of a fatal or nonfatal shooting
2. stating that law enforcement is now focusing on homicides and shootings
3. stating that subsequent acts of violence will result in immediate action from law enforcement (or probation officials) in the form of increased attention and enforcement for the whole group.

The call-in may include an example of group members from a previous call-in who did not heed the message. This message is intended to change the individuals' perceptions of risk of apprehension and to induce group pressure to avoid committing violence. These messages may also be distributed to the public via radio or television. Call-ins also include speakers who represent the community, murder victims, and social services, who serve to challenge norms that encourage violence and offer alternative behaviors (National Network for Safe Communities, 2016). Many focused deterrence programs incorporate intervention components from other entities, such as criminal justice supervision (e.g., probation, parole, reentry), social services, and the community. For instance, some focused deterrence efforts use a community moral voice or outreach worker component to communicate messages of the harm caused by shootings and to counter the narratives that support street violence. Whether these components contribute to the effectiveness of focused deterrence has not been evaluated.

Versions of this focused deterrence approach have been implemented in many cities but have yet to be subjected to randomized controlled trials, the gold standard for evaluating the effects of a program. Braga, Weisburd, and Turchan (2018) recently updated their prior meta-analysis of focused deterrence interventions ($n = 24$) and found the approach to have “moderate effects” on violent crimes committed with guns, corresponding to a reduction to 62 percent of preintervention levels of violent crimes committed with guns. Programs that focused on groups and gangs tended to be more effective, but programs focused on high-rate offenders have also been successful (Papachristos, Meares, and Fagan, 2007).

Although the current research evidence is suggestive of significant reductions in violent gun crime, more-rigorous evaluation designs may more accurately reveal the magnitude of the true effect, given that stronger designs tend to show weaker effects (Braga and Weisburd, 2014; Braga et al., 2019). Some researchers have already begun employing more-rigorous quasi-experimental methods, with evidence of small but significant effects (Braga, Hureau, and Papachristos, 2014; Braga et al., 2019).

It is also important to begin to isolate the mechanisms by which focused deterrence might have effects. Braga (2012) discusses how most of the evaluation research on focused deterrence does not discuss the actions that contribute to reductions in violent gun crime and speculates that a wider set of mechanisms might be implicated than just those described as components of the intervention. For instance, procedural fairness, community social control, and incapacitation may play important roles beyond those features of the intervention that are explicitly parts of its design. Saunders et al. (2016) examined some of these potential mechanisms of effect for a deterrence program that focused on overt drug markets and chronic offenders within those markets. They found that community members perceived both that enforcement action incapacitated the drug market and that police were more effective, which may have improved willingness to cooperate with police. Residents did not often report improved perceptions of community social control and police legitimacy, with some negative perceptions reported (e.g., police harassment). Because the various components of focused deterrence are expected to be implemented together (e.g., direct communication, enforcement action, services), a good starting point for improved evaluation might include more-detailed measurement of program inputs, which can be modeled as part of the evaluation to understand whether certain components are more important than others (Roman et al., 2018).

Measuring the mechanisms and dosage of focused deterrence over time speaks to the final critical issue for its success—sustainability. Sustainability is a major concern for both PSN and focused deterrence programs (McGarrell et al., 2010). Several evaluations have noted that the effects appear to be short-lived. Fox and Novak (2018), in a recent evaluation of Kansas City’s focused deterrence program, found that there was an immediate reduction in homicides and gun-involved aggravated assaults during the first 12 months of the intervention, but these rates returned to pre-intervention levels three years into the program. Similarly, Grunwald and Papachristos (2017) found that the significant effects of PSN in Chicago were only evident during the first several years of the program. Unlike Fox and Novak (2018), however, Grunwald and Papachristos speculate that this was caused by program expansion that did not include an expansion of resources, reducing the intervention dosage. Even the highly successful and acclaimed Boston Ceasefire, also known as the Boston Miracle, was abandoned (and later revived), with corresponding increases (and decreases) in violent crimes committed with guns (Braga, Hureau, and Winship, 2008; Braga, Hureau, and Papachristos, 2014). Such an ebb-and-flow process for implementation dosage might be common with these programs, and although recommendations exist (Tillyer, Engel, and Lovins, 2012), the sustainability issue has not been examined systematically.

Community-Based Approaches

One of the tensions created by the proactive approaches is that they are very targeted, and those targets are often underrepresented minorities and places that are frequented by these groups. Community-based efforts are based on responding to this tension and seek to foster

social cohesion, trust, and willingness to work together to confront crime. Many of these approaches target the community-level physical or social factors that may contribute to environmental risk of violent crimes, such as social disorganization, narratives supportive of violence, the prevalence of gangs, or abandoned or blighted properties. The main feature of these community-based programs is that they are not led by law enforcement. Instead, law enforcement agencies are asked to support and enable the effort. These community partnerships can have the benefit of enhancing police legitimacy or improving community relations, in addition to reducing violence. One way this has been done is through partnerships between police and black clergy, combining the social capital and existing community networks of black churches with messages of nonviolence, engaging in information-sharing or messaging that communicates the nature of police actions, and increasing ownership of crime problems by the community. Still, there are challenges inherent in building and sustaining such community partnership approaches that may be related to the political, interpersonal, and social dynamics of the community (Brunson et al., 2013). In addition, it is unclear whether such efforts directly affect violent crimes involving guns.

One of the most well-known community-based approaches targeted at preventing violent crimes committed with guns is Cure Violence, or the violence interrupter model (Slutkin, Ransford, and Decker, 2015). Violence interrupters and outreach workers tend to be individuals with prior gang involvement, involvement in the justice system, or local connections who use their knowledge, experience, and relationships to understand and interrupt gun violence and the cycle of retaliatory violence. The core components of the model include detecting and interrupting potentially violent conflicts (e.g., at shooting scenes, community events); identifying, engaging with, and managing high-risk individuals; and communicating and changing community norms to reject violence. These programs are not driven by law enforcement but may be coordinated with law enforcement. For example, interrupters may rely on law enforcement for notifications of shooting incidents, hot spot maps, or other official data to guide their work. The nature of this work often requires avoiding a perception that interrupters are cooperating with law enforcement, and, in some cases, it is marked by open hostility toward police (Kennedy, 2011). Often, these programs work through official partnerships with hospitals. Research suggests that the effectiveness of this model is mixed and suffers from weak evaluation designs (Butts et al., 2015). Further research is needed to understand factors contributing to mixed results, which may be informed by a forthcoming systematic review (for details, see Maguire, Telep, and Abt, 2018).

Several other community-based approaches focus on improving property and economic conditions that have been found to be associated with reductions in violent crimes committed with guns. For instance, Moyer et al. (2019) discuss a Philadelphia study in which 110 clusters of blocks in the city were randomly assigned to have their vacant lots receive a greening intervention, a less-intensive mowing and trash collection intervention, or no intervention. Both the greening intervention, which created a “parklike” environment, and the less-intensive mowing and trash pickup intervention were associated with statistically significant reductions in shootings.

Similarly, the emergence of business improvement districts (BIDs) has also been associated with reductions in violent crimes. BID organizations consist of business and property owners interested in economic and urban development efforts aimed at revitalizing urban areas. They often pay for supplemental security and sanitation services in an effort to create safe and clean spaces to reduce fear and crime, with the goal of attracting more consumers. BIDs have been associated with reduced rates of robbery and violent crimes, primarily within the boundaries of the BID area (MacDonald et al., 2010; MacDonald et al., 2013). Similarly, gentrification, or the population and housing shifts that occur when higher-income households move into lower-income areas, has been associated with lower rates of violent crimes (Papachristos et al., 2011; Barton, 2016), although this is not always the case, and gentrification may cause short-term increases in violent crimes (Lee, 2010). It is difficult to verify that gentrification caused the drops in crime rather than the other way around (O’Sullivan, 2005). Both BIDs and gentrification face serious challenges from existing community residents because they often exclude current residents or influence local political decisionmaking in ways that may exacerbate existing social inequality (Hoyt and Gopal-Agge, 2007).

All of the community-based approaches discussed earlier have advantages over traditional policing practices that may contribute to long-term effects; however, the research evidence is very limited and tends to be mixed. In addition, there are challenges to implementing and sustaining these efforts, often corresponding to the social, political, and environmental conditions in which they are embedded. Nonetheless, they deserve to be considered as part of the toolkit for preventing community gun violence, in part because they provide an entry point into a community-focused understanding of gun violence. The reality is that (1) homicides in the United States are concentrated in poor urban communities, and (2) the homicide rate, which is driven by gun violence in the United States, dropped 50 percent from 1980 to 2016.⁷ This drop is even more dramatic in large cities with more than 1 million people, where the drop was 70 percent from 1990 to 2016 (James, 2018). Simply put, communities, especially urban minority communities, are much safer than they were 30 years ago (Sharkey, 2018). As a research exercise, it is impossible to identify any one cause, but research does suggest that it is important not to overemphasize law enforcement to the exclusion of other community-based efforts by both government and nonprofit agencies (Sharkey, Torrats-Espinosa, and Takyar, 2017). In addition, although community approaches may have unique impacts on violent crimes committed with guns, it is important not to overlook the potential for collaborative partnerships between community groups and law enforcement to target and resolve particular problems or sources of violent crimes committed with guns, which may contribute to other important second-order effects (e.g., better police-community relations and legitimacy, improved cooperation from the community in investigating violent crimes, improved case clearance). While such collaborative efforts certainly exist, little is known about their effects.

⁷ The bulk of this drop occurred from 1993 to 2014; there has been a slight increase since 2014.

Conclusions

In this essay, we have reviewed a range of reactive and proactive law enforcement approaches to enforce gun laws and to respond to and prevent gun crime. The research in this space is rather uneven. Although we have a general sense that law enforcement deserves some credit for the drop in the number of homicides committed with guns, very little is known about the exact mechanisms through which standard law enforcement practices, such as enforcement of gun ownership laws or investigations of violent crimes committed with guns, might affect rates of criminal misuse of guns and violent crimes committed with guns. As a result, we do not have strong evidence for the best approaches to improving case clearance. The evidence for the mechanisms behind proactive policing is stronger, and the recent National Academies of Sciences, Engineering, and Medicine (2018) evaluation was cautiously optimistic about these approaches, particularly in the short term.

The National Academies of Sciences, Engineering, and Medicine evaluation was also quick to note that the research that does exist suffers from important limitations, including that evidence does not typically derive from rigorous experimental designs, or even strong quasi-experimental designs, that might help distinguish the effects of the policing intervention from local trends in violent crimes (see Braga and Weisburd, 2014). Similarly, the studies that have been conducted are often evaluations of complex interventions involving multiple agencies or multiple potential mechanisms of effect. As a result, it is difficult to evaluate which intervention components are critical to success and nearly impossible to replicate more than just the spirit or general principles of the intervention in a new location. Finally, some interventions may work best only in the short term because of challenges in sustaining the collaborations, expertise, focus, and unity of purpose they require to remain effective. In general, much of our knowledge about the effectiveness of a variety of policing approaches is limited to the short term (one to two years of data) and is focused on small geographic units (e.g., hot spots, cities), while much of our knowledge about the effects of gun ownership laws relies on long-term evaluations and is focused on large geographic units (e.g., states, nations). Efforts to merge these lines of research may prove useful—for example, new state regulations requiring a permit to purchase a handgun could be evaluated at the city level to discover how the regulations contributed to changes in enforcement and crime. With these important caveats, there is some evidence that place-based approaches, problem-solving approaches, and person-focused approaches can reduce violent crimes and violent crimes committed with guns when appropriately matched to the problem and when implemented well. More-rigorous research is needed for each of the approaches discussed in this essay.

Chapter Five References

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