

David Hemenway

Reducing Firearm Violence

ABSTRACT

The United States has an enormous public health and safety problem from guns. The number of American civilian gun deaths in the twenty-first century through 2015 is greater than the sum of all US combat deaths in the twentieth and twenty-first centuries. Given our love affair with guns, the overriding policy goal has to be to reduce the toll of deaths and injuries without substantially reducing the number of civilians with firearms. There are harm reduction lessons to be learned from many public health successes combating other kinds of foreseeable deaths and injuries. For example, motor vehicle deaths per mile driven have fallen more than 85 percent since the 1950s, primarily by making it harder for drivers to make mistakes or behave inappropriately and by reducing the likelihood of severe injury if they do. The success was not primarily due to changing drivers but to making cars and roads safer. The public health approach to guns is to make it difficult rather than easy for violence-prone, anger-prone, or other at-risk people to shoot and kill. Numerous policies and programs could help. Particularly promising ones include changing guns to make them safer, changing the distribution system, increasing gun owner responsibility, and creating a violence prevention administrative agency.

The United States has a terrible gun violence problem. On an average day in 2014, over 300 Americans were shot and more than 90 died (table 1). The number of American civilian gun deaths in the twenty-first century (2000–2015) is greater than the sum of all US combat deaths in World War I plus World War II plus the conflicts in Korea and Vietnam.

The deaths from firearms represent only the tips of the icebergs; many more people are nonfatally injured from firearms than are killed. These

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TABLE 1
US Firearms Deaths, 2014

Type	Number
Suicides	42,773
Firearm suicides	21,334 (50%)
Homicides	15,809
Firearm homicides	10,945 (70%)
Unintentional firearm	586
Total firearm deaths	33,599

SOURCE.—CDC Web-Based Injury Statistics Query and Reporting System, https://www.google.com/?gws_rd=ssl#q=CDC+Wisqars.

injuries are often severe, resulting in lifelong disability from spinal cord injuries, traumatic brain injuries, and other disabling morbidities.

While the total death count is a very accurate figure from a census of all deaths recorded on death certificates, the figure for nonfatal firearm injuries is only an estimate, typically from a sample of hospital emergency departments. The Centers for Disease Control and Prevention (CDC) estimates that there were over 814,000 nonfatal firearm injuries in 2014.¹

Guns are used in crimes some 1,300 times per day (Bureau of Justice Statistics 2013). This is an undercount since it misses many gun intimidations including gun use to intimidate intimate partners (Hemenway and Azrael 2000; Hemenway, Miller, and Azrael 2000; Rothman et al. 2005).

The United States, an outlier compared to other developed countries, has many more firearms per capita, particularly handguns, and much weaker gun control laws (Gun Policy.org [<http://www.gunpolicy.org/firearms/>]; Masters 2016) Almost all other developed countries have national gun license systems and gun storage and gun training requirements. The United States lacks the former, and the latter are not requirements in most states (Hemenway 2006; Gun Policy.org; Masters 2016). While the United States has average rates of nonlethal crime and violence (Hemenway 2006; van Dijk, van Kesteren, and Smit 2007), it has far higher rates of gun violence (Richardson and Hemenway 2011; Grinshetyn and Hemenway 2016). Table 2 provides data on violent deaths of 5–14-year-olds in 2010 that

¹ CDC Web-Based Injury Statistics Query and Reporting System, https://www.google.com/?gws_rd=ssl#q=CDC+Wisqars.

TABLE 2
Violent Deaths of 5–14 Year-Olds, United States,
2010, Compared with 33 High-Income Countries

	Mortality Rate Ratio
Homicide:	
Gun homicide	18.5
Nongun homicide	1.4
Total homicide	3.4
Suicide:	
Gun homicide	11.2
Nongun suicide	1.1
Total suicide	1.5
Unintentional gun deaths	12.2
Total gun deaths	14.2

SOURCE.—World Health Organization Data Mortality Database documentation (<http://www.who.int/healthinfo/statistics/documentation.zip?ua=1>) for 2010. The table comes from Grinshetyn and Hemenway (2016).

illustrate how far from average the United States is relative to other developed countries.

I pick this age group, basically kindergarteners through eighth graders, because it is hard to blame the victim when the victim is a child. A child in the United States has a far greater chance of dying a violent death compared to children in other developed countries. The risk of an American child becoming a gun homicide victim is not 50 percent higher, or two times higher, or five times higher. It is over 18 times higher. Indeed, of all the children murdered with guns from the two dozen high-income OECD countries, approximately 90 percent are American children.²

I advocate using the public health approach to reduce gun violence. The CDC (2016) describes a four-step public health approach to violence prevention generally: define and monitor the problem, identify risk and protective factors, develop and test prevention strategies, and assure widespread adoption of those proven effective. I believe this definition is unhelpful. It is little more than a description of a reasonable scientific approach.

² Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Korea, Netherlands, New Zealand, Norway, Portugal, Slovak Republic, Spain, Sweden, and United Kingdom (Grinshetyn and Hemenway 2016).

My personal view is that the public health approach contains four key components. First, the goal is prevention. While most resources in criminal justice or medicine are spent on resolving situations after problems have occurred, public health focuses its resources on preventing problems from occurring in the first place. In public health, one steps back as far as possible and considers all prevention possibilities. It is usually more cost-effective to intervene before a problem occurs than to wait until the last moment to try to prevent it.

Second, the focus is on populations rather than on individuals. When I talk to psychiatrists about suicide, I often ask, "Why do you think that there are so many more suicides in Arizona than in Massachusetts?" Their truthful response would be, "That's interesting; we didn't know that." Nor should they, for their interest is in helping named individuals. When I press them to guess, they invariably suggest things that might cause people in Arizona to be more depressed. But the people there are not more depressed. Nor are they more suicidal. What explains the difference between Arizona and Massachusetts, and explains differences in rates of suicide across all 50 states, is not mainly differences in depression or other aspects of mental health, nor differences in availability of mental health treatment, nor suicide ideation, nor even suicide attempts. The explanation is differences in levels of household gun ownership (Miller, Azrael, and Barber 2012). Suicide rates in US cities are also strongly associated with levels of household gun ownership (Miller et al. 2015).

Third, public health uses a systems approach. The goal is to create a system in which it is difficult to make mistakes and difficult to behave inappropriately. And when someone makes a mistake or behaves inappropriately, we want a system that ensures that no one gets seriously hurt. For me, what public health is basically trying to do is to make it easy for individuals to stay healthy. It is important to recognize that we can do this even without changing individual behavior (e.g., make the air less polluted). In this essay I describe policies that make it easier for individuals to be safe and more difficult for them to do things that will make themselves, their families, and their communities less safe.

Fourth, public health tries to get many institutions and individuals involved, not just those in the criminal justice system. This includes schools, foundations, physicians, hairdressers, undertakers, and the faith community. It also includes gun manufacturers, gun shops, gun ranges, gun trainers, and gun owners. The focus is on shared responsibility rather than blame. Too often blame is inimical to prevention. When we blame someone, it

allows us to wash our hands of the matter psychologically and not do our part to prevent the problem. After all, it is someone else's fault.

There is a "just-so" story that injury researchers tell their graduate students over the campfire. It is passed on from generation to generation. It is probably about 90 percent accurate. Here is how I tell it.

When I was growing up in the 1950s we were told, with statistics to back it up, that almost all motor vehicle accidents were caused by driver error. There were tired drivers, stupid drivers, distracted drivers. If virtually all collisions were drivers' fault, what was reasonable policy? Drivers education! Most people in my cohort had to take drivers ed in high school. We now know from many evaluations that those classes were not effective (e.g., Shaoul 1975; Stock et al. 1983). The main thing they apparently accomplished was to let young people drive sooner and die younger (Robertson and Zador 1978; Robertson 1980).

Data also showed that most motor vehicle fatalities were caused by drivers deliberately breaking the law. There were drunk drivers, speeding drivers, drivers in a hurry who ran red lights. If most fatalities were caused by unlawful behavior, what was reasonable policy? Enforce the traffic laws.

Not until the 1950s did public health physicians began asking a different question: not who caused the accident but what caused the injury? And it was clear that motorists were being seriously injured when the steering wheel, which was not collapsible, would puncture the chest; faces were ripped apart by windshields that were not made of safety glass; motorists were thrown from vehicles and hit the hood or the cement; or the car would leave the road and hit trees and lampposts that had been placed too close alongside. Fortunately, we were not putting lampposts along the sides of airport runways. Why couldn't cars and roads be made safer, and why couldn't the Emergency Medical System be improved? Over the next decades cars were made much safer, as were roads, and the EMS system was improved. Fast forward to today. No one thinks drivers today are any better than they were in the 1950s. We are better about drunk driving but much worse about distracted driving. Yet fatalities per mile driven have fallen over 85 percent, a real public health success story (CDC 1999; Hemenway 2009).

The main lesson is that major reductions in injury can be made without convincing individuals to change their behavior. The goal is to create a system in which it is hard to make mistakes. For example, suppose it is very late and you are driving on a California freeway. You are dozing

off and are drifting out of your lane. We could wait for the crash and blame you for driving while tired. Or, bump-bump-bump, you hit the Bott's Dots, which are placed along the lanes, and you wake up and get back in your lane. And nothing bad happens.

The goal is to create a system that makes it hard to behave inappropriately. For example, on streets where cars were speeding and endangering pedestrians, the historical approach was to have more police and stronger enforcement efforts. But a cheaper alternative is to change the configuration of the street. There are some two dozen methods of "traffic calming" that include speed bumps, chicanes, and neckdowns. Motorists slow down without any change in enforcement.

Finally, when there are still crashes, the goal is for no one to be seriously injured. That is why cars now have seat belts, air bags, and rollover protection and why cars no longer have hood ornaments that can impale pedestrians.

The public health approach does not denigrate the potential benefits of education and enforcement. Instead it emphasizes that other approaches—which are often overlooked—are usually much more cost-effective. For example, the National Rifle Association today actively promotes education, such as the Eddie Eagle program, which appears to be ineffective (Jackman et al. 2001; Hardy 2002), and stronger law enforcement, by which they seem to mean waiting until gun problems occur and then throw more people in jail.

Of course, education and enforcement are sometimes crucial ingredients to public health successes (Gielen, Sleet, and DiClemente 2006). For example, increasing the speed, certainty, and severity of punishment can deter some gun violence, and locking people away from society can prevent them from committing acts of violence against society. Laws have often been quite effective in reducing motor vehicle injuries (e.g., seat belt laws, motorcycle helmet laws, increased penalties for drunk driving) and have often helped change social norms. Indeed, a major success concerning motor vehicles, the reduction in drunk driving, was largely due to synergistic changes in both laws and social norms (Lerner 2011). In this essay I often emphasize approaches other than education and enforcement.

We have many motor vehicles, and will for the foreseeable future. Over time we have gotten better at reducing motor vehicle-related injuries and deaths. Many aspects of the problem have been addressed, including injuries to pedestrians, bicyclists, motorcyclists, drivers, and passengers. There are problems caused by rear-end, side-impact, and frontal

collisions, as well as rollovers and fires. Some policies affect some aspects of the problem (e.g., air bags do not help bicyclists) and some affect others. The problems have required multiple policies; no single policy has been a panacea.

We have many firearms, and will for the foreseeable future. There are many aspects of the problems caused by firearms, including accidents, suicides, assaults, and homicides. There are problems related to intimate-partner violence, robberies, gang violence, and mass shootings. Some policies and programs affect some aspects of the problem and some affect others. The problems require multiple policies; none will be a panacea. But while we have been doing a progressively better job learning to live with our motor vehicles, the same cannot be said to be true about learning to live with our firearms.

In this essay, I offer 12 proposals for addressing gun injuries and deaths from a public health perspective. They are shown in the following box.

Gun Deaths and Injuries: Twelve Proposals

Guns:

PROPOSAL 1.—*Disconnects*: New pistols should have magazine disconnects to reduce unintentional shootings.

PROPOSAL 2.—*Microstamping*: New pistols should be equipped with microstamping to aid police in identifying and convicting perpetrators.

PROPOSAL 3.—*Personalization*: New handguns should be personalized to help reduce gun theft (one of the ways guns get into the wrong hands), gun accidents, and gun suicides.

Distribution:

PROPOSAL 4.—*Ownership Prohibitions*: The criteria for prohibited ownership of firearms should be expanded to include alcohol abusers, individuals convicted of serious juvenile offenses, individuals convicted of violent misdemeanors, and youths under age 21.

PROPOSAL 5.—*Police Discretion over Permits*: Local police should have discretion over the issuance of concealed carry permits.

PROPOSAL 6.—*Universal Background Checks*: There should be background checks for almost all nonfamily gun transfers.

PROPOSAL 7.—*Straw Purchasers*: Gun shops should use the best procedures to prevent sales to straw purchasers.

Gun Owners:

PROPOSAL 8.—*Universal Licensing*: All handgun owners should be licensed.

PROPOSAL 9.—*Storage*: Gun owners should store their guns safely.

Social Norms:

PROPOSAL 10.—*Suicide Prevention*: Keep guns away from individuals going through a difficult period to prevent suicide.

PROPOSAL 11.—*Sales to Strangers*: Never sell a gun to a stranger without a background check.

Administrative Agency:

PROPOSAL 12.—*Gun Safety Agency*: Create an administrative agency whose mission is to reduce gun injury similar to the National Highway Traffic Safety Administration, whose mission is to reduce deaths, injuries, and economic losses resulting from motor vehicle crashes.

Drawing on a public health problem-solving perspective, I describe and discuss 12 policies and programs to reduce firearm-related problems in the United States. I divide the discussion into five parts, involving the gun, the distribution system, legal gun owners, social norms, and the administration of gun policy. Then I provide some concluding observations.

My topic is gun violence in the United States rather than gun violence elsewhere. I assume, for better or worse, that there will always be many guns in civilian hands in the United States. My focus is on the role of the gun in gun violence. I do not discuss the many ways to reduce violence generally—including improved parenting, diet, sleep, the educational system, mental health treatment, and drug policy or reducing poverty and

racism—all of which could help reduce gun violence. I do not discuss the role of the criminal justice system.³ I also do not discuss changes in medical treatment for gunshot wounds and mental health treatment of trauma. Finally, I do not analyze the role the United States plays in supplying guns to criminals around the world.

This is a personal essay. It may not represent the beliefs of the many formal and informal groups and institutions with which I might be identified—including public health, academics, northeasterners, progressives, injury researchers, economists, Harvard University, tennis players, older adults, or (mostly) white males. Given the size of the public health and public safety problem due to firearms, it is surprising that we know so little about what works in prevention. A decade ago, reviews by the CDC (Hahn et al. 2005) and the National Academy of Sciences (National Research Council 2005) concluded that we simply do not know whether specific gun policies are effective or not.

A lack of federal and foundation support for research has been a sizable problem. Between 1991 and 2010, there were over 310,000 deaths among youths aged 1–17 from the 10 leading causes. An analysis of publications in PubMed for the same period found over 301,000 publications dealing with those 10 causes. Firearms accounted for 12.6 percent of the deaths but less than 0.3 percent of the publications. There were 25 publications on firearms in 1991 and 33 in 2009. By contrast, publications on neoplasms, which are responsible for approximately the same number of deaths, increased from 5,519 in 1991 to 9,707 in 2010 (Ladapo et al. 2013). Of course, this is not a completely fair comparison since disciplines outside of public health and medicine do research on firearms, but the size of the absolute difference in the number of publications is still astonishing.

I. Changes in Guns

Many changes in the firearm itself could reduce gun violence. The Supreme Court in its 5–4 wisdom ruled that having a handgun in the home is a constitutional right under the Second Amendment. Most purchases of handguns are for self-defense, but a handgun is not a very good weapon

³ A sizable literature explores the effects and effectiveness of criminal justice initiatives for addressing gun violence. Cook and Goss (2014) provide an especially comprehensive and well-informed overview.

for home defense. It is extremely dangerous, increasing the likelihood of gun accidents, suicides, and homicides in the home. It is also not very effective in stopping a determined assault. A better weapon would reduce the costs of home protection and increase the benefits. Even a shotgun is currently probably a better option for most people than a handgun.

Feasible improvements in firearms include requiring serial numbers, which are difficult to obliterate (enabling law enforcement to solve more crimes), and childproof firearms (reducing gun accidents involving children). Here I discuss three important improvements that would reduce injuries and violence.

A. Magazine Safeties

Shooters and victims in accidental gun fatalities are often young. The median age of victims is 23. In other-inflicted shootings, the large majority of shooters are under age 23 (Hemenway, Barber, and Miller 2010; Hemenway and Solnick 2015). Perhaps the most common reason for unintentional firearm fatalities is that the shooter did not know the gun was loaded. Every day in the United States an adolescent boy finds his dad's semiautomatic pistol, takes out the magazine (which contains the bullets), and believing the gun is unloaded, pulls the trigger. Mostly nothing terrible happens, but sometimes he shoots and kills his best friend or his younger brother. We can blame the adolescent and we can blame his parents. Or we can solve the problem, at least in the long run. All that has to be done is to reengineer the firearm so it won't fire when the magazine is removed. Many pistols currently have this feature. They are called magazine disconnects.

Vernick et al. (1999) found that one-third of American adults either thought, or didn't know whether, a pistol could be shot with the magazine removed. A study in 2003 estimated that 24 percent of unintentional firearm fatalities could have been prevented by a loaded chamber indicator or a magazine safety (Vernick et al. 2003).

From Internet discussions it appears a principal argument by gun owners against magazine disconnects is, "What if you drop and lose the magazine during a fight?" This seems analogous to the old arguments against seat belts: "What if my car goes over the bridge and lands in the river?" There seems to be little understanding of relevant probabilities. The other main argument is that "This helps only careless people, and I am not careless."

PROPOSAL 1.—*Disconnects*: New pistols should have magazine disconnects to reduce unintentional shootings.

B. *Microstamping of Bullets*

Ballistic fingerprinting techniques are based on the proposition that all firearms have variations due to marks left by the machining process, leaving shallow impressions in the metal. In addition, normal wear and tear can cause each firearm to acquire distinct characteristics over time. With ballistic fingerprinting, investigators try to determine whether the bullet came from a single firearm and not from another firearm of the same make or model. This ability reduces the likelihood of punishing an innocent person and greatly enhances the likelihood of identifying and penalizing the perpetrator.

Firearm microstamping can be used to engrave the make, model, and serial number on the cartridge and on the face of the firing pin, which stamps the primer as the firing pin impacts. The mandated marking of bullets through microstamping would greatly enhance ballistic fingerprinting techniques. A California law enacted in 2007 led to the requirement in 2013 that new semiautomatic handguns sold in California must be equipped with microstamping. Like the automobile companies that fought for decades against installing air bags in cars, the firearm industry appears to be stonewalling (and has been challenging) this requirement instead of helping improve the technology.

PROPOSAL 2.—*Microstamping*: New pistols should be equipped with microstamping to aid police in identifying and convicting perpetrators.

C. *Personalized Guns*

Years ago, my car radio was stolen. The next car I bought had a sign on the driver-side window that said the radio would not work if it was removed from the car. Personalized guns (also known as smart guns) make it more difficult for unauthorized people to use them. Having such guns rather than the normal firearm reduces the likelihood of accidents, suicides, and thefts. Personalized guns for police would stop criminals from seizing and using officers' guns against them.

A study of unintentional firearm deaths concluded that 37 percent could have been prevented by personalized guns (Vernick et al. 2003). It has been estimated that some 500,000 firearms are stolen from private citizens each year (Cook, Molliconi, and Cole 1995). My latest estimate,

from more recent National Crime Victimization Survey data and a 2015 national survey of more than 4,000 adults, is that at least 300,000 guns are stolen per year, still an enormous number. Stolen guns would be generally inoperable by criminals if they were personalized.

Prototypes of many kinds of personalized guns exist, including semiconductor touch memory technology and radio frequency identification. An Armatix personalized handgun that uses radio frequency identification is being sold in Europe. The most likely impetuses for creation and mass consumption of personalized guns in the United States would be if they were developed with government funding and then mandated, or if manufacturers faced liability for unnecessary damage caused by non-personalized guns (Teret and Mernit 2013).

On the Internet, gun advocates offer many arguments against personalized guns, but the principal one is that they will hinder gun use when it is most needed. For example, fingerprint guns have been denigrated because of what could happen if the battery dies, or your wife needs to use the gun, or you are wearing gloves, or you need to use your opposite hand, or your hands are coated with blood. Yet while almost anything is possible, some dangers are far more likely than others. Almost nothing worthwhile would even happen if we were always stymied by remote but imaginable possibilities of harm.

PROPOSAL 3.—*Personalization*: New handguns should be personalized to help reduce gun theft (one of the ways guns get into the wrong hands), gun accidents, and gun suicides.

II. Changes in the Distribution System

Almost every gun in the United States was manufactured legally and initially sold at retail by a licensed firearm dealer to someone who passes a federal National Instant Criminal Background Check System (NICS) background check. For convicted criminals to gain access to firearms, the guns must somehow pass from people who legally own them to people not permitted to own them.

Of course, most gun deaths are caused by someone who has a legal right to own a firearm. While there does not seem to have been a single study directly on this subject, probably the large majority of gun suicides and accidents involve legally owned firearms. It also appears that a good number of gun homicides are committed by individuals who could pass an NICS background check. Cook, Ludwig, and Braga (2005) found

that the vast majority of homicide perpetrators in Chicago had long arrest records, but most did not have felony convictions. In other words, most killers, even in a place like Chicago, probably could have passed a federal Brady background check. Vittes, Vernick, and Webster (2013) found that 60 percent of inmates in state prisons for gun offenses could have passed an NICS check immediately before their most recent arrest. Yet most individuals in the Cook and Vittes studies were well known to the criminal justice system.

Guns get into the “wrong hands” in two ways. One is for legal owners to be violent toward others or themselves. The other occurs when guns move from legal ownership to the illegal market.

A. Stronger Background Checks

Federal law requires that anyone purchasing a firearm from a federally licensed firearm dealer pass a background check. The NICS is designed to prevent prohibited persons from obtaining a firearm. The 10 categories of prohibited persons include people convicted of a felony or a domestic violence misdemeanor, illegal aliens, people adjudicated to be mentally ill, dishonorably discharged military veterans, or unlawful users of any controlled substance. Most other advanced countries have stronger criteria. For example, to legally obtain a firearm in Canada, the individual needs a license, a criminal background check, proof of a legitimate purpose, a training certificate, and two personal references who will support the application. The spouse is notified, and there is a 28-day waiting period.

Vittes, Webster, and Vernick (2013) make a strong case that the prohibited list of acquirers and owners should be expanded to include alcohol abusers, people convicted of serious juvenile offenses, and youths under age 21. There is ample evidence that these groups are at high risk for violent and criminal behavior. There is no direct evidence that prohibiting these specific groups from gun ownership has an effect, but there is evidence that restricting access to guns by domestic violence abusers has reduced intimate-partner homicides (Vigdor and Mercy 2006).

With respect to a fourth category, people with violent misdemeanor convictions, there is strong evidence both that the group is at high risk for subsequent violent crime and that denial works. California added this group to its prohibited category in 1991. Because California collects individual-level data on firearm transactions, researchers could compare the subsequent criminal behaviors of individuals with violent misdemeanor convictions who were denied gun licenses under the new policy with indi-

viduals with violent misdemeanor convictions who had legally obtained firearms the year before. A 3-year follow-up found that those who had been able to purchase a firearm were significantly more likely to be arrested for a firearm-related or violent offense (Wintemute et al. 1998, 2001; Wintemute 2013a).

PROPOSAL 4.—*Ownership Prohibitions*: The criteria for prohibited ownership of firearms should be expanded to include alcohol abusers, individuals convicted of serious juvenile offenses, individuals convicted of violent misdemeanors, and youths under age 21.

B. *Police Discretion*

One way to ensure stronger background checks is to return discretion to issue concealed carry permits to police chiefs who traditionally had it. Currently most states prevent local police chiefs from denying a permit to anyone who passes an NICS background check, even if the chief knows they are a danger to the community.

Over the past three decades there has been a major shift in state concealed gun carrying laws, from “may-issue,” under which local police chiefs have wide discretion whether to issue a license to carry, to “shall-issue” (sometimes called “must-issue”) laws under which a permit must be issued if the applicant can satisfy statutory requirements (e.g., an NCIS background check).

This change has been subject to more evaluations than any other gun law, with diverse results (Hemenway and Vrinotis 2008; Ayres and Donohue 2009; Gius 2014). However, I believe we do not know nearly enough about the reality of these laws; all the studies have serious limitations. They typically examine aggregate crime categories (e.g., homicide, robbery) and compare measured crime levels with the authors’ estimate of what the levels would have been had the laws not changed. A problem is that no one, including criminologists and economists, is good at predicting crime levels. The models do not accurately estimate what would have happened without the change.

More importantly, none of the evaluations examine individuals who received licenses under the new shall-issue laws who would not have received them under the old may-issue laws. We know that people who receive gun carrying permits come disproportionately from groups with low rates of street crime perpetration and victimization (e.g., older, rural or suburban, white, middle-to-higher-income adults). Most would probably have been able to obtain permits under either regulatory regime.

No evaluation has determined the number of new permits granted, the change in the number of people who carry concealed guns, or even whether the main groups obtaining permits after the law changed are more or less likely to commit gun crimes or be victims of violent crime. Few studies disaggregate outcome measures by whether crimes occurred inside or outside the home (carry permits are largely irrelevant for crimes inside the home), and none disaggregate whether victims or perpetrators had concealed carry permits or whether victims were carrying guns at the time of the crime.

When a state changes from may-issue to shall-issue, the principal effect is that particular individuals to whom a police chief would not have wanted to give a license—even though they met the statutory requirements—must be granted one. In a recent survey of local police chiefs of the 351 towns in Massachusetts, one of a few remaining may-issue states, we asked how often they used their discretion to deny a carry permit to someone who could pass the federal background check. We requested examples of such individuals (Hemenway and Hicks 2015).

The median annual number of denied applicants was two, and the common example was of someone well known to the police from multiple 911 calls to a residence involving violence. Passing a federal background check will not always be enough to ensure that an individual does not pose a threat of violence to others or to himself or herself. Local police chiefs typically know more about people in their community than does a national computer. I would like to see a return to may-issue laws.

PROPOSAL 5.—*Police Discretion over Permits:* Local police should have discretion over the issuance of concealed carry permits.

C. Universal Background Checks

Our 2015 national survey of gun owners found that 40 percent of all gun transfers occur without a formal background check. That is comparable to the figure obtained in an older study (Cook and Ludwig 1997). Extending criminal background checks to all transactions should help reduce the transfer of firearms to clearly illegal individuals. Ten states containing about one-third of the US population, including California, New York, and Pennsylvania, already require background checks at the point of firearm transfer; universal background checks are clearly feasible. It makes sense for some transfers to be exempt. California exempts transfers between spouses and vertical immediate family members (e.g.,

from a grandparent) and temporary transfers such as infrequent and short-term loans between friends (Wintemute 2013*b*).

While it is always illegal for a prohibited person to obtain a firearm, it is illegal to transfer a firearm to a prohibited person only if the seller knows or has reasonable cause to believe the purchaser is prohibited. Most private sellers appear to do little to determine whether the purchaser is a prohibited person. Many private sellers seem willing to sell even if they should have reasonable cause to believe they are selling to a criminal. Private investigators performed “integrity tests” on 30 private sellers at gun shows in Nevada, Tennessee, and Ohio. Even though the purchasers stated that “he probably could not pass a background check,” 63 percent of sellers completed the sales (City of New York 2009).

Recall that 60 percent of inmates in state prisons for gun offenses could have passed an NICS check the moment before their most recent arrest. Yet 80 percent obtained their firearms from private parties (Vittes, Vernick, and Webster 2013). Universal background checks should thus reduce the likelihood not only of prohibited persons but also of other high-risk people obtaining firearms. In addition, universal background checks make it more likely that law enforcement will be able to identify the most recent purchase of a firearm rather than just the first purchase.

States with weaker gun regulations are net exporters of crime guns (Webster, Vernick, and Bulzacchelli 2009). Criminal possession of guns is higher in states near to other states with weak laws (Knight 2013). Regulation of private sales is significantly associated with lower net exports (Webster et al. 2013).

PROPOSAL 6.—*Universal Background Checks:* There should be background checks for almost all nonfamily gun transfers.

D. Best Procedures for Gun Shops

Just as alcohol outlets can use more or less effective methods to prevent underage purchases, so can gun shops be more or less vigilant in ensuring that guns do not end up immediately in the wrong hands. Improvements in gun dealers’ practices could substantially reduce the number of guns getting into the wrong hands. There are many dealers, and many are willing to sell to clearly inappropriate buyers. In one telephone study of gun shops, over half indicated that they would make an illegal straw sale (Sorenson and Vittes 2003). A study of California dealers found that 20 percent would engage in a straw sale (Wintemute 2010).

Undercover stings have resulted in changes in dealer practices that have been shown to reduce the flow of guns to criminals. After federal Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF) tracing data showed that a small number of gun dealers had long histories of selling many guns that were later recovered by police, the cities of Chicago and Detroit initiated a series of sting operations. Undercover police posing as gang members made videos of themselves blatantly making straw purchases from these dealers. Guns recovered by police within a year of retail sale by an in-state gun dealer dropped 62 percent in Chicago and 36 percent in Detroit, following lawsuits against these dealers, with no significant changes in control cities (Webster, Vernick, and Bulzacchelli 2006).

In 2006, the City of New York hired private investigators to stage and secretly videotape undercover stings of 55 gun dealers in seven states known to be suppliers of guns used in New York City crime. Twenty-seven dealers were caught facilitating illegal straw purchases, and nearly all came to an agreement with the city to change their business practices. Following those changes, guns recovered in NYC crime from these dealers fell by over 80 percent (Webster and Vernick 2013).

Voluntary changes in dealer practices can also be effective. In Milwaukee, after negative publicity that a single dealer was linked to the majority of crime guns recovered by police, the dealer voluntarily changed its sales practices. There was a 76 percent reduction in the flow of new guns to Milwaukee criminals from that gun shop and a 44 percent reduction in new crime guns citywide (Webster, Vernick, and Bulzacchelli 2006). Walmart, the largest seller of firearms in the United States, has adopted a 10-point voluntary code for responsible sales practices to prevent the guns it sells from getting into the wrong hands. The code includes videotaping the point of sale of all firearm transactions, employee background checks, responsibility training, and a policy of no sales without background check results.

Many changes to current laws could improve dealer behavior. These include allowing more than one routine inspection per year by the ATF, allowing the ATF to impose a wider range of administrative sanctions for illegal dealer behavior, removing the special protection given to the gun industry from liability for gun use, providing researchers easy access to trace data, and having state-level dealer licenses (Vernick and Webster 2013). The need for a stronger and more effective ATF cannot be overemphasized (Braga and Gagliardi 2013).

PROPOSAL 7.—*Straw Purchasers*: Gun shops should use the best procedures to prevent sales to straw purchasers.

III. Responsibilities of Gun Owners

A responsible gun owner will ensure that his guns do not fall into the wrong hands. Unfortunately, too many gun owners in the United States do not take that responsibility seriously enough. Responsible gun ownership could be encouraged in a variety of ways, including enactment of strict liability laws (e.g., child access protection laws) that make owners legally responsible for misuse of their firearms. It is also possible to make sure that guns get into the hands only of individuals likely to behave responsibly (e.g., through stronger background checks and licensing).

A. Licensing

While nearly every other advanced country has a national licensing requirement for handgun ownership, there are no federal licensure requirements in the United States for handguns or long guns. There is, however, a strong federal licensing requirement for machine guns; crimes with machine guns have been nearly nonexistent for more than a half century. Nine states currently have some form of licensing for handgun purchasers (Law Center to Prevent Gun Violence, <http://smartgunlaws.org/universal-gun-background-checks-policy-summary/#state>).

Many studies have found that strong gun laws are associated with lower rates of gun violence and suicide (Sommers 1980; Kwon and Baack 2005; Gius 2011; Fleegler et al. 2013). Studies that examine the effects of many gun-related laws find that licensing laws can have a statistically significant association with lower levels of violence (Kleck and Patterson 1993; Kalesan et al. 2016).

There is probably stronger evidence of beneficial effects of gun licensing than of any other type of gun control law. However, the evidence is far from overwhelming. A cross-sectional study using tracing data found that state licensing of handgun purchases (“permit-to-purchase licensing”) was associated with lower levels of diversion to criminals of guns sold by in-state dealers. Diversion was measured by the number of guns recovered by police within 1 year of retail sale (unless the criminal possessor was the legal retail purchaser; Webster, Vernick, and Bulzacchelli 2009). Licensing was also associated with lower levels of crime gun exports to other states (Webster et al. 2013).

A before-after analysis of the repeal of the permit-to-purchase licensure law in Missouri found that it was associated with a large and immediate increase in the percentage of Missouri crime guns with short time intervals between retail sale and recovery by police. It was also associated with a substantial increase in the share of Missouri crime guns originating in Missouri (Webster et al. 2013).

PROPOSAL 8.—*Universal Licensing*: All handgun owners should be licensed.

B. *Storage/Theft*

Theft is a common way for guns to fall into the wrong hands. Like money and jewelry, guns are attractive loot for burglars (Wright and Decker 1994). Many of the hundreds of thousands of guns stolen each year are undoubtedly used in criminal activities.

Lax storage makes it easier for guns to be stolen. There have been numerous studies of gun storage practices; a sizable minority of owners do not store their guns locked, and many guns that are locked are not kept in a secure safe (Johnson, Coyne-Beasley, and Runyan 2004).

Lax gun storage is associated with higher rates of gun accidents and gun suicides (Brent et al. 1993; Conwell et al. 2002; Grossman et al. 2005; Miller et al. 2005). No study has examined the relationship between gun storage and gun theft.

While many first-world countries require safe storage of firearms, Massachusetts is the only American state that requires that handguns be locked up. The Massachusetts law is not enforced. Unfortunately, only a few studies evaluate efforts to improve safe storage, and these focus on medical advice and community-based campaigns (Albright and Burge 2003; Horn et al. 2003; Barkin et al. 2008). Nonetheless, reducing gun theft is crucial to preventing guns from being obtained by unauthorized individuals and has to be part of any comprehensive policy on firearms. Changes in laws, inducements, and social norms are probably all necessary.

PROPOSAL 9.—*Storage*: Gun owners should store their guns safely.

IV. Social Norms

Public health emphasizes the importance of social norms for affecting behavior; successes are often best achieved when norms are changed. For example, some of the success in reducing motor vehicle fatalities has

been due to changes in norms about drinking-and-driving. Decades ago, drinking-and-driving was socially acceptable; after all, if you went to a cocktail party, how were you going to get home? Today, drinking-and-driving has much more of a social stigma, and alcohol-related fatalities have fallen substantially. Changes in the acceptability of spitting in public and picking up your dog's poop are also twentieth-century public health success stories. In these examples, laws mattered, but changes in public attitudes were equally if not more important.

A. Guns

Changes in social norms about dueling go further back in time but are more directly related to gun violence (Holland 2003). Dueling was typically illegal but often tolerated and implicitly encouraged. When an upper-class male was treated disrespectfully by another upper-class male, the socially acceptable response was often to challenge the offender to a duel. Many famous Americans were killed in duels (e.g., Alexander Hamilton, Stephen Decatur) or shot others while dueling (e.g., Andrew Jackson, Aaron Burr, Thomas Hart Benton, Sam Houston, Wild Bill Hickok, Doc Holliday). Changes in social norms effectively ended dueling. A similar subcultural social norm that needs changing justifies young inner-city minority males' use of gun violence as a response to being dissed.

An illustrative attempt to change social norms with respect to firearms, the ASK (Asking Saves Kids) campaign, encourages parents to ask whether there is an unlocked gun at another home where their child is going to play. The goal is to reduce accidental gun shootings involving children. An evaluation found that a large majority of parents thought that asking is a good idea and that few would feel uncomfortable being asked (Johnson et al. 2012). The campaign itself may have led to modest changes in attitudes about the danger in having one's child visit a home with unlocked firearms.

A small nonprofit group in Boston, Citizens for Safety (disclosure: I am a member of its board), has undertaken two campaigns relating to attitudes and actions concerning gun trafficking. Whenever there is a traffic fatality, media reports usually indicate whether alcohol was involved and whether the occupants were wearing seat belts. Such was not the case 40 years ago. The information reinforces the notion that not wearing your seat belt and driving under the influence are socially unacceptable. Whenever there is a street shooting, Citizens for Safety has been successfully encouraging all sectors of the city of Boston, including the mayor,

police, and reporters, immediately to ask “Where did the gun come from?” rather than who shot whom. Most guns used in Boston were brought from outside the state by adults who sold them for profit.

A second campaign, Operation LIPSTICK (Ladies Involved in Putting a Stop to Inner-City Killing), emphasizes the roles that women can play in reducing inner-city gun violence. The overwhelming majority of gun purchasers are male, and most straw purchasers are male. However, when a woman buys a gun, she is disproportionately likely to be buying it illegally for a prohibited purchaser (Brandl and Stroshine 2011; Wintemute 2013c). There are no studies on the effect of this new initiative, but Suffolk County District Attorney Dan Conley claimed that LIPSTICK works: firearms cases involving women dropped by one-third in 2013, the first full year of his partnership with Operation LIPSTICK. The program conveys the message that buying or holding a gun for a man puts community lives at risk and carries serious criminal penalties.

B. Suicide

We can say with certainty that a gun in the home increases the likelihood of completed suicide. At the individual level, there have been a dozen case-control studies in the United States; all show that a gun in the home is a risk factor for suicide (Anglemyer, Horvath, and Rutherford 2014). At the areawide level, there have been nearly a dozen ecological studies of regions, states, and cities in the United States. When they use accurate proxies for gun ownership, they find that areas with more guns have more suicides overall because they have more gun suicides (Hemenway 2014).

Guns are lethal. The case-fatality rate for gun suicides is close to 90 percent. By contrast, the case-fatality rate for attempts with poison and cutting, the most common methods, is under 3 percent (Miller, Azrael, and Hemenway 2004). Many suicides are impulsive and the urge is fleeting (Rimkeviciene, O’Gorman, and DeLeo 2015). Over 90 percent of serious suicide attempters who do not die that time do not kill themselves later (Owens, Horrocks, and House 2002).

It is therefore not surprising that suicide experts overwhelmingly agree that gun accessibility is a risk factor for suicide. For example, the 2012 National Strategy for Suicide Prevention from the National Action Alliance for Suicide Prevention and the US Surgeon General concluded that “firearm access is a risk factor for suicide in the United States.” My monthly surveys of gun researchers found that 84 percent agree that a gun in the home increases the risk for suicide; only 8 percent disagree (Hemenway

2015; see also <http://cdn1.sph.harvard.edu/wp-content/uploads/sites/1264/2014/05/Expert-Survey-1-Results.pdf>).

Correctional officials understand the impulsive and fleeting nature of many suicide attempts, which is why they often order suicide watches on certain prisoners until the danger passes. Similarly, the Means Matter campaign (Harvard Injury Control Research Center) is an effort to get guns out of the hands of potential suicides. We have successful working relationships to try to reduce suicide not only with physician groups but also with gun advocates, gun trainers, and gun shop owners.

We are successfully encouraging gun shops to adopt policies and procedures that will help them avoid selling firearms to clearly suicidal people (Vriniotis et al. 2015). We are working with firearms trainers to add suicide modules to their basic training course. We helped to ensure that Massachusetts, when it modified its gun laws in 2014, became the first state to pass a gun law focused in part on suicide prevention. One requirement is that the firearms training course required to obtain a gun license include a module on suicide.

Another attempt to change social norms about guns and suicide involves gun owners voluntarily relinquishing firearms during a period of crisis. Similarly to “friends don’t let friends drive drunk,” one goal is to create a norm that friends should temporarily “babysit” the guns of friends going through rough patches (his wife is leaving, he’s drinking and talking crazy) until the danger passes (he gets a new girlfriend). Dubbed the “eleventh commandment of firearm safety,” the goal is to create a social norm that at certain times individuals should temporarily relinquish ready access to a firearm.

The work with gun shops has been rolled out in over 20 states. The Means Matter campaign received a 2015 Lifesaver Leadership Award from the American Foundation for Suicide Prevention “for promoting activities that reduce a suicidal person’s access to lethal means of suicide.”

PROPOSAL 10.—*Suicide Prevention*: Keep guns away from individuals going through a difficult period to prevent suicide.

C. Selling to a Stranger without a Background Check

It should not be acceptable behavior to sell a gun without a background check to someone not well known to you. An important step is to require universal background checks, but equally important is to change norms. Drunk driving and dueling were illegal, but much of the success

in reducing these problems resulted from changes in norms. It should be seen as equally immoral to sell a gun to someone who might use it criminally. In old western movies, the most evil of villains sold guns to Indians who might use them against settlers. We need to make the contemporary selling of guns to strangers without a background check equally culpable.

PROPOSAL 11.—*Sales to Strangers*: Never sell a gun to a stranger without a background check.

V. An Administrative Agency for Violence Prevention

If I were required to propose one policy development I would most like to see implemented to reduce firearm fatalities, it would be creation of a National Firearm Safety Administration. A more broadly focused agency, a National Violence Prevention Administration, would also focus on other violence including bullying, child abuse, intimate-partner violence, stalking, elder abuse, and suicide.

The establishment 50 years ago of what is now the National Highway Traffic Safety Administration (NHTSA) was a milestone in the history of motor vehicle safety. NHTSA created data systems on motor vehicle crashes and deaths and provided funding for data analysis that enabled us to learn what policies reduce traffic injuries and what policies do not. NHTSA mandated many safety standards for cars, including those leading to collapsible steering columns, seat belts, and air bags. It became an advocate for improving roads and helped change the prevailing highway design prevention paradigm from the “nut behind the wheel” to the “forgiving roadside.”

An equivalent national agency could help reduce public health problems relating to firearms. It could establish and maintain comprehensive and detailed national data systems for firearms injuries and deaths and provide funding for research. The National Violent Death Reporting System (NVDRS) would be one of those data systems. Currently NVDRS provides data for only 32 states and has no money for research. The national agency would ensure that questions about firearms are included in the Behavioral Risk Factor Surveillance System, the Youth Risk Behavioral System, and other public health data systems.

The agency could require safety and crime-fighting features in all firearms manufactured or sold in the United States. It could ban products

from regular civilian use that are not needed for hunting or protection and that only endanger the public. It would have power to ensure that all firearm transfers are preceded by background checks.

The agency should have the resources and the power to make reasonable decisions about firearms' use and safety. Equivalent powers to determine side-impact performance standards for automobiles and to ban three-wheeled all-terrain vehicles (while allowing safer four-wheeled vehicles) reside with a regulatory agency. Rules and standards for manufacture and sale of firearms would be developed through scientific administrative processes rather than through blatantly political legislative processes. This might help take some of the politics out of firearm safety.

PROPOSAL 12.—*Gun Safety Agency*: Create an administrative agency whose mission is to reduce gun injury similar to the National Highway Traffic Safety Administration, whose mission is to reduce deaths, injuries, and economic losses resulting from motor vehicle crashes.

VI. Conclusion

The 12 changes I propose could substantially reduce public health and public safety problems caused by firearms. Many other policy changes, from improving firearm safety training to banning high-capacity magazines, could also help reduce firearms injuries and deaths. The two most important foundational improvements would be expansion and improvement of firearm data systems (expanding the National Violent Death Reporting System to 50 states and including firearms questions on the Behavioral Risk Factor Surveillance System, the National Crime Victimization Surveys, and other data systems) and provision of easy access for researchers to existing data systems (e.g., tracing data from the ATF; state data on concealed carry permits).

Two factors may limit the effectiveness or likelihood of enactment of the policies proposed. The first is the large stock of existing firearms. There are estimated to be some 300 million guns in the United States in 2015, a number consistent with earlier estimates (Hepburn et al. 2007) and that of the Geneva-based Smalls Arms Survey (2007). Guns are highly durable. It may take decades for improvements in new guns to have a noticeable effect. By comparison, only a decade had to pass before most automobile safety improvements, such as air bags, became pervasive. A large gun stock also makes it more difficult to keep guns out of the wrong hands.

Fortunately, criminals typically prefer new guns, which are less likely to be linked with previous crimes.

The second is the power of the National Rifle Association and the gun lobby generally. Public opinion surveys typically find that both gun owners and non-gun owners support policies such as those I recommend; the gun lobby strongly and usually effectively opposes them. However, strong opposition has been common in virtually all public health success stories (Hemenway 2009). There is a remarkable history of (slowly) overcoming such opposition. A few dozen years ago the tobacco lobby was considered the strongest in Washington, yet the reduction in tobacco consumption has been a major US public health success story. The successes of public health campaigns targeting other harms justify optimism that as a society we will effectively tackle the serious health and safety problems associated with firearms. Evidence from every other advanced nation shows that we can do much better.

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